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To my parents and my teacher
Prof. Sabihuddin Butt

Muhammad Shahbaz

To Hadi, Emaan and Shumaila

Muhammad Shujaat Mubarik

To Moosa, Abeeha, Ayesha and my mother
Farhat Sultana and Father Rana
Khalil-ur-Rehman

Tarique Mahmood

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Ambidextrous Intellectual Capital (AIC): A Measuring Framework

Tarique Mahmood, Muhammad Shujaat Mubarik, Tahir Islam, and Navaz Naghavi

Abstract The study focuses on the fusion of organizational ambidexterity and intellectual capital and proposes a construct to measure the ambidextrous intellectual capital (AIC). We argue that ambidextrous learning is derived from intellectual capital architectures that underlies unique configurations of human, relational, and structural capital. A threefold approach was adopted to develop the scale of AIC. Initially, a total of 501 sub-dimensions of IC were identified through a survey of the literature. In the second stage, the preliminary survey was conducted from 90 selected experts, aiming to select the most relevant dimensions and sub-dimensions of AIC. Among the 501 identified dimensions of intellectual capital, 12 dimensions of HC, 10 dimensions for RC, and 10 dimensions for SC were selected using the mean value criteria. In the last stage, statements were generated keeping in view both dimensions of ambidexterity i.e. *exploitation and exploration*. The developed constructs to gauge AIC—*Intellectual Capital with Organizational Ambidexterity*—was reviewed by the experts to ascertain whether the generated statements truly captured the main idea or not. After incorporating experts' feedback, the exploratory factor analysis (EFA) was conducted by collecting the data from 548 respondents. The results accrued the AIC questionnaire with a total of 91 items. The developed questionnaire can be used to measure the AIC of an organization.

Keywords Organizational ambidexterity · Intellectual capital · Ambidextrous intellectual capital · Exploratory factor analysis

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1 Introduction

Rapidly changing business dynamics, along with the global disruptions, are compelling organizations to be ambidextrous—*an organization's ability to balance between its exploitation and exploration activities* (Jansen et al., 2012). Researchers (e.g., Asiaei et al., 2018; Harris, 2000; Mubarik et al., 2019a, 2019b, 2019c) consider intellectual capital (IC) as the critical capability to acquire organizational ambidexterity (Stewart, 1997; Pasamar et al., 2015). Transforming IC into ambidextrous IC can help firms to effectively balance exploration and exploitation activities (Mahmood & Mubarik, 2020). It implies that once the organization has ambidextrous intellectual capital (AIC)—*the capability of intellectual capital to explore and exploit simultaneously*—it can attain organizational ambidexterity (Asiaei et al., 2018). Combining IC with ambidexterity (A) to form AIC and offering a framework to gauge the AIC has not yet captivated the researchers' due attention as most researchers consider ambidexterity as a strategy rather than a capability (Pasamar et al., 2015). Although the term AIC has appeared in extant literature several times, its comprehensive definition is missing from the literature. Likewise, the operationalization of AIC is also absent from the literature. Whereas, to understand the role of AIC in uplifting organizational ambidexterity and firm performance as a whole, it is imperative to define and operationalize it properly. The present study undertakes this task by adopting a threefold approach. In the first stage, relevant literature has been reviewed to identify the dimensions and sub-dimensions of AIC. In the second stage, with the help of experts' survey, the important sub-dimensions of AIC have been selected. In the third, stage by employing exploratory factor analysis (EFA), the construct of AIC has been developed. In doing so, this becomes the pioneering study that operationalizes and presents a construct to gauge the AIC. The new measure of AIC may not only be helpful to examine the effect of AIC on firm performance empirically, but it can also be instrumental in measuring the level of AIC in a firm.

2 Literature Review

2.1 Intellectual Capital: Definitions and Dimensions

The earlier definition of the IC can be traced back to John Kenneth Galbraith. He first coined the term "intellectual capital" in 1969 (Itami & Roehl, 1991) by defining it as the knowledge that can be transformed into organizational performance (Andriessen & Boom, 2007; Harris, 2000; Stewart, 1997). However, the popularity of the IC started with Stewart's (1997) seminal work, published in Fortune magazine. He attempted to introduce IC as the knowledge, ability, and skills of employees to strengthen an organization's competitiveness. Various scholars from distinctive backgrounds sought to explain IC's particular concepts in their own ideas and concepts (Barathi Kamath, 2007). Earlier research argued that an organization's intellect,

knowledge, and ability could play an instrumental role in improving a firm's performance. The concept of IC was quite similar to that of human capital. However, a later stream of researchers (e.g. Bontis, 1998; Edvinsson, 1997; Youndt et al., 1996) view IC from a broader perspective. They considered IC as an organization's intangible resource that comprises of an organization's relationship, business processes, routines, and employees' knowledge and ability. For Harris (2000), organizational processes, copyrights, future interests, patents, franchises, brand names, operating rights, trademarks, and secret processes are all considered IC facets. According to Harris (2000) and Itami and Roehl (1991), IC encapsulates intangible assets of an organization, which involve a broader range of activities, including the image of a brand, consumer trust, management skills, and corporate culture. Bontis et al. (1999) links IC with an organization's human resources that creates value for the organization. Whereas Youndt et al. (2004) define IC as the sum of all the knowledge organizations used for gaining competitive advantage. Majority of the studies (e.g. Bontis, 1998; Khalique et al., 2015; Mubarik et al., 2016a, 2016b) identified three main components of IC: human capital, structural capital, and relational capital. Human capital is defined as the knowledge, skills, and capabilities or abilities exploited by individual employees (Prajogo & Oke, 2016). Structural capital is the institutional knowledge used through patents, databases, structures, processes, and systems (Andrews, 2010). Finally, relational capital is defined as the knowledge rooted in the interrelationships' networks and their interactions among individuals (Al-Hawajreh, 2013; Mubarik et al., 2016a, 2016b). All these three elements form IC. The following section has been dedicated to explaining the dimensions and sub-dimensions of IC.

2.1.1 Human Capital

The literature on IC explains human capital to be the basis of competitive advantage (Mubarik et al., 2019a, 2019b, 2019c). Employees' skills, knowledge, experience, and abilities are considered essential strands of human capital (Becker, 1962). The earlier concept of human capital introduced by Becker, (1962) was more focused on the macro level. The notion of human capital can be traced back to the early 50s (Mubarik et al., 2018) to the human capital theory. Becker (1962) defines human capital as the knowledge, skills, and abilities of a person, which can help improve his/her job-related performance (Ployhart & Moliterno, 2011). Studies (e.g. Black & Lynch, 1996; Edvinsson & Sullivan, 1996; Gimeno et al., 1997; Hershberg, 1996; Lepak & Snell, 1999) consider qualities such as attitude, creative thinking, and problem-solving skills as essential constituents of HC. Likewise, the organization's human capital is also defined as employees' combined competencies to resolve customers, suppliers, and organizational problems. The organization-wide human capital is the knowledge and institutional memory about prioritizing the importance of organizational issues (Alvesson, 2001). This resource comprises the individual skills, collective experience, general know-how, and management expertise of all the employees in the organization (Edvinsson, 1997). Thus, this capital can be defined as the worker's knowledge and skills through experience and education (Sullivan &

Sullivan, 2000). Drawing upon human capital theory, human capital is the employees' knowledge, skills, and abilities, which can be instrumental in increasing organizational performance (Lepak & Snell, 2002). Human capital is one of the essential and key features of IC in which knowledge, skills and abilities, experience, and competencies are embodied within the individual for value creation. Through the employees' competencies in their job experience, this human capital, i.e., know-how, can know why and where to use knowledge skills to create value.

2.1.2 Structural Capital

Structural capital (SC) encompasses the organizational processes, routines, structure, software, databases, treatments, manuals that remain with the organization even when employees go back home. Structural capital deals with the database, research, development, trademarks, information system, leadership, innovation, and patents that help and support employees to optimize employee performance (Nezam et al., 2013). SC is well-defined as the organization's structures and processes that employees follow to execute business transactions. It represents an accumulation of an organization's knowledge, including strategies, leadership standard operating procedures, organizational culture, business processes, management style, and supportive infrastructure (Nezam et al., 2013). The construct of structural capital deals with the organization's structures and mechanisms to help employees achieve optimal overall organizational and business performance (Rahim et al., 2011). An individual can possess a higher level of intellect. However, when the organization has inadequate procedures and systems, IC fails to reach its full potential (Sullivan & Sullivan, 2000). An organization with a robust structural capital would support an organizational culture that enables individuals to explore new things, learn, fail, and try again. If the culture endorses failure, the organization's success will be at a minimum (Moon et al., 2012). Structuring intellectual resources with information systems can lead individuals to become familiar with a group property (Al-Hawajreh, 2013; Nezam et al., 2013; Rahim et al., 2011). The fundamental capital concept permits IC to be developed and measured in organizational performance. The construct of structural capital encompasses procedural innovations, transaction times, efficiency, and access to information to codify knowledge (Zangoueinezhad & Moshabaki, 2009). From the perspective of the organization, structural capital incorporates all non-human knowledge resources. It represents an organization's processes and structures through which an organization performs its business transactions (Nezam et al., 2013). These structures range from the tangible to intangible items that an organization offers, such as copyrights, patents, software systems, databases, processes and trademarks, accountability, organizational culture, trust among employees, and efficiency (Nezam et al., 2013; Rahim et al., 2011). Asiaei et al. (2018) stated that organizational capital involves internal capital, which encompasses management philosophy, intellectual property, management processes, financial relations, information and networking systems, and corporate culture. Structural capital deals with procedures, policies, culture, norms, and organization

values. It is considered the supporting infrastructure of human capital. Through organization structure, human capital mainly includes innovation, processes, systems, culture, and everything that is left within the organization when employees go home from a structural capital. Structural capital usually encompasses the procedures and processes, employee's intellect, and input form (Rahim et al., 2011). Structural capital has been conceptualized by Moon et al. (2012) in terms of system organizational processes, information, intellectual property, and organizational culture.

2.1.3 Relational Capital

It encompasses an organization's relationship with its suppliers, customers, employees, and other stakeholders (Mom et al., 2015). Relational capital caters the trust, collaboration, and relationships among strategic partners. Studies (e.g. Mubarik et al., 2018; Nahapiet & Ghoshal, 1998) define it as the interactions, connection stocks, closeness, linkages, loyalty, and goodwill organization and strategic partners. It is also considered as the external capital, which comprises customers, brands, company name, business collaboration, distribution channels, licensing agreements, and customer satisfaction (Guthrie & Petty, 2000).

The majority of the literature (e.g. 'Bontis and Fitz-Enz 2002; Denison et al., 1995; Ghemawat and Ricart Costa 1993; Keller and Weibler 2014; Khasmafkan Nezam et al. 2014; Kostopoulos et al. 2015; Lopes-Costa and Munoz-Canavate 2015) demonstrates the equal importance of suppliers, customers, and employees in RC. However, some of the studies give importance to its one dimension over others. For example, Cegarra-Navarro and Dewhurst, (2007) consider customer relationship—*customers capital*—as major constituents of relational capital (Cegarra-Navarro & Dewhurst, 2007). According to Kang et al. (2007), the image of customer capital is mentioned as market orientation leveraged by customers. The core of customer capital is customer knowledge in the organization's external relationships (Mubarik et al., 2016a, 2016b). Although most of the studies consider relational capital as the relationships, interaction on collaborations with supplier, customer, and employees, some scholars have extended it beyond these three strands. For example, Moon et al. (2012) added relationship with the community as part of a firms RC, defining it as the cooperation, relationships, trust, and mutual actions among stakeholders (Kogut & Zander, 1996; Mom et al., 2015; Nahapiet & Ghoshal, 1998). In this study, we have taken relational capital as the relationship of a firm with its suppliers, customers, employees and other important stakeholders.

2.2 Organizational Ambidexterity

The orgin of term organizational ambidexterity is linked to Duncan (1976). It was later on expanded by March (1991), who suggested that exploitation and exploration were two learning activities that organizations carry out. The exploration entails variation,

experimentation, search, and discovery, whereas exploitation is linked with efficiency, selection, refinement, and implementation activities. Therefore, exploration and exploitation require essentially different strategies, organizational structures, and contexts. Various scholars agree that an organization faces a tradeoff between properly exploiting existing competencies and exploring new opportunities by aligning its functions (Alänge & Steiber, 2018; Baškarada et al., 2016; Junni et al., 2013; Mubarik et al., 2019a, 2019b, 2019c). Previous studies have stated that ambidextrous organizations tend to perform better and thrive in the business compared to non-ambidextrous counterparts (Benner & Tushman, 2003; Tushman & O'Reilly, 1996). According to Tushman and O'Reilly (1996), ambidextrous organizations can both compete in the competitive market (where efficiency, cost, and dynamic innovation are critical) and develop new products and services for new emerging markets (where speed, flexibility, and experimentation are crucial). They claimed that ambidextrous organizations could operate to explore and exploit simultaneously. The concept of ambidexterity has been further embedded in the dynamic capabilities by Eisenhardt and Martin (2000). They suggested that dynamic capabilities require two different types of logic, namely, exploration logic and exploitation logic. The level of ability to achieve ambidexterity lies at the heart of an organization's dynamic capabilities. This ability mainly lies in the performance of organizations to achieve ambidexterity through dynamic capabilities (Eisenhardt & Martin, 2000).

Organizations that focus solely on exploration can fail to collect the return on their investment (Siggelkow & Levinthal, 2003). Organizations, as a result of exploration, may fail to adapt to changes and prevent themselves from benefiting from economies of scale March (1991). Focusing solely on exploitation also has drastic effects. By exploitation, firms can suffer from obsolescence (Siggelkow & Levinthal, 2003). It implies that exploration and exploitation are two different activities where organizations place their attention and resources. Through exploitation, organizations invest themselves in implementation, improvement, production, efficiency, and refinement, while exploration leads to adaptive mechanisms that ensure variation, experimentation, innovation, and search. Previous studies have focused on the concept that the exploratory approach is designed to meet emerging customers or markets (Danneels, 2002). The exploitative approach focuses on new designs, new procedures, and systems, thus creating customers' new channels through further channel distribution. As a result, major organizational business units are held responsible for aligning with the existing products and market.

Meanwhile, the research and development department and business development groups are responsible for seeking new markets, establish new technologies, and keeping track of growing industry trends (Mahmood & Mubarik, 2020). Earlier research has affirmed that organizations that simultaneously practice active exploration and efficient exploitation can find difficulty in the attainment of goals (e.g., Baškarada et al., 2016; Jansen et al., 2012). Solely focusing on one facet e.g. exploitation may lead organizations to improve their short-term performance; thus, organizations would be trapped into competency while failing to respond to environmental changes (Ahuja & Morris Lampert, 2001).

It is important to note that ambidexterity is a competency rather than a performance outcome, and actual performance occurs long after competency is developed. Three concepts are related to ambidexterity: decision risk capability at the strategic level, structural differentiation at the implementation level, and structural differentiation between exploitative and exploratory activities aiding ambidexterity competency. In a nutshell, organizational ambidexterity is the capability of an organization to strike a balance between its exploration and exploitation activities.

2.3 Ambidextrous Organizations

Ambidextrous organizations have become very important in today's environment, where for the survival of organizations, innovation and agility are taken as the hallmarks for organizations' stability and competitive advantage. Organizations must develop continuous learning to establish dynamic competencies and strategic renewal. According to researchers, the ambidexterity of an organization or acquiring new knowledge skills helps organizations. First, it increases the range of organizational strategic choices (Hedlund, 2007). Second, it allows organizations to form and continuously modify distinctive capabilities. (Teece et al., 2016). Third, it helps organizations by preventing their main abilities from becoming major inflexibilities (Leonard-Barton, 1992). For Levinthal and March (1993), most of the research on organization emphasizes two alternative methods for the learning of an organization: exploration and exploitation. The exploration method encompasses learning pursuance besides the organization's present knowledge domains, whereas exploitation involves enhancing existing knowledge stocks of a firm (Levinthal & March, 1993). Researchers have proposed that with the help of exploration, organizations can search for new opportunities for the labor market and adapt to the changing environment (Benner & Tushman, 2003; Danneels, 2002; Levinthal & March, 1993; Smith & Tushman, 2005). According to March (1991), creating a balance between exploration and exploitation is a basic factor for the organization system's overall prosperity and survival. The research entails that organizations that pursue both exploration and exploitation are more innovative, profitable in terms of production design, and successful than their competitors that work on either exploration or exploitation (Bierly & Chakrabarti, 1996; Danneels, 2002; Gibson & Birkinshaw, 2004; He & Wong, 2004; Katila & Ahuja, 2002; Tushman & O'Reilly, 1996). Exploitation and exploration have both been seen as essential and considered complementary to each other. According to researchers, following both methods simultaneously is not easy (Levinthal & March, 1993). Ambidexterity formally involves distinctive structures, processes, cognitive orientations, and affiliations (McGrath, 2001). In reality, an organization's exploitation and exploration compete for scarce resources (March, 1991). Existing research suggests that exploration and exploitation can be balanced in three possible ways (Burgelman, 2002; Gibson & Birkinshaw, 2004; Gupta et al., 2006; Jansen et al., 2008). Ambidextrous organizations in today's dynamic environment are successful and efficiently aligned with current growing business demands and,

at the same time, are adaptive to changing the organizational environment (Duncan, 1976; Gibson & Birkinshaw, 2004). Despite all these arguments, various authors, such as Raisch and Birkinshaw (2008), have demanded further studies regarding the organization's exploration and exploitation approaches.

2.4 Ambidextrous Intellectual Capital

Ambidextrous organizations undergo a process of sharing, acquiring, and integrating skills and new knowledge from outside the organization and inside the organization (Crossan et al., 1999). Exploration is a broad term through which the organization expands its knowledge into unfamiliar or novel areas to establish a new combined mechanism. Exploitation refers to an in-depth and narrower search mechanism to gain solutions about an existing knowledge domain (McGrath, 2001). This long-standing issue asks whether organizations collectively pursue exploration and exploitation. Researchers from different domains have observed the organization's close relationship with its ambidexterity and IC (Siggelkow & Levinthal, 2003). To have a thorough understanding of this trade-off, an organization's knowledge stock must be given a more direct and closer look (Mubarik et al., 2018).

According to Kang and Snell (2009) and Turner and Lee-Kelley (2013), the theory of IC enables ambidexterity at the operational level. In human capital, specialists can be exploitative, and generalists (or those having technical skills) can be exploratory. These broad experiences in general management roles exist in individuals' heads (Flickinger et al., 2013; Gimeno et al., 1997). In the cooperative (exploitative) approach, structural capital uses a dense social network, whereas the entrepreneurial (exploratory) perspective uses a weaker relation to seeking new knowledge (Argote et al., 2003; Burt, 2017). In structural capital, enterprise knowledge is preserved (Daft & Weick, 1984), and it can be mechanistic or organic (Burns & Stalker, 2005).

By implementing two specific architectures (i.e., patterns or combination of knowledge resources), ambidexterity can be achieved (Kang & Snell, 2009). They support disciplined extrapolation (combining generalist, entrepreneurial, and mechanistic knowledge), thus allowing flexibility for specialist expertise and adding a more disciplined approach to innovative teams. However, these resources appear to be limited to two forms of architecture. Given this constraint, we sought to examine further the nature of IC resource configurations that support the management of developments.

Exploration and exploitation are recognized by the state of ambidexterity, and the decisive argument in the literature is that these modes occur simultaneously rather than at opposite ends (Cao et al., 2009; Gupta et al., 2006). Sufficient argument has emerged on the separation of organizational units that exploit and explore at the organization's operational level. IC is aided by ambidexterity. Therefore, both specialist and generalist human capital are expected to exist simultaneously in organizational development (Hatch & Dyer, 2004). Moreover, the social context and the relationship of structural capital exist together (Tiwana, 2008), and the balance between rigid

and flexible innovation are related to organizational capital (Brown & Duguid, 2001; Simsek, 2009).

2.4.1 Human Capital: Specialists Versus Generalists

Organizational practices are vital in managing human resources by focusing on recruitment and selection, placement strategy, and retention mechanisms to build and manage knowledge resources that organizations use to gain organizational performance and competitive advantage. Nowadays, corporate practitioners consider training and development a strategic tool to retain, maintain and gain human capital stock in organizations. Based on Kang et al. (2012), generalist and specialist human capital are used in our study. Generalist human capital encompasses extensive training to develop new sets of multiple skills for prospective business requirements. Specialist human capital fosters intensive training to improve knowledge skills as their current job requirement further (Bae & Lawler, 2000; Guthrie & Petty, 2000).

The central issue that organizations face for learning is in the context of generalists versus specialists. Specialized learning encompasses knowledge that is embedded, localized, and invested within particular knowledge domains. Meanwhile, generalist learning is linked with multiple skills. In addition, it is more versatile and can be used in alternate situations. The consequences of individual learning are like diverse individual knowledge concerning multiple domains versus knowledge of specific domains. Both aspects affect the mindsets or organizational future learning and the current knowledge available (Antonelli & Colombelli, 2011; Taylor & Greve, 2006). Specialist human capital embodies concepts of the world or domain-specific knowledge (i.e., interpretation systems, processing of information, and events expectation phenomena). It is effective for assimilating and acquiring new in-depth knowledge within shorter parameters (Brown & Duguid, 1991). Exploitative learning tends to be clearer in such cases. According to the researcher Diaz-Fernandez et al. (2017), specialized human capital is considered a functional bias that has reduced individuals' willingness to incorporate and combine new knowledge skills apart from their specialized domain. Hence, specialist human capital is more likely to focus on exploitation.

Meanwhile, generalist human capital forms a broader perspective and has positioned itself in several domains. This capital provides a variety of knowledge. Moreover, it possesses the adaptability to combine, comprehend, discover, and apply new knowledge (Shane & Venkataraman, 2000; Wright & Snell, 1998).

2.4.2 Relational Capital: Cooperative Versus Entrepreneurial

Previous research shows that relational capital is classified into two types: cooperative and entrepreneurial. Cooperative relational capital includes dense network

connections and a strong understanding of how knowledge can be shared. Cooperative relational capital fosters the use of job-based compensation, set of norms, rules, pay structures, and procedure of monitoring (Kang et al., 2007).

Entrepreneurial relational capital is less concerned with relational systems and enables flexibility and resilience. Moreover, trust is mainly developed through personal experience. This trust would not be developed until the results of the combined contributions of individuals at work are acquired. Relational capital describes the patterns of relationships among global networks and internal employees, which are considered the real contributors in organizations. Relational capital has been categorized into three components by researchers: effect, structure, and cognition (Kang et al., 2007). The affective dimension encompasses the expectations, motives, trust, and norms of interpersonal exchange among people. The structural component of relational capital contains connection and configuration among individuals. The third cognitive dimension highlights the significance of representation, meaning of shared systems, and understanding among an organization's members. All these components complement one another in terms of motivation, opportunity, and exchange for knowledge. These aspects can be taken as the elements of a social system. The cooperative relational capital archetype is a tight social system that includes dense and strong network connections and institutional and/or generalized trust based on membership in the shared knowledge and social unit. Kang et al. (2007) considered that cooperative relational supports the integration of fine-grained, effective acquisition and in-depth knowledge.

Entrepreneurial relational capital supports a loose social system. It is described as a nonredundant and weak social network connection, with resilient dyadic trust developed through a common main component of knowledge that reflects shared operational, technical, and professional knowledge and direct professional experience. Kang and Snell (2009) stated that entrepreneurial relational archetypes acquire, expand, and absorb novel knowledge, thus helping organizations pursue exploratory learning. However, this flexibility may obviate the efficiencies required for exploitation.

2.4.3 Structural Capital: Organic Versus Mechanistic

Kang and Snell (2009) suggested two kinds of structural capital: mechanistic and organic structural capital. Mechanistic structural capital involves the conformity of members of its organization to establish and maintain organizational rules and social norms. Organic structural capital is encouraged proactively to create, and shape established corporate values, norms, and cultures that foster organizational success. Researchers also consider performance appraisal to encourage and motivate employees within the organization to achieve different goals and objectives. Mechanistic structural capital assumes that organizations accumulate relatively complete information about cause-effect relations in organizational activities. Organic structural capital encourages employees to develop flexibility and behavioral repertories to

adjust themselves to situations. These steps can be supported through "error embracing" which ensures that mistakes are natural and a part of human tendency as a part of learning. This support helps individuals evaluate themselves on the basis of their performance goals, review their decisions, and make changes according to their job performance (Lepak & Snell, 1999).

Structural capital constitutes codified experience and institutionalized knowledge that arise from established processes, structures, and routines. Research studies have supported the notion that organizational capital consists of two types: organic and mechanistic (Burns & Stalker, 2005). Both these forms have distinctive effects on the integration and acquisition of knowledge within an organization. Mechanistic organizational capital consists of standardized structures and processes, detailed routines, and a culture of following rules and regulations to enable the system of coordination among employees that are required for learning organizations. According to Crossan et al. (1999), mechanistic organizational capital institutionalizes the existing knowledge that helps to develop a common frame of reference among an organization's employees. These employees see things from a similar perspective and capitalize on the discussion for understanding and interpretation. This type of organizational learning uses exploitation learning by refining existing knowledge.

Meanwhile, organic structural capital captures the simple routines, culture, and structures by setting a looser organizational culture, rules, and traditional style of working. Organic capital provides new opportunities, flexibility, and autonomy in individual decision making and group experiments as employees organize work. It also helps in creativity and the system of interpretation (Daft & Weick, 1984). Architectures of IC, i.e., human, relational, and structural capital, are closely aligned with either exploration or exploitation. On the one hand, exploration tends to be supported by an IC architecture that consists of generalist human, organic structural, and entrepreneurial relational capital. Individuals under this architecture encompass several new ideas through their career and social contacts and have the flexibility and ability to combine and share knowledge. On the other hand, exploration is encouraged by IC architectures that consist of cooperative, specialist, and mechanistic, structural capital. Individuals who do not have a full range of learning knowledge may access others' knowledge through interactions to improve and refine their knowledge domains.

3 Methodology

We adopted a three-fold approach for developing the construct of AIC as explained below.

3.1 Identification

At the first stage, the literature was reviewed in order to identify the dimensions and sub-dimensions of IC. Likewise, the literature on the organizational ambidexterity was reviewed in order to find out its vital aspects.

3.2 Selection

In the second stage, relevant dimensions and sub-dimensions of IC were selected with the help survey from the experts as explained in the below lines.

3.2.1 Sampling Experts

In the second stage, the experts were selected using expert sampling, a sub-case of purposive sampling.

3.2.2 Data Collection from Experts

Data was collected from experts using a three-scale questionnaire where (where 1 denotes not important, 2 somewhat important, and 3 very important). Part 1 of the questionnaire contained 197 potential dimensions of human capital, 147 potential dimensions of relational capital, and 157 potential dimensions of structural capital selected from the empirical literature. Part 2 of the questionnaire encapsulated the 501 sub-dimensions. Some minor changes were incorporated from the experts' feedback, and then the questionnaire was sent to experts through email.

3.2.3 Selection Criteria

We adopted the criteria for selecting the dimensions from Mubarik (2015) by computing the mean values of each dimension. According to Mubarik (2015), "*it is done by multiplying the respondents' percentage with its value and adding the resulting products. For example, if 60% of the respondents rated Variable A as not important, 30% somewhat important, and 10% very important, then the mean value will be 1.5 = [(60% X 1) + (30% X 2) + (10% X 3)], where the values of 3, 2 and 1 represent important, somewhat important and not important*" (p. 115). The average of minimum and maximum mean values was used as the cut-off criteria.

$$\begin{aligned} \textit{Mean Value} = {} & \%\textit{Not Important}\,(1) + \%\textit{Somewhat Important}(2) \\ & + \%\textit{Important}(3) \end{aligned} \tag{1}$$

$$Cut-off = (Minimum\,mean\,value + Maximum\,Mean\,Value)/2 \quad (2)$$

3.3 Exploratory Factor Analysis (EFA)

The selected dimensions and sub-dimensions were then converted to the statement knowing in view the IC and organizational ambidexterity. Data were collected firm 300 respondents and EFA using principal component method was employed to determine the number of factors.

4 Findings

The whole process of scale development has been divided into three major parts. First is the identification of the relevant dimensions and sub-dimensions of ambidextrous intellectual capital. The second is the selection of the relevant dimensions of AIC. The third is the generation of items to operationalize the dimensions and sub-dimensions to employ exploratory factor analysis (EFA) for deciding the final construct. Following 11 keywords were identified to search for the relevant studies on intellectual capital and organizational ambidexterity.

4.1 Identification

As the first step, the quantitative studies conducted between 1958 and 2020 were reviewed. After reviewing the studies, we could find various HC, RC, and SC dimensions. A review of these tables reveals that each dimension of IC has been represented by various qualitative and quantitative factors. Nevertheless, all the factors may not be important while gauging the ambidextrous intellectual capital. Therefore, for selecting the most relevant dimensions of HC, SC, and RC, we employed a preliminary survey, as discussed in the proceeding section.

4.2 Selection

A preliminary survey was conducted by developing a questionnaire based on 03 scales (*01 for not important to 3 for important*). Questionnaires were sent to 90 selected experts. The mean value and the cut-off values were computed according to the procedure described in the previous section. The cut-off criteria, by taking the

Table 1 Selected sub-dimensions of IC

Human capital	Structural capital	Relational capital
Education	Intellectual property rights	Relationships with customers
Experience	Research and development	Customer service
Expertise	Business process re-engineering	Relationships with suppliers
Skills	Working systems	Goodwill
Training	Brand and trademark reputation	Distribution channels
Creativity	Databases	Cooperation with universities and research institutes
Attitudes	Portfolio management	Strategic alliance
Abilities	Internal management systems	Relationships with stakeholder
Health	Organizational structure	Internal relationship management
Capability		

average of the maximum and minimum mean values, for HC was 2.5, for relational capital 2.48, for structural capital 2.53. Among the 501 identified dimensions of IC, 10 dimensions of HC, 9 dimensions for RC, and 9 dimensions of structural capital were selected as exhibited in Table 1.

4.3 Exploratory Factor Analysis

4.3.1 Generation of Items

After selecting the most appropriate IC dimensions, in the context of organizational ambidexterity, the next step was to generate the statements against each item keeping in view its linkage to ambidexterity. The statements were generated keeping in view the incorporation of both dimensions of ambidexterity i.e. *exploitation and exploration.* Hence each statement measures the effectiveness of that dimension from the point of view of both exploration and exploitation. In doing so, we have generated statements for each of the dimensions of *AHC, ASC,* and *ARC*. In doing so a total of 248 items were generated to present AIC (96 items of AHC, 80 items for ARC, and 72 items of ASC). The developed constructs to gauge ambidextrous intellectual capital—*Intellectual Capital with Organizational Ambidexterity*—were reviewed by the experts in order to ascertain whether the generated statements truly capture the main idea or not. We sent the construct to 30 experts. The experts were selected from industry, academia, and institutions to get a diverse opinion. Some of the experts suggested deleting some items as it was overlapping with some other items. After incorporating the experts' feedback, 192 items were retained to present AIC (72 items of AHC, 60 items for ARC, and 60 items of ASC). The final version of the construct was used to collect data from 548 respondents.

4.3.2 PCA Findings

The exploratory factor analysis conducted on ambidextrous Intellectual capital was initiated with 192 items. The process used to conduct the exploration factor analysis was principal component analysis (PCA) using SPSS version 22. The formal application of exploratory factor analysis was preceded by the assessment of data for the suitability of EFA. For most of the items, the correlations between the items were found to be more than 0.3. The Kaiser-Meyer-Oklin (KMO) value was (0.889), highly exceeding the recommended threshold value of 0.6 (Kaiser & Rice, 1974). Additionally, Barlett's Test of Sphericity was found to be significant, thus providing support for the factorability of the correlation matrix (Bartlett, 1954).

For ambidextrous human capital (AHC), the principal component analysis extracted 33 factors that had Eigenvalues above 1. The total variation in the data explained was 59.03%. To improve the interpretability of the drawn constructs, Varimax rotation was applied. The resulting structure manifested a simple structure loading the items on the relevant construct only. The drawn components are found to be related to the previous researches.

For, ambidextrous relational capital (ARC) construct, principal components analysis revealed the presence of four components with eigenvalues exceeding 1, explaining 26.3%, 35.4%, 41.4%, 46.8%, 51.1%, 54.5%, 57.0%, 59.5%, and 61.4% of the variance respectively. Using Cattell (1966) scree test, it was decided to retain 09 components for further investigation. The decision was further supported by the results of Parallel Analysis, which showed only nine components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (variables 60 × 549 respondents). To aid, in the interpretation of these nine components, Varimax rotation was performed. The rotated solution revealed the presence of a simple structure Wherry and Thurstone (1948), with all 9 components showing several strong loadings. The nine components solution explained a total of 61.40% of the variance. A total of 26 items were retained under the selected 09 components. Factor-wise explanatory power is shown in Tables 2, 3, and 4.

For ambidextrous structural capital (ASC), the principal components analysis extracted 9 factors that had Eigenvalues above 1. The total variation in the data explained was 64.63%. To improve the interpretability of the drawn constructs, Varimax rotation was applied. The resulting structure manifested a simple structure loading the 26 items on the relevant construct only. The drawn components are found to be related to the previous researches. The final construct of AIC comprising of a total 91 items is presented in Appendix 1.

5 Conclusion and Implications

Both researchers and policymakers believe that maintaining a balance between their exploration (innovation) and exploitation (productivity) activities can augment a firm's performance. This balance at the firm level can be brought by infusing the

Table 2 Factor-wise explanatory power (Ambidextrous Human Capital-AHC)

	Education	**Experience**	**Skills**	**Trainings**	**Capabilities**	**Expertise**	**Abilities**	**Attitude**	**Creativity**	**Health**
Eigen Value	14.813	11.491	4.192	2.327	2.210	1.708	1.622	1.524	1.325	1.291
Variance Extracted	20.574	15.960	5.822	3.232	3.070	2.373	2.253	2.117	1.840	1.794
Cumulative Variance Extracted	20.574	36.534	42.356	45.587	48.657	51.030	53.283	55.400	57.239	59.033

Table 3 Factor-wise explanatory power ambidextrous relational capital (ARC)

	Relationship with suppliers	Relationship with customer	Goodwill	Customer service	Strategic alliance	Distribution channels	Cooperation with Universities and Research Institutes	Relationship with Stakeholders	Internal Relationship Management
Eigen value	15.806	5.488	3.601	3.2	2.605	2.001	1.538	1.322	1.285
Variance extracted	26.343	9.147	6.001	5.333	4.342	3.335	2.563	2.203	2.141
CVE	26.343	35.49	41.491	46.824	51.166	54.501	57.064	59.267	61.408

CVE Stands for Cumulative Variance Extracted

Table 4: Factor-wise Explanatory Power (Ambidextrous Structural Capital-ASC)

	Intellectual Property Rights	Databases	Business Process Reengineering	Working Systems	Brand and trademark reputation	Research and Development	Internal management Systems	Organizational structure	Portfolio management
Eigen Value	19.09	5.11	3.67	3.31	2.02	1.80	1.40	1.24	1.13
Variance Extracted	31.82	8.52	6.12	5.52	3.36	3.00	2.33	2.06	1.88
Cumulative Variance Extracted	31.82	40.35	46.47	51.99	55.35	58.36	60.69	62.75	64.63

ambidexterity in the intellectual capital. If the intellectual capital is ambidextrous itself, it may help organizations attain organizational ambidexterity. Although anecdotal evidence endorses this fact, studies on how ambidextrous intellectual capital (AIC) can be measured were absent from the literature. In this context, the overarching objective of this chapter was to operationalize and develop a comprehensive measure of AIC. By adopting a three-fold approach, the study came up with 91 items scale of AIC, which encapsulates both the qualitative and quantitative aspects of it.

The developed scale could be used to examine the impact of AIC on the various facets of firm performance. Similarly, the developed scale could be used for analyzing the extent of AIC in an organization. Besides, the study draws some other insightful implication for developing AIC. Firstly, AIC is an organization's capability to attain consistent organizational performance. It requires deliberate efforts of organization develop the AIC through restructuring the organization's strategies. For customers, business, and corporate strategies, AIC should be built by organizations in terms of sequential, structural, and contextual ambidexterity (Mubarik et al., 2019a, 2019b, 2019c; Raisch et al., 2009). Attaining ambidextrous capabilities is mainly a complex process encompassing different strategic components.

Appendix 1

A. Ambidextrous human capital	
Education	
1	Education of our employees in our organization helps them to adopt innovative work processes
2	Education of our employees in our organization helps the firm to commercialize products and services that are completely new to our organization
3	Education of our employees is instrumental in reducing the operational cost
4	Education of our employees is instrumental in exploiting existing market opportunities
Experience	
1	Experience of our employees helps them to adopt innovative work processes

(continued)

(continued)

2	Experience of our employees helps the firm to commercialize products and services that are completely new to our organization
3	Experience of our employees is instrumental in reducing the operational cost
4	Experience of our employees is instrumental in exploiting existing market opportunities
Skills	
1	Skills of our employees help them to adopt innovative work processes
2	Skills of our employees help the firm to commercialize products and services that are completely new to our organization
3	Skills of our employees are instrumental in reducing the operational cost
4	Skills of our employees are instrumental in exploiting existing market opportunities
Trainings	
1	Training provided to our employees helps them to adopt innovative work processes
2	Training provided to our employee's help the firm to commercialize products and services that are completely new to our organization
3	Training provided to our employees is instrumental in reducing the operational cost
4	Training provided to our employees is instrumental in exploiting existing market opportunities
Capabilities	
1	Capabilities of our employees help them to adopt innovative work processes
2	Capabilities of our employees help the firm to commercialize products and services that are completely new to our organization
3	Capabilities of our employees are instrumental in reducing the operational cost
4	Capabilities of our employees are instrumental in exploiting existing market opportunities
Expertise	
1	The expertise of our employees helps them to adopt innovative work processes
2	The expertise of our employees helps the firm to commercialize products and services that are completely new to our organization
3	The expertise of our employees is instrumental in reducing the operational cost
4	The expertise of our employees is instrumental in exploiting existing market opportunities

(continued)

(continued)

Abilities	
1	Abilities of our employees help them to adopt innovative work processes
2	Abilities of our employees help the firm to commercialize products and services that are completely new to our organization
3	Abilities of our employees are instrumental in reducing the operational cost
4	Abilities of our employees are instrumental in exploiting existing market opportunities
Attitudes	
1	Attitudes of our employees help them to adopt innovative work processes
2	Attitudes of our employees are instrumental in reducing the operational cost
Creativity	
1	The creativity of our employees helps the firm to commercialize products and services that are completely new to our organization
Health	
1	The health of our employees helps them to adopt innovative work processes
2	The health of our employees are instrumental in reducing the operational cost
B. Ambidextrous Structural Capital	
Intellectual property rights (IPR)	
1	Intellectual property rights (IPR) in our firm help us to adopt innovative work processes
2	Intellectual property rights (IPR) in our firm help the firm to commercialize products and services that are completely new to our organization
3	Intellectual property rights (IPR) in our firm are instrumental in reducing the operational cost
4	Intellectual property rights (IPR) in our firm are instrumental in exploiting existing market opportunities
Databases	
1	Databases in our firm help us to adopt innovative work processes
2	Databases our firm help the firm to commercialize products and services that are completely new to our organization
3	Databases in our firm are instrumental in reducing the operational cost
4	Databases in our firm are instrumental in exploiting existing market opportunities

(continued)

(continued)

Business Process Re-engineering (BPR)	
1	Business Process Re-engineering (BPR) in our firm help us to adopt innovative work processes
2	Business Process Re-engineering (BPR) in the firm helps the firm to commercialize products and services that are completely new to our organization
3	Business Process Re-engineering (BPR) in our firm are instrumental in reducing the operational cost
4	Business Process Re-engineering (BPR) in our firm are instrumental in exploiting existing market opportunities
Working systems	
1	Working Systems in our firm help us to adopt innovative work processes
2	Working Systems in our firm help the firm to commercialize products and services that are completely new to our organization
3	Working Systems in our firm are instrumental in reducing the operational cost
4	Working Systems in our firm are instrumental in exploiting existing market opportunities
Brand and trademark reputation	
1	Brand and trademark reputation in our firm helps us to adopt innovative work processes
2	Brand and trademark reputation in our firm help the firm to commercialize products and services that are completely new to our organization
3	Brand and trademark reputation in our firm are instrumental in reducing the operational cost
4	Brand and trademark reputation in our firm are instrumental in exploiting existing market opportunities
Internal management systems	
1	Internal management Systems in our firm help us to adopt innovative work processes
2	Internal management Systems in our firm are instrumental in reducing the operational cost
3	Internal management Systems in our firm are instrumental in exploiting existing market opportunities
Organizational structure	
1	Organizational structure in our firm are instrumental in reducing the operational cost

(continued)

(continued)

Research and development	
1	Research and development in our firm help us to adopt innovative work processes
2	Research and development in the firm help the firm to commercialize products and services that are completely new to our organization
Portfolio management	
3	Portfolio management in our firm are instrumental in exploiting existing market opportunities
C. Ambidextrous Relational Capital	
Relationship with suppliers	
1	Relationship with our suppliers helps us to adopt innovative work processes
2	Does the relationship with suppliers help the firm to commercialize products and services that are completely new to our organization
3	Relationship with suppliers in our firm is instrumental in reducing the operational cost
4	Relationship with suppliers in our firm is instrumental in exploiting existing market opportunities
Relationship with customers	
1	Relationship with our customers helps us to adopt innovative work processes
2	Does the relationship with customers help the firm to commercialize products and services that are completely new to our organization
3	Relationship with customers in our firm is instrumental in reducing the operational cost
4	Relationship with customers in our firm is instrumental in exploiting existing market opportunities
Goodwill	
1	Good reputation and prestige help us to adopt innovative work processes
2	Does goodwill help the firm to commercialize products and services that are completely new to our organization
3	Goodwill in our firm is instrumental in reducing the operational cost
4	Goodwill in our firm is instrumental in exploiting existing market opportunities
Customer service	
1	Customer service helps us to adopt innovative work processes
2	Does customer service help the firm to commercialize products and services that are completely new to our organization

(continued)

(continued)

3	Customer service in our firm is instrumental in reducing the operational cost
4	Customer service in our firm is instrumental in exploiting existing market opportunities
Strategic alliance	
1	Strategic alliance helps us to adopt innovative work processes
2	Does strategic alliance help the firm to commercialize products and services that are completely new to our organization
3	Strategic alliance in our firm is instrumental in reducing the operational cost
4	Strategic alliance in our firm is instrumental in exploiting existing market opportunities
Distribution channels	
1	Distribution channels helps us to adopt innovative work processes
2	Does distribution channels help the firm to commercialize products and services that are completely new to our organization
3	Distribution channels in our firm is instrumental in reducing the operational cost
4	Distribution channels in our firm is instrumental in exploiting existing market opportunities
Cooperation with universities and research institutes	
1	Cooperation with universities and research institutes helps us to adopt innovative work processes
2	Does cooperation with universities and research institutes help the firm to commercialize products and services that are completely new to our organization
Relationships with stake holders	
1	Relationships with stakeholders help us to adopt innovative work processes
2	Does relationships with stakeholders help the firm to commercialize products and services that are completely new to our organization
Internal relationship management	
1	Internal relationship management helps us to adopt innovative work processes
2	Does Internal Relationship Management help the firm to commercialize products and services that are completely new to our organization

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Educational Context of Intellectual Capital: An Exploratory Four-Factor Study

Janet L. Hanson, Muhammad Niqab, and Arthur Bangert

Abstract This chapter extends the literature on the topic of Intellectual capital (IC) by reporting the results of SEM and dimensions analysis using a new population; teachers ($n = 408$) in secondary schools in a developing country, Pakistan. Results of empirical testing revealed a four-factor structure for IC. Organizational citizenship behavior (OCB) mediated Principal leadership skills (PLS) in promoting the development of IC in schools. Construct validity of the IC factors was shown by a favorable comparison with the World Bank 4-Pillars of a knowledge economy and dimensions of the Human Capital Index (HCI). Validated measurement instruments are provided for use by school leaders to collect reliable data as evidence of their school's progress toward developing IC in their schools. A deep literature review informs the reader regarding the critical importance of developing IC in a changing world context. A discussion of current disruptive technologies explains how these can be kept in perspective so as not to overshadow the necessity for respect and nurture of the human element. Implications for using IC as the basis of creating ambidextrous organizational structures to meet the needs of challenging economic and social times are provided.

Keywords Intellectual capital · Educational institutes · Knowledge economy · Resource-based view theory · Disruptive technologies

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1 Introduction

> Wealth has evolved into outcome of knowledge and has become the most crucial factor of [organizational improvement].
>
> –Bhatti and Zaheer (2014, p. 187).

New disruptive technologies along with the COVID19 worldwide pandemic shutdowns have shattered previous conceptions of business models by "creatively destroying" the context and rules governing social as well as economic operations and transforming the world's landscape (Schumpeter, 1942). Businesses, schools, non-governmental agencies will need to rapidly retool their resources and knowledge base in order to survive. Rapid response is necessary to maintain organizational health from barriers in place such as stay-at-home orders, social distancing requirements, global implementation of 5G communication networks, blockchain centralizing control of distribution, purchasing, and identification, Big Data analytics used for predictive and influence-marketing, and other mass information technologies facilitated by quantum computing. Power brokers are using AI as a means to manipulate the user's emotions toward an agenda and maximize brokers' power by capturing and using the populations' data to monetize and control, without apparent concern for businesses and individual's wellbeing, privacy, and choice (Taneo et al., 2020, p. 195).

These combined changes shift the basis for a firm's ability to compete from tangible to intangible resources. Organizations, including schools, must become "ambidextrous," or flexible enough, to modify their processes in favor of new and existing opportunities for growth and development (O'Reilly & Tushman, 2013). "According to [an interpretation of] Darwin's *Origin of Species,* it is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself" (Megginson, 1963, p. 4; University of Cambridge, 2021, para. 4). Ultimately, only organizations with sufficiently skilled leaders, who can restructure, train, and develop the resources in hand that will survive and thrive through these global transformations. Therefore, an understanding of skills needed in developing intellectual capital (IC) is a key to successful transformations.

This chapter provides new insights into the construct of IC by reporting the results of empirical tests: to determine the factors of IC, test the reliability of new instruments for collecting data on IC in secondary schools in the developing country of Pakistan, and the proposal that a school leader's skills in promoting positive school cultures can work indirectly through the organizational citizenship behavior (OCBO) of its faculty to improve IC.

The scope and objective of this chapter are to inform external stakeholders, school administrators, teacher leaders, policy making bodies, and other interested readers regarding the implications of the research for explicit steps to improve IC thereby increasing a faculty's "ambidexterity" (O'Reilly & Tushman, 2013) to quickly adapt to rapid changes imposed by the government and rapid technological changes in society. Rigorous research design, theoretical framework, and empirical testing

provide the foundation for reliable research results to inform the reader regarding the context and processes to engage faculty and stakeholders in challenging dialogues toward collaborative self-improvement processes to develop IC at their schools.

This chapter provides the results of a study performed in Pakistan collecting a sample of teachers from secondary public schools. The researchers proposed and tested a new model, using self-developed instruments to contribute new insights into the relationships of variables contributing to IC in schools, with an eye toward making recommendations for cost-effective ways to improve school outcomes, bridging theory with practice, and promote practical benefits for schools. This chapter reports the findings of empirical analysis, including the identified four factors of the operationalized IC, three-factor OCBO, and unidimensional PLS constructs, useful for informing administrators and policy leaders in understanding malleable variables for influence in improving knowledge sharing in schools. The IC factors were shown to have construct validity by positively conforming to the World Bank's (WB) 4-Pillars of a knowledge economy (Knoema, 2018, para. 1). Additional evidence from empirical testing also includes the influence of OCBs as a mediator of PLS in developing IC in the context of secondary schools in Pakistan (Popescu & Deaconu, 2013).

This chapter provides a deep literature review that informs the reader why IC is critical in current contexts, a review of the literature, methods, and results, discussion of results, conclusions and implications for practice in schools. Additionally, a context discussion of the current disruptive technologies is included and how these can be kept in perspective, so as not to overshadow the necessity for respect and nurture of the human element as the basis of organizations. Appendices provide the instruments tested in the studies reported.

1.1 Research Purpose

The authors were motivated to perform a study on IC in Pakistani schools as a response to the concerns raised in the literature on learning inequities in developing countries overall. Context relevant research is critical to provide information to policy makers, who can use evidence-based models to improve educational outcomes for all bringing large benefits to society (Bisogno et al., 2018, p. 10; Khalique et al., 2015). This chapter reports the results of research testing the relationships between variables shown to contribute to IC and that are shown malleable to administrator influence. The results can be used to inform self-development processes in schools "for social betterment" both in and outside the school organization (Secundo et al., 2018a, 2018b, p. 159). Secondly, results are provided from testing the reliability and construct validity of the newly-developed scale for use in measuring IC, OCBO, and PLS in public secondary schools in the developing country, Pakistan. The literature identified a need for "an appropriate [IC] scale with inter-subjective and auditable measures that support comparability and benchmarking" (Bornemann & Wiedenhofer, 2014, p. 467). A domain-specific (educational context) reliable tool

for measuring IC, can provide meaningful feedback for self-improvement, accountability, and reporting processes, creating a positive workplace environment, and directing resources to develop IC. Third, a parsimonious empirically–tested model was developed that provides research-based relevant information about the processes related to developing IC and positive school cultures that "benefits all stakeholders interested in an organization's ability to create value over time, including employees, customers, suppliers, business partners, local communities, legislators, regulators and policy-makers" (IIRC, 2013, p. 7).

1.2 Intellectual Capital: Definitions and Dimensions

A variety of definitions for IC are in use in the literature as the concept has been explored over time. Three major intangible components of IC included human capital (HC), operationalizing an employee's knowledge and abilities, structural capital (SC), operationalizing an organizations databases, social values, organizational structures, etc., and customer or relational capital (RC), measuring a firms relationships with stakeholders (Bornemann &Wiedenhofer, 2014, pp. 458 & 459; Kim et al., 2011; Ramezan, 2011; Tai & Chen, 2009; Wall, 2005). More recently, IC models have added new constructs to its measured dimensions including customer capital, technological capital, and spiritual capital (Khalique et al., 2015, p. 226).

Human Capital (HC)

The construct of HC operationalizes employees' training, education, and experience (Grano, 2013, p. xii). The literature on the topic describes an interactive relationship between human and social capital shown to predict student achievement (p. 30). Therefore, one recommendation is to develop educational leaders' skills in employee professional development and in promoting the willingness of their employees' to participate in personal and professional development (Doong et al., 2011; Gavious & Russ, 2009; Yang & Lin, 2009). The components of HC, worker education, skills and attitudes, have been shown to vary between types and size of organizations tested. For example, medium-sized firms showed the highest levels of the HC components compared to small firms (Mubarik et al., 2015). However, schools were not included in this sample warranting further study in this area.

A variety of terms were found to be used interchangeably in the IC literature such as social capital, relational capital, and consumer capital, all considered components of HC. Social capital refers to the value derived from relationships between people in an organization such as trust, positive attitude, and mutual dependence (Kannan & Aulbur, 2004). Khalique et al.'s (2011) integrated model described a similar construct of customer capital as the informal behaviors and relationships between the leader, fellow teachers, community, parents, and students. Stillet al.'s (2013) findings, using citation network analysis, suggested social and relational capital are two different fields of study, though they did not propose distinct definitions in their discussion.

To clarify the distinction between the use of the terms Relational capital (RC) and social capital, RC refers to external relationships between organizations or between an organization and its stakeholders, while social capital refers to internal relationships and networks within the organization. In combination the three concepts relational, social, and consumer capital can be viewed as one variable called social/relational capital (SRC) referring to collaboration and coordination by both internal and external members of an organization, who share their ideas and build positive networks that contribute value to the organization and to one another (Carmona-Lavado et al., 2010).

Structural Capital (SC)

Structural capital (SC) includes tangible and intangible assets that set the stage in an organization, i.e. create a suitable environment, to develop HC that leads to IC (Liu, 2010). SC is described as "all the non-human storehouses of knowledge including databases, organizational charts, process manuals, strategies, routines and policies" (Khalique et al., 2011, p. 344). SC also includes an organization's "technology, inventions, publications, culture, structure,… system, and organizational procedures" (Niqab et al., 2020, pp. 8–9). Structural capital is context dependent, that is, the form and type of SC vary by the organization. For example, data collected from schools that are operated by different organizations would be expected to have different structural capital i.e. unique norms, procedures, and policies designed to affect employee performance.

Open systems structure. In an Open System, faculty and principal work together as colleagues. The collaboration increases their sense of control over their work resulting in a positive relational culture which increases motivation (Tarter & Hoy, 2004, p. 540). Open systems structures processes compare favorably with the influence of Principal leadership skills (PLS) and OCB on the development of HC and SC that leads to IC. Sergiovanni (2009) explained the need for PLS in developing positive social relationships between administrators, teachers, community members, students and their families. Positive relationships lead to a willingness to contribute to the school, consistent with research that revealed the administrator's behaviors were found to transform the organizational capabilities while enhancing the social capital (Kianfar et al., 2013). Hanson's (2017) model of Leadership within Open Vital Systems (LOVS) also recognizes the influence of a leader's management skills in creating a three-prong approach to improvement in organizations including (1) a supportive, safe, and predictable formal structure, (2) a positive informal relational culture, and (3) vitality for the individuals and organization (see also Hanson et al., 2020).

Intellectual Capital (IC)

Following is a definition of the construct IC to be used in this chapter. Intellectual capital includes the "knowledge, skills, competencies and abilities that … help generate valuable outputs" and has been operationalized on measurement scales as a three-dimensional construct.

Social Relations (SR): measures the "behaviors of employees in the informal structure of the organization for developing … the best social structure; co-operation; decent behaviors that reflect good social relations in the school and between principal, teachers and students; and as a step toward societal change" (Niqab et al., 2020, p. 14).

Teacher Technical Skills (TTS): measures the organization's resources and time invested in employee in-service training (such as ICT and multimedia) and the employee's inclination toward investing in such training. These training programs support the employee's existing professional knowledge and competencies in the classroom.

Teacher Experience and Education (TEE): measures a teacher's (1) professional qualifications and experience developed prior to employment, and (2) developed through professional development, continuing education, and years of experience on the job.

Structural capital (SC): "refers to the existing structures and processes of the organization…values, processes, digital date, policies and procedures" (Kianfar et al., 2013, p. 117).

Organizational Citizenship Behaviors (OCB)

"Organizational trust and organizational citizenship behavior have a positive, significant influence on intellectual capital" (Kianfar et al., 2013, p. 114). Schools depend upon the teachers going beyond the formal duties of their job description to perform the needs of the organization to achieve the school's goals (Runhaar et al., 2013). OCB operates on three levels affecting commitment and feelings of attachment directed to the individuals, co-workers, or peers (OCBI); toward the organization overall (OCBO); and behaviors directed toward public service users, such as parents, stakeholders, community, and other organizations, termed organizational citizenship behavior toward the public service user, (OCBP) (Conway et al., 2014, p. 740). Through OCBI, teachers work collaboratively to share information on instructional strategies with their colleagues. OCBI builds informal relationships that result in this knowledge sharing and the development of organizational learning, thereby teachers develop IC of the organization. When leaders transform the school community to accept shared leadership roles and responsibilities, they are developing OCBO (Mendels, 2012).

Researchers found that school leaders, who were supportive of a collaborative working environment and had a "desire[d] to see teachers working, teaching, and helping one another," built the informal behaviour of OCB (Portin et al., 2009, p. 59). Reciprocally, OCB has a positive impact on school teachers, who observe OCBO in their schools, resulting in a conducive teaching and learning environment. For example, when teachers help colleagues overloaded with work, mentor new teachers, and support school improvement plans, the result is increased OCB (Runhaar et al., 2013). This is consistent with how the organizational learning factors of the LOVS model and Open systems structures elements lead to school improvements (Hanson, 2017; Tarter & Hoy, 2004).

OCBO results in a higher level of performance and effectiveness in the organization (Oplatka, 2009; Organ, 1988). Schools with OCBP develop relational capital

by enhancing their image in the community (Ashkanasy et al., 2002). Teacher OCB has been shown to have an impact on the students' futures as they will perform OCB at their own workplace and in their lives in society (Sultanova et al., 2018). Similarly, both OCBO and a school's growth mindset culture (school level) include factors similar to those listed in the definition of IC including; shared and supportive leadership, informal supportive communication networks (social and relational), and formal structures that provide systems and resources for teachers to work, plan, and learn together (Hanson et al., 2016). There is a close link between the concepts of SRC, OCB, and its corollary, counterproductive work behaviors (CWB) in that both OCB and SRC can be helpful in some actions, while harmful for other actions.

Citizenship behaviour (OCB) is defined for this study as the employee's discretionary behaviour that goes beyond his or her existing role expectations, and that is directed at either an individual (OCBI) or at the organization overall (OCBO) and is intended to benefit the organization (Organ, 1988; Podsakoff et al., 2009). The three factors of individual OCB (organizational level) identified by Niqab et al. (2019) include:

Supportive Leadership (SL) measures the principal/leaders' helping and supportive behaviors in the group through acknowledging teachers' efforts, setting role model, showing sportsmanship and good spirit, and leading team efforts toward identified goals (p. 96).

Civic Virtue (CV) "…teacher behaviors demonstrating flexible skills, training, and ability to participate in, and prepare students for, a variety of…occasions and extracurricular and co-curricular activities" (Niqab et al., 2019, p. 96).

Collaborative Problem Solving (CPS) "operationalizes behaviors of employees related to their ability to work together, help each other, and solve problems related to the school context…and following the formal structures of the organization." Examples include solving student problems, with his/her colleagues, collaborating under pressure, and being "part of the solution" (Niqab et al., 2019, p. 97).

Principal Leadership Skills (PLS)

Principal leadership skills relate to those competencies and behaviors, dispositions, and knowledge brought to bear by the principal in the school context. The lens used for this study draws from research and standards set by "primary agencies and professional organizations associated with school administration" and divides PLS into three primary domains: transformational, managerial, and instructional (Richter, 2006, p. 26). Research on principal leadership has been widely reported in the literature connected with teacher support, systems design, transformational leadership, and supporting vision. Understanding the relationships between IC, leadership elements, and employee behaviors can provide insights into how to turn theory into processes that can be enacted and practiced by school leaders to realize the goal of self-development in schools.

Effective PLS in schools has been broadly researched and many models have been proposed and tested. Construct validity comes from a favorable comparison of PLS with other constructs showing factors of a leaders' skills influencing the development of positive school cultures including; a school's growth mindset culture (shared

leadership, collaborative planning, and open communication and support) (Hanson, et al., 2016); an enabling school structure (leaders working in open systems) (Tarter & Hoy, 2004), and leadership within open vital systems (LOVS) model (Hanson, 2017; Hanson et al., 2020).

Principal leadership skills (PLS), in this study, was a unidimensional construct operationalizing:

Transformational leadership skills (TLS) for vision setting, consensus building, expressing high expectations for performance;

Organizational leadership skills (OLS) for supporting progress toward organizational goals, skills in problem-solving, providing resources and professional development to support goal attainment and create value in the organization; and

Behavioral leadership skills (BLS). Administration to establish and hold others accountable for accomplishment of tasks, meeting behaviour management standards, practices and performances (Niqab et al., 2019).

Niqab et al. (2015) explained, "Since school is … an organization like other organizations, to achieve competitive advantage school leaders should throw their inclination towards development of their own capabilities as well as staff capabilities to make schools more effective" (p. 36).

Integrated Reporting

Integrated reporting by school leaders and educators to parents, "employees, customers, suppliers, business partners, local communities, legislators, regulators and policy-makers" is a next step to including intangible assets in the reports of organizations (IIRC, 2013, p. 4). Measurement tools provide accountability through the reporting processes of systems. Data collected can inform decision makers by providing feedback for making changes that can create positive workplace environments. Resources can be directed to promote the development of IC; bridging theory with practice, and promoting a practical benefit for schools and society at large. (Bhasin, 2012; Di Berardino & Corsi, 2018).

Defining Allied Concepts

"Creative destruction and the creation of competency-based and market-based knowledge are usually carried out by companies in power to create barriers to entry and expand distance with similar businesses" (Taneo et al., 2020, p. 195).

Enabling school structures

"Structure is an essential feature of all organizations…enabling school structures is a hierarchy that facilitates rather than hinders and [includes] procedures that guide rather than…punish. [P]rincipals and teachers work as colleagues while retaining their distinctive roles… mechanisms support teachers rather than enhance principal power" (Tarter & Hoy, 2004, p. 540).

Knowledge management (KM)

"… the ability of an organization to recognize the value of new external information and knowledge, assimilate, and apply them… this ability is critical in determining an innovative result" (Leal-Rodríguez et al., 2013, p. 63).

Resource-based view organizational theory (RBV). Planning and strategizing through a review of the resources of the firm as opposed to the product side. This provides a new perspective for diversification and development of resources (Liu, 2010; Wernerfelt, 1984, p. 172).

Resource. "Anything which could be thought of as a strength or weakness of a given firm…[such as] brand names, in-house knowledge of technology, employment of skilled personnel, trade contacts, machinery, efficient procedures, capital" (Wernerfelt, 1984, p. 172).

2 Theoretical Framework

The dimensions of IC are fundamental for achieving an organization's mission and vision and are, therefore, important to be understood by leaders. Leaders can apply the theory in day-to-day actions and decision-making processes because "… the way knowledge is managed [KM] in an organization affects the creation, building, and maximization of its IC" (Seleim & Khalil, 2011, p. 592). Conceptual frameworks found in the literature studying IC included both ecosystem view theory and resource-based view (RBV) theory (Liu, 2010). RBV organizational theory views organizational management from the lens of improving resources versus an emphasis on the production output. This demonstrates a shift in leaders' perspective which increases the opportunity to develop HC as a resource, thereby bringing additional benefits to the organization overall (Wernerfelt, 1984, p. 172). A second conceptual lens includes an ecosystem view taking into account the interaction and collaboration "purposes and the larger community and society as well as the influence of education on a country's socio-economic growth" (Secundo et al., 2018a, 2018b, p. 2). Both lenses provide a clear foundation for understanding the importance and means for promoting IC in schools.

2.1 Psycho-Social

Hanson (2017) suggested that an organization exists not in its buildings, systems, and formal structures, but within the memories of those who engage in a relationship and social interactions each day. In this aspect, IC relates to the capacity of individuals to relate socially in an organization and, resultantly, adapt and to create outcomes that go beyond the individuals. Therefore, to be successful, and to continue to exist, the leader must develop flexible structures that primarily meet the needs of the individuals,

support flourishing relationships, and secondarily, produce goods and services for society. These capacities create new assets for the organization, as IC, because the new knowledge becomes a part of the intangible assets remaining even after individuals leave (Burr & Girardi, 2002; Tai & Chen, 2009).

How AI is changing human relationships, especially in a Post-COVID-19 context, must be addressed. For example, most schools are functioning remotely using technologies that have developed within the last 100 years. Are teachers prepared with the knowledge to reduce transactional distance between their students and themselves? Are students prepared to engage in online learning successfully? Further, businesses are experiencing disruptive digital technologies that are transforming the way the world and local economies enact business on a day to day basis, "creatively destructing" current systems through linked processes such as block chains, Big Data, and AI. To survive, school leaders, faculty, stakeholders, and business leaders must develop "ambidextrous" organizations, flexible open systems, using a resource-based view, recognizing current and future opportunities to develop the human and intangible resources.

Contrast the ambidextrous view to a mechanistic view that focuses on outcomes such as productivity, exam scores, or sales and profit margins. Mubarika et al. (2019) identified statistically significant effects of three IC components, structural capital, relational capital, and human-development capital, to provide a competitive advantage to textile firms studied in Pakistan. The evidence of IC's ability to indirectly affect an organization's competitive advantage through its organizational ambidexterity provides a rationale warranting further development and testing of reliable instruments to measure IC dimensions in schools.

This current research builds on prior researchers' tests of the hypothesis there is a relationship between PLS, OCBO, and IC. The context of the studies reported expands the measurement of IC to secondary schools in the developing country of Pakistan. Data was collected using a newly developed, Likert-style measurement tool, operationalized for the new context. The study is also unique in that it tested the variable of OCBO, a proposed mediator of PLS, for use in self-developing processes in schools to develop IC. Structural Capital (SC), a dimension of IC, was tested indirectly and measured as the change in IC mean scores between differencing school systems used for teacher accountability and improvement. Therefore, this chapter reports the results of empirical studies testing the proposition that PLS (in managing variables of KM) is moderated by boundary conditions, such as OCBO, in Pakistani schools.

2.2 Research Question

The overarching research question of this study was:

> Is there a relationship between principal leadership skills, organizational citizenship behaviors (organizational level), and intellectual capital in secondary schools in Pakistan?

2.3 Model

A parsimonious model of relationships between PLS, OCB, and IC was proposed using OCB as a mediator of PLS, operationalized as a leader's skills in KM, and considered a significant contributor to IC. Figure 1 shows the model tested and developed from a review of the literature.

3 Context and Background

IC is measured as the activities of individuals in an organization, which increase the overall capacity to adapt to circumstances and create new processes. To be successful, however, the organization must go beyond developing the individual's capacities and find ways to embed the learning and skills of the individuals into the memory of the organization. For example, the primary purpose of a knowledge-based organization, in an information society, is the development and transfer of knowledge (Hanson, 2017). This is important for schools as organizations as well. In schools, the intangible assets are the majority contributors to the output of knowledge creation. IC can be viewed as "both an input and an output in schools since students exiting one school level bring their knowledge to the next level and eventually to society at large" (Borneman & Wiedenhofer, 2014, pp. 462–466). The quality of the teachers in the school has a significant and primary influence on school effectiveness because of the relationship to developing IC. IC develops from the sharing of teachers' skills among the group which then become embedded as skills of the organization. Importantly, these variables have been shown malleable to administrator influence (Niqab et al, 2020; Simkin et al., 2010). IC is seen as an "innovative management technology" that needs exploration to develop further understanding of its ability to create value in schools that brings relational capital to society (Secundo et al., 2018a, 2018b, pp. 158–159).

Fig. 1 Model of proposed path of antecedent variables to intellectual capital

3.1 Educational Context of IC

Tangible (physical), financial (funds), and intangible assets in schools (including IC) have been shown to develop improvements in school organizations (Wall, 2005 in Niqab et al., 2019, pp. 10–11). This compares favorably with Bornemann and Wiedenhofer's (2014) "minimum common denominator in educational institution processes" which includes the transfer of knowledge between members, leadership agendas, and management of the facilities (p. 460). They suggest viewing "an education system as a multi-layered construct of various institutions that provide education." The research seeks to identify connections and coordinate the levels to bring increases in IC "to meet the requirements of a knowledge society" (p. 453). Additionally, many studies in the literature reported the leadership skills of the school principals were the only difference between effective and ineffective measures (Piaw et al., 2014). Therefore, leaders are encouraged to develop skills of KM in influencing systems to support employees in their personal and professional development, the use of appropriate technologies, and collaborative behaviors leading to ambidextrous organizations/schools flexible enough to not only survive, but to thrive in our rapidly changing world.

Developing Countries

Large inequities in the learning demonstrated by students in developing countries, versus their developed counterparts, evidences a great divide (Lynd, 2007). Researchers recommend improvements in school performance may come by remodeling the structures of education in developing countries to promote HC development leading to IC, thus improving school performance (Cricelli et al., 2018). For example, one barrier to improvement in developing countries is the decreased capacity of the physical facilities. Other barriers to school improvement may include the inability to implement effective policies (Kamboh & Parveen, 2015, p. 5); low skills of leadership to monitor and supervise teachers; and low levels of money spent on education in relation to overall GDP (Knoema, 2020). Therefore, in the face of economic challenges and limited resources, pursuing the development of school leaders' skills in KM is a viable option that could lead to self-developing processes in schools, leading to IC development (Khan, 2004, 2013).

Pakistan. The educational system in Pakistan faces many challenges. Reports from the latest *Pakistan Social and Living Standards Measurement (PSLM) Survey* (Government of Pakistan, 2018–19) indicated an overall 60% literacy rate for those 10 years and older as compared to 58% in 2013–2014. Further, when disaggregating by gender subgroups, the literacy rate for males (71%) during 2018–19 was much higher than for females (49%). The literacy rate in urban areas was also significantly higher (74%) compared to rural areas (51%) (p. 19). Serious efforts need to be employed to balance the gap between genders (−22%) and economic contexts (−25%) (Qureshi, 2012). Pakistan seeks to improve the quality of education in its school systems based upon reviews of school achievement data being low compared to other developing countries (Memon, 2007).

3.2 Disruptive Technologies

Technology is advancing at an exponential rate during the twenty-first Century contributing to a greater focus on intangible assets, which include knowledge resources and IC in organizations (Bisogno et al., 2018; Ramírez et al., 2007). However, there is a danger that businesses and schools may *over focus* on the technological aspects of resource development at the expense of human well-being. Rather than entering a Brave New (futuristic) World (Huxley, 1932), we seem to be engaging a shadowy, ubiquitous world where power brokers are seeking to "creatively destruct" current societal structures through disruptive technologies that take control over the lives of individuals through rapidly evolving dependencies (BerkLane Consulting, 2020, para. 2; Taneo et al., 2020). This aspect of IC development will be addressed further in this chapter, including the section titled, *Ethics of IC*.

4 Methodology

4.1 Research Design

The research reported here used a quantitative survey approach for data collection and structural equation modeling (SEM) technique to develop an understanding of the relationship between the variables. SEM technique requires a large sample size and n = 408 of this study was considered sufficient (Kline, 2010, p. 11). The quantitative approach was used here to facilitate generalizations to the whole population (Creswell, 2013). In this study OCB and PLS were used as predictor/exogenous variables, while IC of the schools was used as the endogenous variable. The demography of gender, was used as a control variable. The difference in IC means between schools was used to test for a moderating effect of school structural capital on IC (Qureshi, 2012).

Participants. The data used in this study represented self-reports from participants in Pakistan with the help of a four part close-ended questionnaire. Table 1 provides the distribution of the total population of schools in the sample and the number of participating schools by the parent organization. The participant sample in this study was drawn from a total population of secondary school teachers ($N = 1260$) in government schools in the province of Pakistan. The distribution of the survey instrument included 465 teachers (respondents). The number of completed questionnaires returned by respondents was 408 (excellent response rate of 90%, according to Babbie, 1990), providing a 95% confidence level with a margin of error of less than 4% (Krejcie & Morgan, 1970; Niqab et al., 2020).

Survey instruments. Data was collected using a self-developed, close-ended questionnaire consisting of two a Part A: Demographic data and a Part B: Principal leadership skills (PLS), organizational citizenship behaviour - organizational level (OCBO), and intellectual capital (IC) measurement scales.

Table 1 Distribution of sample schools according to Federal Board of Intermediate and Secondary Education (FBISE), Islamabad, Pakistan, from Niqab et al. (2020), Appendix A, p. 28

School #	School's parent organization	Category	Actual population	Sample of study
1	Federal Government	Government	34	21
2	Pakistan Army	Semi-government	23	08
3	Private	Private	08	–
4	Fizaia (Air Force)	Semi-government	05	05
5	Frontier Constabulary	Semi-government	03	–
6	Fauji Foundation	Semi-government	01	–
	Total		74	34

The Principal Leadership Scale (PLS) construct included three operationalized dimensions: transformational leadership skills (TLS), managerial or organizational leadership skills (OLS) and behavioral leadership skills (BLS). The measure included 18 items on a Likert-style scale ranging from 1—(does not exhibit this skill), 2—(Exhibits this skill but not effective), 3—(Is somewhat effective), 4—(Is effective), to 5—(Is very effective). The items in this part have been adopted from Richter (2006) and Richter et al. (2012) with permission. Results of the validation testing revealed a unidimensional construct with a scale reliability indices, Cronbach alpha = 0.95.

Organizational Citizenship Behavior- Organizational Level. This five-point, Likert-type scale, included thirteen items of a three-factor model; Supportive leadership, Collaborative problem solving, and Civic virtue. The rating ranges from 1—(Not true), 2—(Somewhat true), 3—(Quite true), 4—(True), and 5—(Very true). The full-scale internal consistency reliability of the OCBO scale was 0.91 (Organ & Ryan, 1995). The three-factor model yielded an RMSEA of .076 from the CFA analysis using the Satorra-Bentler Scaled Chi-Square (Satorra & Bentler, 1994). The Satorra-Bentler adjusted chi-square was used because of the multivariate non normal distribution of the variables analyzed. The proposed model was a good fit to the estimated population as shown by the 90% confidence interval (0.064–0.087) surrounding the RMSEA result (Browne & Cudek, 1993; MacCallum et al., 1996). The accuracy of this fit was strengthened by a CFI of 0.96 and an NNFI of 0.95—both well above the suggested threshold (Niqab et al., 2019).

Intellectual Capital (IC). A self-developed 23-item, Likert-type scale, composed of HC constructs and Social capital was used to collect data on IC. Items 48–51 were rated by participants on a scale ranging from 1—(Very low), 2—(Low), 3—(Somewhat low), 4—(High), and 5—(Very High). Items, 39–61 used scale ranges from 1—(Strongly disagree), 2—(Disagree), 3—(Somewhat agree), 4—(Agree), and 5—(Strongly Agree). The results section of the Chapter provides reliability and validity results from the survey validation study of this instrument. The factors Social relations (SR), Teacher technical skills (TTS), and Teacher experience and education (TEE)

were empirically tested and validated showing scale reliability Cronbach alphas (0.89, 0.90, and 0.76, respectively). The full-scale IC measurement instrument had an internal consistency reliability $\alpha = 0.897$. A review of the collinearity diagnostics revealed all variance proportions <0.90 for all pairs of variables, supporting the conclusion that no issues with multi-collinearity existed between the sub-factors (Niqab et al., 2020).

Structural Capital (SC) was tested indirectly. The Federal Government schools had statistically significant differences, and lower, IC measures (*Median* = 3.82) than both the Fizaia (*Median* = 4.26, $p < 0.001$) and Pakistan Army schools (*Median* = 4.29, $p < 0.001$) as shown by results of the KW test. No meaningful differences existed between the Pakistan Army and Fizaia schools. Therefore, the null hypothesis was rejected in favour of the alternative hypothesis; H_A: There is a difference in IC measures by school types. Item dimensions are displayed in Appendix 1, including a brief overview of the number of items, variables and their dimensions. Appendix 2 provides the items on the demographic survey and the PLS, OCB, and IC construct surveys (Niqab et al., 2020).

5 Results

The data collected was examined to evaluate the assumptions of normality, multicollinearity, and for missing data before performing exploratory statistical procedures. Correlational analysis was used to answer the overarching question, "Is there a relationship between principal leadership skills, organizational citizenship behaviors, and intellectual capital?" The following null hypothesis was tested.

Hypothsis_0 = There is no relationship between principal leadership skills, organizational citizenship behaviors and intellectual capital.

Results from the correlational analysis found that PLS, OCB, and IC were significantly related ($p < 0.001$). Based upon correlation analyses, providing percentages showing significant relationships in each variable's mean scores, the null hypothesis was rejected.

5.1 EFA and CFA Results

The result of Niqab et al. (2020) study of the dimensions of IC revealed the reliable four-factor structure shown in Fig. 2 a new scale developed for the contextualized sample of teachers in secondary-level public schools in Pakistan. The construct validity of these factors was shown by comparing their operationalizations with the World Bank's four pillars of a knowledge economy.

Construct validity IC factors. The Knowledge Economy Index (KEI), an aggregate measure of a regions' ability to compete in today's Knowledge Economy, was

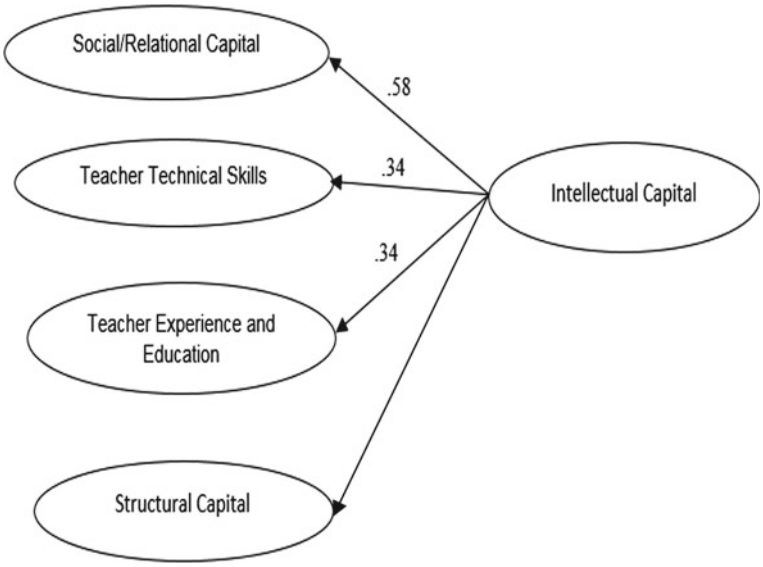

Fig. 2 Model of operationalized factors of IC proposed for testing using a contextualized scale self-developed for this study, From Niqab et al. (2020, p. 17). *Note* Structural Capital was measured indirectly tested indirectly as the change in IC mean between schools with differing systems for teacher accountability and improvement

developed by The World Bank. The index includes four pillars; "economic incentive and institutional regime (EIR), innovation and technology adoption, education and training, [and] information and communication technologies (ICT) infrastructure that promotes the efficient use of new and existing knowledge" (Knoema, 2018, para. 1). Weber (2011) explained that a variety of "new, interrelated forces [are] at work" that include information and communication technologies (ICT), a regions education systems, and technological innovations referred to as Knowledge economies (KE). Organizations are currently including the KEI in their strategic planning (p. 2590).

Of note for the studies reported here, The World Bank rated Pakistan's 2012 knowledge economy index (KEI) as 2.45 out of a possible 10.00, weighted by population (Kapsarc, 2020, para. 1). Following is a comparison of the WB 4-Pillars with the four factors of IC, identified from the studies reported in this chapter (Niqab et al., 2020, pp. 21).

WB Pillar 1—"economic incentive and institutional regime (EIR)" (Knoema, para. 1). This pillar compared favorably with the factor of structural capital, operationalized as the overall environment in a school that creates a favorable context to develop HC leading to IC (Liu, 2010). SC has been described as "all the non-human storehouses of knowledge including databases, organizational charts, process manuals, strategies, routines and policies" (Khalique et al., 2011, p. 344).

WB Pillar 2—"innovation and technology adoption" can be compared to the TTS factor described in this study, conceptualized as "special skills teachers develop from

in-service and technical training programs, areas not directly related to their professional area though supportive such as technologies and information processing" (Niqab et al., 2020, p. 14).

WB Pillar 3—"education and training," can be compared with the TEE factor including HC and spiritual capital constructs of the integrated model. TEE is the quality of the employees' "knowledge, competence, skill, capability, and innovation" that disappears from the organization "when the employees go home at night" (Khalique et al., p 344).

WB Pillar 4—"information and communication technologies (ICT) infrastructure" compared favorably with SR factor, "capturing behaviors of employees in the *informal* structure of the organization for developing positive communication and sharing information" (Niqab et al., 2020, p. 21).

Human Capital Index (HCI). Further construct validity is provided by comparing the three-fold model for HC developed and tested for in small and medium-sized manufacturing firms in Pakistan by Mubarik et al. (2018). The model identified nine dimensions on the HCI including "experience, education, training, skills, attitude personal attributes, compliance, health and stability" (p. 616). This compared favorably with the model developed from this study for schools in Pakistan, which included the dimensions of technical skills, experience and education, and social relational skills, providing.

Multiple Regression Analysis

The relationship between the independent variables PLS and OCB and the endogenous (dependent) variable IC was tested and met the assumptions of normality, linearity, multi-collinearity and homoscedasticity required for multiple regression analysis. All three independent variables were entered simultaneously into the regression analysis. Additionally, Fig. 3 shows the results of a test of mediation of variable OCB on PLS in explaining changes in IC mean values.

The results showed PLS and OCB variables explained a significant proportion ($R^2 = 0.585$) of the variance in IC ($F(2, 405) = 167.87$, $p < 0.001$). The R^2 of .587 was considered a large effect (Cohen, 1988). The OCBO ($\beta = 0.557$) were followed by PLS ($\beta = 0.237$). A one-way ANOVA test was run comparing the IC means of the three schools in the study. Significant differences were found with the Federal Government School having the lowest IC mean score, and the Null hypothesis was rejected in favor of the alternative, these results suggest an important relationship between the three constructs.

Fig. 3 Results of regression analysis results of PLS, OCB, and IC (ß values)

Structural Equation Modeling (SEM)

The modeled relationships (standardized coefficients) between OCB, PLS and IC along with their sub-dimensions are presented in Fig. 4. The results of the SEM provided empirical evidence to support the regression analysis. The model fit measured by the Root Mean Square Error of Approximation was .074 was found to be a "reasonable" fit. (Browne & Cudek, 1993; MacCallum et al., 1996). Figure 4 shows the relationships between OCB, PLS and IC. The relationship between shows that OCB has a significant causal relationship with IC. In addition, PLS has a significant causal relationship with OCB. This finding suggests that OCB is responsible for a large and significant amount of variation ($\beta = 0.98, p < 0.001$) in IC. Likewise PLS is responsible for a large and significant amount of variance ($\beta = 0.81, p < 0.001$) in OCB. However, these results show explains almost no variance in IC.

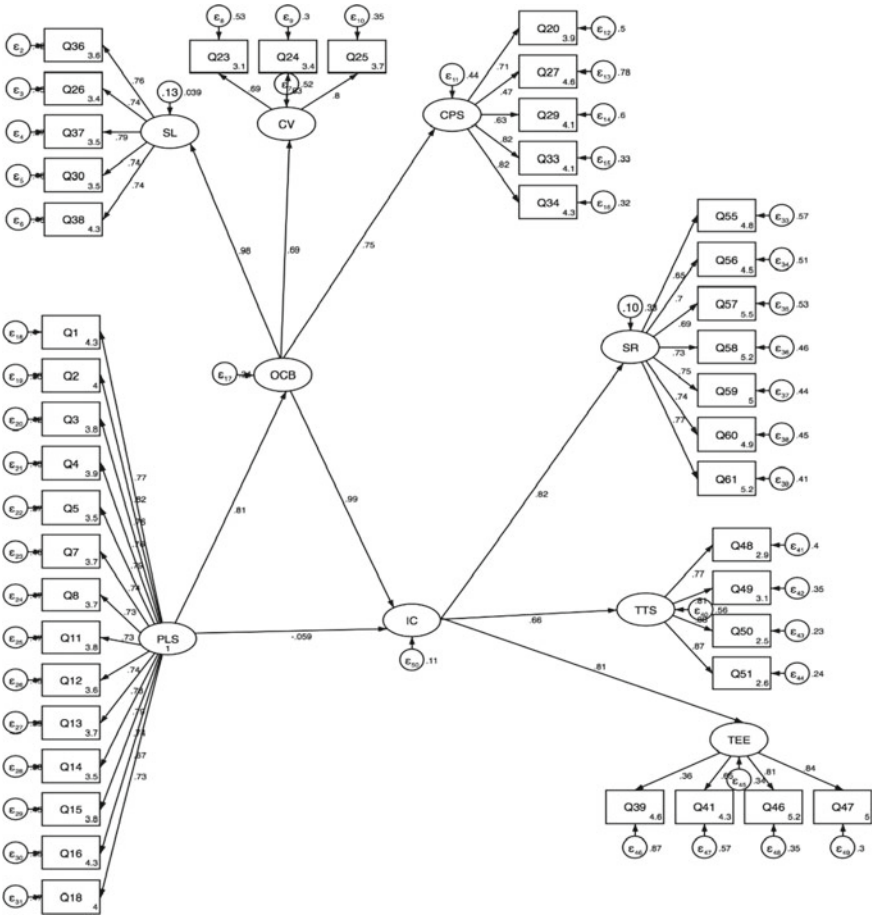

Fig. 4 SEM model showing the relationships OCB, IC, and PLS. Standardized coefficients are reported

6 Discussion

The results of several studies exploring dimensions of IC and its relationship with OCBO and PLS were the first of their kind to develop and test three contextualized measurement tools for promoting IC in public secondary-level schools in Pakistan. Importantly, the SEM results suggest that a leaders' KM skills in developing positive school cultures promote the development of IC indirectly through positive school cultures that include OCBs. Additionally, empirical results of dimension analysis of IC provided sufficient evidence to suggest that IC is comprised of four key factors that were shown similar to the 4-Pillars of a KE. Supportive leadership, a key factor in OCBO and the four factors of IC, the leader's skills in developing structural capital, positive social relationships, teachers' technical skills, and professional development work together to explain positive increases in IC in schools. This model of knowledge development is consistent with the LOVS model, where proxy leaders, who promote open flexible systems and provide sufficient resources and time to work together, results in individual faculty development and promotion of social relations leading to knowledge sharing. The information in this chapter may encourage the development of leaders' understanding of the use of variables to improve schools.

7 Conclusion and Implications

The empirical results of statistical tests performed in this study provide important insights into the relationships between variables leading to IC as a measure of "value creation." The research conceptualized IC in secondary-level public schools in Pakistan as a combination of the constructs of Human Capital (TTS, TEE, SR, and SC) which is indirectly developed through PLS by the creation of the mediating variable OCBO. Empirical results showed sufficient evidence that the scales developed to collect the data used in this study are reliable for use by school administrators and teacher leaders to capture the proposed factors of IC, PLS, and OCBO in their schools. Constructs showed validity by favorable comparisons with constructs in the literature on the topic.

Processes for improvement include a framework aligned with Argyris and Schön's (1974), theory of action, in which espoused theories are those standards and values the individual(s) purport to believe and follow (such as self-report data on the research survey). In order to substantiate faculty self-reports, exploration of their theories-in-use are performed by observing actions in the workday.

Identify the leaders' current KM skills by taking the PLS survey.

Evaluate the results and explore professional development opportunities to improve *actual* performance skills in KM toward building positive cultures in their schools.

Distribute the OCBO scale to the faculty/employees to determine areas for growth.

School leaders support faculty dialogues to reflect and make explicit the organization's values in order to address challenges and dilemmas in current practice.

Work collaboratively to develop the next steps in developing systems that promote *actions* identified by the factors of OCBO.

The results of self-developing processes would be expected to yield high returns leading to improved IC for schools and ultimately society at large.

Complete the IC survey to determine if the faculty self-reports yield espoused theories aligned with high IC in the schools.

Share the findings with the faculty, parents, community, stakeholders, and policy makers and obtain feedback to validate espoused theories are in use in the schools.

Perform recursively in a process of continuous school self-improvement.

7.1 Recommendations

The new model can provide relevant and reliable information on the various aspects of IC in businesses as well as schools. Developing systems that promote positive cultures is a skill all leaders need to build intangible assets such as IC and provided accountability to outside customers and stakeholders. Strategies for school leaders include reflecting on the items responses in the survey and considering ways to develop opportunities for collaborative decision making, providing supportive processes, time for faculty, staff, community, students and leaders to work together to plan, share knowledge, build relationships, and develop common norms resulting in social and organizational identities and shared vision/goals (Hanson, 2017; Isaac et al., 2009). All these factors lead towards the development of relational learning and increase the potential for the knowledge to become embedded in the organization. Teachers can reflect on research-based data from self-report feedback and collaborate on the next steps for designing professional development and school systems that promote IC in their schools.

Using the tool developed in this study, recursively, and distributing the results to stakeholders to join the conversation could lead to local solutions for contextually-based issues of knowledge management. The scale may also be used for accountability and reporting of IC levels to increase transparency with stakeholders and for policy holders to direct resources and propose school improvements. Policy makers are calling for integrated reporting measures of intangible assets in schools with Austria leading the way with mandatory reporting of IC in their universities (Leitner, 2004). Policy makers and journal editors are asking researchers to explore and develop recommendations for school processes promoting IC and for measurement models to develop transparency that builds relational capital with the community (Secundo et al., 2018a, 2018b, p. 157). The tools provided in this study are shown useful to collect reliable data for valid decision making.

School leaders have an indirect effect on student achievement through their influence on teacher development and school culture. However, research shows developing individuals is not enough to improve an organization. Knowledge sharing must

occur between individuals and learning must occur at the organizational level that embeds shared skills across the school culture thus developing IC. Using a *bottom-up approach,* the validated constructs IC, OCBO, and PLS measurement scales provided in Appendix 2 can be used to collect reliable data from faculty/employees. The results can be used to begin challenging dialogues with faculty for self-development, recursively. Self-developing processes seek to avoid down-stream consequences of top-down approaches such as standardized assessments accountability mandates.

7.2 Ethical Concerns

Organizations and individuals can become overwhelmed by the changing landscape of the departing Information Age, of what we found familiar and routine. Heidegger (1939/2017) warned with his futuristic claim,

> The "miracles" of technology … enchant the human being, such that he arrives at the opinion that he himself dominates the miracle, whereas he has become merely the most submissive cog in a machine (p. 306).

Bi (2019) described the 'Age of Reckoning" as following the Information Age. He predicts "technology [won't] solve all our problems, and brings with it new ones" (para. 1). "Economic growth and technological development don't increase the ratio of available human attention to the amount of need for human attention …" (Bi, para. 4). Rather, leaders are encouraged to remember that IC foremost results from social capital through the development of relationships between human individuals in organizations that develop positive OCBO. Leaders' skills in KM should enhance positive relationships, and not over focus on tooling up TSS, if the goal is to promote IC.

Counterproductive Work Behaviors (CWB). Administrators and teacher leaders must consider ethical concerns when developing systems to promote OCB at all levels by putting protections in place for potential negative consequences. Resentment toward less productive employees can build for conscientious employees, who feel pressured to perform OCB to ensure the jobs in the school get done. The result can lead to anger and frustration explaining why studies show both OCB and CWB demonstrated in the workplace by the same individual(s).

Conflicts of Interest None.

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Appendix 1

Table of items used for measuring dimensions and sub-dimensions of variables tested

Variable	Dimensions	Items distribution	Total items
Principal leadership skill (PLS) [Exogenous variable]	Transformational leadership skills (TLS)	1–9 (9 items)	18
	Organizational leadership skills (OLS)	10–14 (5 items)	
	Behavioural leadership skills (BLS)	15–18 (4 items)	
Organizational citizenship behaviour (OCB) [Mediating variable]	Altruism (ALT)	19–22 (4 items)	20
	Civic virtue (CV)	23–26 (4 items)	
	Consciousness (CON)	27–30 (4 items)	
	Courtesy (CSY)	31–34 (4 items)	
	Sportsmanship (SMS)	35–38 (4 items)	
Intellectual capital (IC) [Endogenous variable]	(a) Human capital (HC)	39–51 (13 items)	23
	Education (EDU)	39–42 (4 items)	
	Experience (EXP)	43–45 (3 items)	
	Training (TRG)	46–49 (4 items)	
	Skills and abilities(SAA)	50–51 (2 items)	
	(b) Social capital (SC)	52–61 (10 items)	

Appendix 2

Intellectual Capital, Principal Leadership, and Organizational Citizenship Behaviors Survey (from Niqab et al. (2020), Appendix C, pp 29–34).

I am conducting a survey to find out how different aspects of principal's leadership develop intellectual capital of the secondary school teachers. You are invited to respond to the following items by keeping in view your school situation. Your response will be kept strictly confidential.

Respondent's code_____
Designation _____
Address of school_____

School Type (Please tick (√) the relevant category).

Public ☐ Private ☐ Semi-government ☐

Part-A

Teacher's Demography:

1) Sex: Male ☐ Female ☐

2) Age (Years):

25-30 ☐ 31-35 ☐ 36-40 ☐ More than 40 ☐

3) Professional Qualification:

C.T. ☐ B.Ed. ☐ M.Ed. ☐ Others ☐

4) Working Experience:

Less than 1 Year ☐ 1-5 years ☐ 6-10 years ☐

11-15 years ☐ 16-20 years ☐ More than 20 years ☐

5) Academic Qualification:

Undergraduate ☐ Graduate ☐

Masters ☐ Others ☐

Principal Leadership Skills (PLS) Survey

ITEM No	*The Principal:*	Does Not Exhibit this Skill at all	Exhibits this Skill but Not Effective	Exhibits this Skill somewhat	Exhibits this Skill Effectively	Exhibits this Skill Very Effectively
1	Leads staff in establishing a school vision.					
2	Leads staff in establishing a set of goals to implement Vision					
3	Actively encourages staff input and participation to prioritize goals					
4	Works toward whole staff consensus on important school wide issues and goals					
5	Uses problem-solving skills to help staff to reach consensus.					
6	Expects high performance from all staff.					
7	Encourages and supports staff to self-evaluate progress in implementing school-wide goals.					
8	Provides professional development activities to support school wide goals.					
9	Anticipates predictable problems and effectively responds to them					
10	Makes sure that school agrees with district, province, and federal regulations					
11	Promotes staff unity and co-operation					
12	Provides staff with materials, resources, and proper planning to achieve school-wide goals					
13	Establishes school-wide behavioral management plan					
14	Provides resources to implement school-wide behavioral management plan					
15	Supports and recognizes staff who helps in implementing behavioral management Plan					
16	Supports and recognizes student who display improved behavioral/social skills					
17	Regularly informs students, staff ,parents, and community about procedures and progress toward meeting behavioral management goals					
18	Ensures all staff know, understand, and follow agreed upon school-wide behavioral management standards, systems and practices					

Organizational Citizenship Behavior—Organizatinal Level (OCBO)

	Teachers in this school:	Not True	Somewhat True	Quite True	True	Very True
19	…are committed to complete the given task in given time.					
20	…are found to help each other when there is a sharp notice issued by principal for any assigned task.					
21	…feel no boredom when they find extra work to be done.					
22	…feel a sense of co-operation among themselves.					
23	…are trained such that they take part in extracurricular and co-curricular activities actively.					
24	…always co-operate in conducting various functions at different occasions.					
25	…have enough skills to prepare students for various activities.					
26	…are facilitated by principal for organizing various educational and social activities.					
27	…always abide by rules and regulations set by administration.					
28	…express their views on improving teaching learning process.					
29	consider themselves as part of the solution not the problem					
30	…consider that Principal acts as a role model for teacher and student development.					
31	resolve their problems amicably among themselves					
32	…show sense of respect for each other when they discuss issues regarding job performance.					
33	…solve students' problems in meetings so the students never find any conflict among teachers					
34	…try to solve the problems of his/her colleagues.					
35	…never loose heart, when they are not awarded on their achievements					
36	…feel that the principal publically acknowledges the commendable efforts of the teachers in organizing various activities					
37	…feel that the principal develops the sportsmanship spirit in them to achieve various academic and non-academic goals					
38	…act like a team together with the principal to achieve curricular, co-curricular and extra-curricular goals					

Intellectual Capital (IC) Scale

		Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
39	Well qualified teachers are one of the reasons of remarkable output of the school.					
40	Academically and professionally trained teachers are appointed in our school.					
41	Our school encourages teachers to enhance their academic and professional qualification.					
42	Our school staffs are well mannered.					
43	Our school teachers possess rich work related experience.					
44	Teaching experience has a positive impact on school performance.					
45	Our teachers have rich experience in organizing co-curricular activities.					
46	Continuous professional development contributes to the performance of our school.					
47	Continuous professional development of teachers is an integral part of our school.					
	Please indicate your school's level in the following elements:	**Very Low**	**Low**	**Somewhat**	**High**	**Very High**
48	Investment in in-service trainings					
49	Time spent on in-service trainings					
50	Inclination towards technical training, like ICT trainings					
51	Inclination towards the provision of resources like ICT, Multimedia etc.					
		Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**
52	Teachers develop and discuss new ideas to improve teaching process and students' outcome.					
53	Teachers are always interested to learn and acquire new skills which enhance their professionalism.					
54	Teachers are energetic and enthusiastic while performing their organizational tasks.					

		Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
55	There is best practice of social relations among the teachers in our school.					
56	There is an observation of positive relations among principal and teachers in our school.					
57	Best social relations among the teachers act as a role model to develop the same social relations among students in our school.					
58	Best social relations among the teachers have developed a best social structure in our school.					
59	Mutual trust among the teachers has led to co-operation in various activities.					
60	Decent behaviour of our teachers with principal, students and parents reflects their good social relations in our school.					
61	Best practice of social relations among our principal, Teachers and Students is a step towards societal change.					
Thank you for taking time to complete this questionnaire. Your opinion are very important. Please return the completed questionnaire to the designated person in your school.						

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The Role of Intellectual Capital as a Determinant of Firm Value

Rumeysa Bilgin

Abstract The twofold purpose of this chapter is to provide a detailed literature review on the relationship between intellectual capital and firm value and to present an empirical study of this relationship in developing countries. The originality of this study lies in the use of the multilevel modeling method to analyze a large cross-country data set of 12,331 firms from 26 countries. The efficiency of intellectual capital is measured with value-added intellectual coefficient. Market value, earnings quality, return on asset, and return on equity are employed as proxies of firm value and performance. Variance coefficient and random intercept models are estimated. The findings imply that the efficient management of intellectual capital increases the profitability of sample firms. However, no significant relationship is detected between intellectual capital and market value. These results indicate that intellectual capital increases firm profitability in developing countries. However, investors in these countries do not count intellectual capital in their valuation processes. Managers can increase their firms' profitability by efficient management of intellectual capital in developing countries.

Keywords Intellectual capital · Firm value · Multilevel analysis · Panel data

1 Introduction

According to corporate finance theory, the main objective of management is to maximize a firm's value (Brigham & Ehrhardt, 2013; Jensen, 2001; Ross et al., 2016). Estimating the value of a firm and understanding its determinants are vital for managerial decision-making (Damadoran, 2007). There are different ways to measure the value of a firm. Intrinsic value and market value are the two most relevant for this chapter. The intrinsic value of a firm is a function of the magnitude and risk level of its future free cash flow streams. In contrast, the market value is decided in the free market. It

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is identical to the intrinsic value under perfect market conditions. Although information asymmetry prevalent in the real world causes market imperfections, the market value equates with intrinsic value in equilibrium. The market value of a firm is a function of various firm-, industry-, and country-specific factors. Corporate governance structure, capital structure, and dividend policy decisions are the main drivers of the market value (Antwi et al., 2012; Chen et al., 2019; Makhija & Spiro, 2000; Naceur & Goaied, 2002). An alternative measure is the book value, which is defined as total asset value on the balance sheet. Edvinsson and Malone (1997) define the difference between market and book values as Intellectual Capital (IC), which comprises intellectual property of a firm and the expertise of its employees. IC is an intangible asset that can create tangible profit (Sullivan, 2000). However, there is no generally accepted definition of IC (Sardo & Serrasqueiro, 2017). Lin et al. (2015) state that "IC comprises intangible assets, including skills, know-how, brands, corporate reputation, organizational capabilities, relationships with customers and suppliers, employee innovativeness, and other identifiable intangible assets such as patents and royalties". During the 1990s, researchers proposed tools for measuring the efficiency of IC, such as the balanced scorecard and the Skandia navigator (Bontis, 2001; Edvinsson & Malone, 1997; Kaplan & Norton, 2005). Among these tools, the value added intellectual coefficient (VAIC) model is the most popular one (Pulic, 1998, 2000). Recently, some researchers have suggested modifications to the VAIC approach to increase its effectiveness (Bayraktaroglu et al., 2019; Nadeem et al., 2017; Ulum et al., 2014; Xu & Li, 2019). Notwithstanding the limitations of VAIC (Stahle et al., 2011), it is still frequently used in IC research due to its simplicity, reliability, and comparability.

A recent trend is to consider IC as a component of a regional or national ecosystem (Pedro et al., 2018; Svarc et al., 2020). Bellucci et al. (2020) state that "the diverse meaning that IC management can assume in particular local contexts, such as economically advanced countries or developing countries, democratic countries rather than oligarchic or even dictatorial regimes, liberal market economies or coordinated market economies, etc." requires additional research. Lin and Edvinsson (2020) point out the need for comparative studies. The twofold purpose of this chapter is to provide a detailed literature review on the relationship between IC and firm value and to present an empirical study of this relationship in developing countries. A panel data set of 12,331 firms from 26 developing countries for the 2012–2018 period is analyzed using a multilevel modeling approach. Multilevel analysis is a tool for modeling hierarchical/nested data structures to examine the relationship between variables measured at different levels (De Leeuw et al., 2008). This method is particularly useful in studying cross-country panel data sets due to their multilevel structures. The data set consists of time, firm, and country levels. Multilevel modeling makes it possible to analyze the effects of each level separately (Skondral & Rabe-Hesketh, 2008).

The rest of the chapter proceeds as follows. Section two highlights the main theoretical approaches and empirical findings on the relationship between IC and firm value. Research methodology and the data are explained in section three. Results of the empirical analysis are presented in section four. Finally, section five concludes with a discussion of the findings and their implications for research and practice.

2 Literature Review

2.1 Theoretical Background

The agency theory of firm implies that managers are agents of the shareholders, and their main objective should be the maximization of shareholder wealth (Jensen & Meckling, 1976). The objective becomes the maximization of the stock price for publicly listed firms under the assumption that there is not any asymmetric information nor agency problem between managers and shareholders (Ross et al., 2016). The stakeholder theory rejects this view and suggests that managerial decision-making should consider the interests of any individual or group who affects and/or is affected by the corporate activity (Donaldson & Preston, 1995). Similarly, Resource-Based View (RBV) theory implies that a firm's unique resources generate its value (Barney, 1991). As Jensen (2001) states, stakeholder theory cannot be accepted as a substitute to the value maximization approach since it fails to provide a single objective for the management. This single objective enables managers to find their way along the jungle of possible investment, financing, and dividend decisions. It also improves social welfare (Jensen, 2002). The continuing debate between these two views shows the necessity of a more mutualistic approach (Freeman et al., 2020). The stakeholder theory states that the success of a firm is decided by the total wealth generated for its stakeholders (Riahi-Belkaoui, 2003). On the other hand, the value maximization approach emphasizes firm value, which can be defined as book, market, or intrinsic values. The book value is equal to the total assets in the balance sheet. Actually, it is an unrealistic measure due to the historical cost assumption of accounting. It is assumed that the value of assets should be recorded at their initial costs on the balance sheet. Even though some depreciation or amortization adjustments are made for the long-term assets over the years, the book value of a firm rarely reflects its fair value. Besides, it is extremely difficult to decide fair values of the assets due to market inefficiency and the low probability of finding similar assets on sale in the market at the time of valuation. Even if the fair values of the assets are known, the going concern value of the firm might be different from the sum of the fair values of its assets. Thus, the total value of assets reported in the balance sheet may be far from reflecting the actual firm value. That discussion implies that the off-balance-sheet assets also affect the value of a firm.

The market value of a firm is the sum of the market values of its debt and equity. The market value of debt is usually accepted to be very close to its book value.

However, this is not the case for the market value of equity. It is a function of the stock price and the number of shares outstanding for a publicly listed firm. If the efficient market hypothesis holds and if the markets are at equilibrium, market value is equal to intrinsic value. The intrinsic value of a firm can be estimated by the Discounted Cash Flow (DCF) method (Damodaran, 2007). Since Fisher (1930) first provided a formal definition of the DCF concept, it became the most well-known and broadly used valuation method. DCF states that the present value of an asset is the sum of the present values of its future cash flow streams. In this context, the value of a firm can be formulated as follows:

$$V_0 = \sum_{t=1}^{\infty} \frac{FCF_t}{(1 + WACC_t)^t} \tag{1}$$

Here, V_0 is the intrinsic value of the firm at present time (at time 0), FCF_t is the expected future free cash flow at time t and $WACC_t$ is the weighted average cost of capital of the firm at time t. $WACC_t$ reflects both the risk of FCF_t and the financing mix used to raise the necessary capital. FCF is calculated as follows:

$$FCF = [EBIT \times (1 - t_c)] + Depreciation - \Delta NWC - Capital\ Expenditure \tag{2}$$

Here, *EBIT* is earnings before interest and taxes, t_c is the corporate tax rate and ΔNWC is the change in the networking capital. The firm values estimated using DCF and Economic Value Added (EVA) approaches are equivalent if the assumptions about growth and reinvestment are the same (Damodaran, 2007; Shrieves & Wachowicz, 2001). Both estimations are based on *EBIT* (Iazzolino, 2014). Thus, firm value is a function of profits generated by its tangible and intangible assets. Initially, the term IC is used as synonymous with the intangible assets of a firm (Edvinsson & Malone, 1997; Sullivan, 2000). Later, it became clear that it is a subset of the intangible assets (Petty & Guthrie, 2000). IC is the value-generating knowledge and capacities based on intangible assets of a firm (Pedro et al., 2018).

The IC literature has evolved four stages since the first introduction of the term by Galbraith in (1969) (Lin & Edvinsson, 2020; Pedro et al., 2018; Roos & O'Connor, 2015). During the first stage, which lasted until the early 2000s, researchers have focused their attention on raising general awareness of IC management (Dumay & Garanina, 2013; Petty & Guthrie, 2000). Some early attempts to measure the efficiency of IC are made (Edvinsson & Malone, 1997; Kaplan & Norton, 2005). The value added intellectual coefficient (VAIC) approach, developed by Pulic (1998, 2000), becomes the most widely adopted measurement tool (Iazzolino et al., 2014). From 2000 to 2003, the second stage of the literature is developed with the emergence of empirical studies on measurement and disclosure of IC (Lin & Edvinsson, 2020). Petty and Guthrie (2000) emphasize that the distinction between the first two stages should not be chronological. According to their view, research works should be classified based on content. The three components of IC are defined as human, relational, and structural capital in the second stage (Guthrie et al., 2012). Human capital refers

to the knowledge, competence, and inter-relationship ability of employees (Chen et al., 2004). Structural capital is the knowledge embedded in the organizational structure and the processes of a firm. Relational capital is the knowledge embedded in customers and external relations of the firm (Guthrie et al., 2012). The third stage of IC research emerges from critical analyses of IC management in practice (Guthrie et al., 2012). Lastly, the fourth stage constitutes the state-of-the-art in IC research and considers IC as a component of a regional or national ecosystem (Mahmood & Mubarik, 2020; Pedro et al., 2018; Svarc et al., 2020).

2.2 Empirical Studies

Firm profitability, leverage ratio, asset tangibility, size, and growth opportunity are the well-known determinants of market value (Buchanan et al., 2018; Desai & Dharmapala, 2009; Maury & Pajuste, 2005). Some researchers document significant relationships between efficiency of IC and firm value (Chen et al., 2004; Maditinos et al., 2011; Nadeem et al., 2017; Singla, 2020; Soetanto & Liem, 2019; Wang, 2008, 2013). Others fail to detect any relationship. (Firer & Williams, 2003; Ghosh & Mondal 2009; Mosavi et al., 2012; Tan et al., 2007). The empirical knowledge about the relationship between IC and firm value is mostly based on single-country studies. In an early study, Bozbura (2004) shows that human and relational capital increases firm value and structural capital has correlations with human and relational capitals in Turkey. Using a survey method, Tseng and James Goo (2005) found that the efficient management of IC increases firm value in Taiwan. Chen et al. (2005) have shown that IC has a positive impact on both market value and performance in Taiwan. Veltri and Silvestri (2011) find that human capital has a more significant effect on firm value than structural capital in Italy. Clarke et al. (2011) report a positive relationship between the IC and the performance of Australian firms. Liang et al., (2011) use a panel dataset to investigate the mediating role of IC on the relationship between corporate ownership and firm value in Taiwan. They find that IC has a mediating role in high-tech industries. Wang (2013) detects a positive relationship between IC and firm value in Taiwan. Using a large sample of Chinese listed firms, Li and Zhao (2018) use a GMM estimation approach to analyze the dynamic effect of IC on firm value. They fail to detect a significant impact of human capital on firm value. However, significant relationships between current and past organizational capitals and firm value have been documented. Thus, even though intellectual capital investments have a decreasing effect on the current firm value, they increase future value. Ahmed et al. (2019) document the positive impacts of organizational and human capital on firm performance in Pakistan. Bayraktaroğlu et al. (2019) report positive relationships between Turkish firms' IC components and firm performance. In addition, they detect that innovation has a moderating role between structural capital and performance. Similarly, Soetanto and Liem (2019) find a positive effect of IC on firm performance in Indonesia. Singla (2020) show that IC affects the performance of Indian infrastructure firms. Ting et al. (2020) report a

negative relationship between Taiwanese electronic firms' IC and firm performance. They attribute this finding to the relative weight of capital employed efficiency in their IC measure. Xu and Liu (2020) investigate the relationship between IC and firm performance in South Korea. They find that human capital efficiency increases performance while relational capital decreases it. Structural capital does not affect firm performance for this country.

There are some cross-country studies on the relationship between IC and firm value. Using the system GMM estimation method, Nimtrakoon (2015) finds the efficient management of IC increases firm performance in ASEAN countries. Sardo and Serrasqueiro (2017) use the same methodology to analyze non-financial listed firms from 14 Western European countries. They show that human capital is a key indicator of firm value. Nirino et al. (2020) reach the same conclusion using a data set that contains 345 European firms. Recently, several systematic literature reviews on IC are published (Alvino et al., 2020; Bellucci et al., 2020; Crupi et al., 2020; Lin & Edvinsson, 2020). They reveal the necessity of developing better methods to measure IC as well as an ecosystem-oriented and interdisciplinary research agenda. In addition, the relationship between IC and firm value in advanced or developing countries is suggested as a further research topic (Bellucci et al., 2020; Lin & Edvinsson, 2020). It can be assumed that the relationship between IC and firm value in developing countries may be different from that in developed countries. The remaining part of the chapter aims to contribute to this literature by analyzing the impact of IC on firm value in developing countries.

3 Data and Methodology

3.1 Sample and Variables

The sample comprises 12,331 firms from 26 developing countries selected from the upper and lower-middle-income groups of the World Bank's country classifications by income level (World Bank Group, n.d.). Financial statement data of sample firms are obtained from the Compustat database. The sample period covers nine years between 2010 and 2018. Financial firms are excluded from the sample because their balance sheets have a different structure from those of nonfinancial firms. Firms with negative equity are also excluded from the sample because they are financially troubled. As can be seen in Table 1, the number of firms varies from country to country and across time. The total sample consists of 100,041 firm-year observations. China and India have the highest numbers of firms with 30,104 and 28,825 firm-year observations, respectively. Botswana, Ghana, and Zambia are countries with the lowest number of firms in the sample with 98, 117, and 114 firms, respectively. The sample panel data set has an unbalanced structure since observations for some firms in some years are missing.

Table 1 Number of sample firms for each country per year

Countries	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Argentina	69	69	68	66	65	65	65	63	61	591
Bulgaria	127	146	174	181	184	156	183	186	175	1512
Brazil	323	322	319	316	313	312	309	306	299	2819
Botswana	12	12	12	11	11	10	10	10	10	98
China	2479	2929	3280	3394	3541	3573	3636	3641	3631	30,104
Colombia	34	35	35	35	33	33	32	32	32	301
Egypt	49	134	139	143	141	141	142	140	135	1164
Ghana	12	12	13	13	14	14	14	14	11	117
Indonesia	357	371	381	392	414	437	440	444	440	3676
India	3139	3206	3297	3320	3288	3248	3203	3115	3009	28,825
Jordan	93	119	116	113	111	108	105	104	98	967
Kenya	36	37	39	36	35	35	35	36	29	318
Sri Lanka	187	190	190	190	191	188	186	184	180	1686
Morocco	58	60	59	57	56	55	54	54	53	506
Mexico	107	108	103	105	104	103	102	101	100	933
Malaysia	845	824	812	798	790	796	791	780	768	7204
Nigeria	98	104	100	98	99	95	93	91	89	867
Pakistan	330	335	341	343	346	344	344	341	335	3059
Peru	86	87	85	84	82	79	76	75	73	727
Philippines	168	168	171	173	172	173	172	171	168	1536
Romania	128	125	131	133	128	110	110	108	104	1077
Russia	253	255	262	255	240	235	225	217	205	2147
Thailand	461	482	522	546	578	580	585	576	573	4903
Turkey	286	313	315	316	312	308	302	295	287	2734
South Africa	264	257	247	238	226	221	213	201	189	2056
Zambia	9	11	14	14	13	14	13	13	13	114
Total	10,010	10,711	11,225	11,370	11,487	11,433	11,440	11,298	11,067	100,041

Source Author

Market value (MV), earnings quality (EQ), return on asset (ROA), and return on equity (ROE) are the dependent variables in this study. MV is natural logarithm of the market value of equity and the book value of liabilities. The market value of equity is estimated by multiplying the number of shares outstanding by the year-end stock price. Following Xu and Li (2019) natural logarithm of earnings before taxes is used as a proxy of earning quality. Also, ROA and ROE are employed as indicators of firm profitability. Following Pulic (2000), intellectual capital is measured by the value added intellectual coefficient (VAIC). It is the sum of human capital efficiency (HCE), structural capital efficiency (SCE), and capital employed efficiency (CCE). HCE gives the unit value added (VA) for one unit increase in human capital (HC).

HC is equal to salaries and wages expense. VA is estimated as the sum of operating profit and HC. SCE measures the structural capital (SC) as a percentage of value added. SC is estimated as the difference between value added and salaries and wages expense. CEE gives the unit value added for one unit increase in physical and financial capital (CA). CA is equal to tangible assets. Following Xu and Li (2019) and Ting et al. (2020), market leverage (LEV), firm size (SIZ), market to book ratio (MtB), asset tangibility (TAN), current ratio (CUR), and research and development (RD) are employed as control variables. LEV is measured as the financial debt over the total invested capital. Financial debt is the sum of short and long-term debt. Total invested capital is the sum of the financial debt and the market value of equity. SIZ is measured as the natural logarithm of total assets. MtB is the ratio of market value to book value. TAN is representation of fixed assets as a percentage of total assets. CUR is measured as the ratio of current assets to current liabilities. The last variable is a dummy variable (RD), which takes a value of 1 when the firm reports a research and development expense and takes the value of 0 otherwise. Variable definitions are given in Table 2.

The line graphs of the mean values of dependent variables and VAIC are displayed in Fig. 1. The mean value of MV decreases between 2010 and 2013. It increases each year for the rest of the sample period. A similar pattern exists for EQ and VAIC. The mean values of ROE and ROA increase only between 2015 and 2017.

Descriptive statistics of variables are presented in Table 3. The mean and the median values of dependent variables are close. Their skewness values indicate approximately symmetric distributions. However, kurtosis values show that their observations are heavily accumulated around the mean. VAIC has a skewed distribution with a much higher peak even after trimming at 1–99%.

Pearson correlation coefficients are shown in Table 4. Significant correlations exist between all pairs of dependent variables. Furthermore, VAIC has positive and significant correlations with all of the dependent variables. In addition, SIZ, MtB, and TAN have significant correlations with VAIC. Nevertheless, the magnitudes of these coefficients are smaller than or equal to 10%. Thence, none of them indicates multicollinearity.

3.2 Methodology

The estimation method employed in this study is chosen considering the multilevel structure of the sample data. Cross-sectional and over-time heterogeneity both exist in this structure. Additionally, an extra level of heterogeneity is created when firms are nested in countries. The unbiasedness and efficiency of the ordinary least squares estimation depend on the validity of several assumptions. One of them is random error terms' not being correlated with each other. This assumption is not satisfied in the case of a hierarchical data structure. The two-stage least squares estimation method can be used to overcome that problem. However, such an approach decreases the degree of freedom, especially with a large number of groups. Another solution

Table 2 Variable definitions

Variables	Definition	Symbol	Formula	Source
Dependent variables	Market value	***MV***	$MV = \ln(Total\ assets - Book\ value\ of\ equity + Market\ value\ of\ equity)$	All financial data were collected from compustat capital global IQ database
	Earnings quality	***EQ***	$EQ = \ln(Earnings\ before\ interest\ and\ taxes)$	
	Return on asset	***ROA***	$ROA = (Net\ income)/(Total\ assets)$	
	Return on equity	***ROE***	$ROE = (Net\ income)/(Book\ value\ of\ equity)$	
VAIC components	Human capital efficiency	***HCE***	$HCE = VA/HC$ $HC = Salaries\ and\ wages\ expense$ $VA = (Sales\ revenue - COGS) - (Operating\ expenses$	
	Structural capital efficiency	***SCE***	$SCE = SC/VA$ $SC = VA - HC$	
	Capital employed efficiency	***CEE***	$CEE = VA/CE$ $CE = Total\ assets - Intangible\ assets$	
Focus variable	Value added intellectual coefficient	***VAIC***	$VAIC = HCE + SCE + CEE$	
Control variables	Market leverage	***LEV***	$LEV = Financial\ debt/Total\ capital$	
	Firm size	***SIZ***	$SIZ = \ln(Total\ assets)$	
	Market to book ratio	***MtB***	$MtB = Market\ value\ of\ firm/Total\ assets$	
	Asset tangibility	***TAN***	$TAN = Net\ fixed\ assets/Total\ assets$	
	Current ratio	***CAR***	$CAR = Current\ assets/Current\ liabilities$	
	R&D expense dummy	***RD***	$RD = 1 if\ R\&D\ expense > 0$ $RD = 0 if\ R\&D\ expense < 0$	

Source Authors

is to include explanatory variables that measure group characteristics instead of dummy variables. However, it may not be possible to find variables that can accurately measure group effects. If the group effects are not taken into account, the estimates of the standard errors are biased. This bias leads to narrow confidence intervals and smaller p-values. As a result, the probability of making type 1 error increases (Steele, 2008). The multilevel estimation method makes it possible to model group-level variability (Raudenbush & Bryk, 2002). Besides, it provides the opportunity to

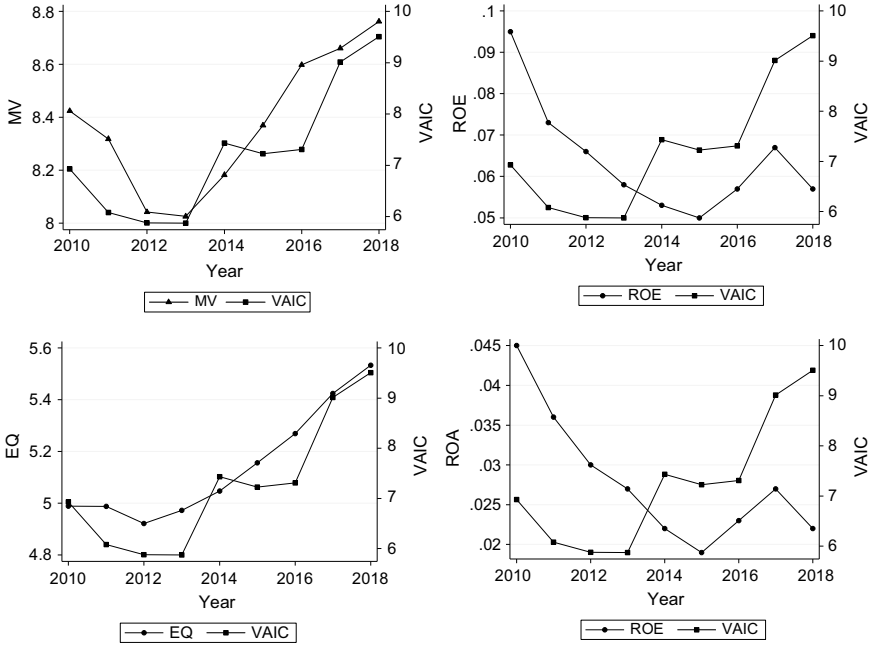

Fig. 1 Line graphs of mean values. *Source* Authors

Table 3 Descriptive statistics

Stats.	MV	EQ	ROE	ROA	VAIC	LEV	SIZ	MtB	TAN	CUR
Mean	8.39	5.14	0.06	0.03	6.98	0.17	7.70	1.86	0.32	2.44
Median	8.37	4.98	0.07	0.03	3.15	0.05	7.57	0.96	0.29	1.48
St.Dev	2.58	2.59	0.22	0.09	19.36	0.24	2.46	3.68	0.23	3.48
Min	0.39	0.39	−1.52	−1.78	7.16	1.51	0.47	10.18	0.55	5.44
Max	4.06	4.66	18.06	11.37	66.19	4.35	4.74	152.08	2.51	41.96
Skew	−3.96	−6.91	−1.72	−0.60	−29.85	0.00	−6.91	0.07	−0.44	0.09
Kurt	20.15	17.60	1.33	0.29	255.55	0.95	19.66	82.72	1.34	42.49
N	83,033	79,463	86,210	86,115	47,452	70,772	99,219	69,861	983,41	95,644

Source Authors

examine the group-level effects (Woltman et al., 2012). Panel data, which is formed by combining cross-sectional and time-series data, has a very suitable structure for a simple multilevel model. In this structure, the time dimension constitutes the second level while the cross-section units are located at the first level (Snijders & Bosker, 1999). If the cross-sectional units are also grouped within themselves, the model turns into a three-level hierarchical structure. Multilevel models can be used even if the panel data is unbalanced (Skondral & Rabe-Hesketh, 2008). Simultaneous analysis of

Table 4 Correlation matrix

	MV	EQ	ROE	ROA	VAIC	ML	FS	RD	MtB	AT	CR
MV	1.00										
EQ	0.93***	1.00									
ROE	0.11***	0.22***	1.00								
ROA	0.08***	0.23***	0.67***	1.00							
VAIC	0.11***	0.11***	0.05***	0.05***	1.00						
LEV	0.11***	0.13***	-0.24***	-0.42***	0.00	1.00					
SIZ	0.97***	0.93***	0.05***	0.00	0.10***	0.21***	1.00				
RD	0.16***	0.14***	0.01**	0.00	−0.01	0.02***	0.16***	1.00			
MtB	0.15***	0.02***	0.11***	0.17***	0.04***	−0.20***	−0.01**	0.01*	1.00		
TAN	0.12***	0.13***	−0.08***	−0.10***	0.02***	0.29***	0.15***	0.01**	−0.04***	1.00	
CUR	-0.18***	−0.19***	0.01*	0.17***	-0.01	-0.27***	−0.19***	−0.01**	0.10***	−0.21***	1.00

*** $p < 0.05$

Source Authors

within-level and cross-level relationships is possible via multilevel analysis (Woltman et al., 2012). Multilevel models can be used even if the panel data is unbalanced.

In this study, the data set has three levels where time and firm are identifiers of the third and the second levels, respectively. Firms are nested in countries to create the first and the highest level. Two types of multilevel models are employed in this study. The first one is the Variance Components Model (VCM). It shows the impact of each level on the variance of the dependent variable. The VCM equations for each dependent variable are specified as follows:

$$\begin{aligned} MV_{kit} &= \alpha_0 + \eta_k + \mu_{ki} + \nu_{kit} \\ EQ_{kit} &= \beta_0 + \theta_k + \pi_{ki} + e_{kit} \\ ROE_{kit} &= \gamma_0 + \tau_k + \lambda_{ki} + \varepsilon_{kit} \\ ROA_{kit} &= \delta_0 + \sigma_k + \zeta_{ki} + \epsilon_{kit} \end{aligned} \tag{3}$$

where, MV_{kit}, EQ_{kit}, ROE_{kit} and ROA_{kit} are MV, EQ, ROE and ROA values at time t for the i th firm in k th country, respectively. α_0, β_0, γ_0 and δ_0 are mean values of the dependent variables. η_k, θ_k, τ_k and σ_k are the country level error terms for the k th country. Thus, mean values of the dependent variables for the k th country are $\alpha_0 + \eta_k$, $\beta_0 + \theta_k$, $\gamma_0 + \tau_k$ and $\delta_0 + \sigma_k$. Similarly, μ_{ki}, π_{ki}, λ_{ki} and ζ_{ki} are firm level error terms for the i th firm in k th country. Lastly, ν_{kit}, e_{kit}, ε_{kit} and ϵ_{kit} are time level error terms for the i th firm in k th country at time t. Error terms at all levels are assumed to have normal distributions with zero means and constant variances.

Random Intercept Model (RIM) is the second multilevel model employed in this study. The RIM equations for each dependent variable are specified as follows:

$$\begin{aligned} MV_{kit} &= \alpha_0 + \alpha_1 VAIC_{kit} + \alpha_2 ROE_{kit} \sum_{m=3}^{7} a_m X_{m,kit} + \eta_k + \mu_{ki} + \nu_{kit} \\ EQ_{kit} &= \beta_0 + \beta_1 VAIC_{kit} + \sum_{m=2}^{6} \beta_m X_{m,kit} + \theta_k + \pi_{ki} + e_{kit} \\ ROE_{kit} &= \gamma_0 + \gamma_1 VAIC_{kit} + \sum_{m=2}^{6} \gamma_m X_{m,kit} + \tau_k + \lambda_{ki} + \varepsilon_{kit} \\ ROA_{kit} &= \delta + \delta_1 VAIC_{kit} + \sum_{m=2}^{6} \delta_m X_{m,kit} + \sigma_k + \zeta_{ki} + \epsilon_{kit} \end{aligned} \tag{4}$$

where, $VAIC_{kit}$ is VAIC value at time t for the i th firm in k th country and $X_{m,kit}$ is the value that m th control variable takes at time t for the i th firm in k th country. Control variables included in the models are LEV, SIZ, RD, MtB, TAN CUR and RD. Since profitability is a well-known determinant of firm value, ROE is also included in the first model as an additional control variable. α_1, β_1, γ_1 and δ_1 are the coefficients of the focus variable and α_m, β_m, γ_m and δ_m are the coefficients of m th control variable.

All coefficients except the intercept are accepted as fixed in RIM. The models are estimated using the maximum likelihood (ML) estimation method. Since ML is an asymptotic method, its consistency relies on the sample size. Hox et al. (2010) states that both the coefficient and standard error estimates are getting more accurate when sample sizes are increased at each level. The following hypotheses were formulated for this study:

H1: There is no relationship between a firm's IC and its value in developing countries.

H2: There is no relationship between a firm's IC and its profitability in developing countries.

4 Results

Table 5 presents the results of the VCM models given in Eq. 3. Overall (grand) mean values of the dependent variables are displayed in the first part of the table. The variance components of each level are presented in the second part. Lastly, the interclass correlation coefficients (ICC) are given in the third part. ICCs are estimated by proportioning the variability of the dependent variable at each level to the total variability.

63% of the total variability in MV across sample firms are caused by country-level factors. Similarly, 33% of the variability in MV comes from firm-level factors. Only 4% of it is due to time level. The ICCs at country, firm, and time levels have similar percentages in EQ. Thus, more than half of the variabilities in MV and

Table 5 Results for variance components model

Dependent variable	MV	EQ	ROE	ROA
Overall [grand mean]	8.2460 [0.4791]	5.1260 [0.4492]	0.0765 [0.0074]	0.0314 [0.0038]
Variance components				
Country level	5.9179 [1.6550]	5.1763 [1.4563]	0.0012 [0.0005]	0.0003 [0.0001]
Firm level	3.1137 [0.0411]	4.3066 [0.0586]	0.0107 [0.0002]	0.0036 [0.0001]
Time level	0.3889 [0.0021]	0.7455 [0.0041]	0.0381 [0.0002]	0.0044 [0.0000]
Interclass correlation coefficients				
Between countries (%)	63	51	2	4
Between firms (%)	33	42	21	43
Across time (%)	4	7	76	53

Standard errors in brackets
Source Authors

EQ are coming from the country-level factors. These initial findings validate the employed methodology in this study. The country-level ICCs are only 2% and 4% for ROE and ROA, respectively. The time level is found to have the highest effect on the variability of these two profitability measures. As can be seen in Table 6, the variance components change with the inclusion of independent variables in the

Table 6 Results for random intercept model with IC

Dependent variable				
	MV	EQ	ROE	ROA
ROE	0.0476*** [0.0091]	–	–	–
VAIC	−0.0001 [0.0003]	0.0030*** [0.0003]	0.0006*** [0.0001]	0.0003*** [0.0000]
LEV	−0.6577*** [0.0389]	−0.6123*** [0.0329]	−0.1392*** [0.0069]	−0.1027*** [0.0025]
SIZ	1.0199*** [0.0132]	1.0296*** [0.0056]	0.0155*** [0.0010]	0.0118*** [0.0004]
RD	0.0516*** [0.0159]	0.0887*** [0.0177]	0.0025 [0.0039]	0.0041*** [0.0014]
MtB	0.1149*** [0.0106]	0.0192*** [0.0023]	0.0016*** [0.0005]	0.0002 [0.0002]
TAN	0.0606* [0.0359]	−0.0962** [0.0436]	−0.0636*** [0.0081]	−0.0289*** [0.0031]
CUR	−0.0140*** [0.0016]	−0.0186*** [0.0027]	−0.0001 [0.0005]	0.0014*** [0.0002]
Constant	0.0322 [0.1627]	−2.9076*** [0.0968]	−0.0264* [0.0158]	−0.0439*** [0.0083]
Industry effect	Yes	Yes	Yes	Yes
Observations	30,954	25,842	30,954	31,102
Variance components				
Country level	0.0238 [0.0082]	0.0669 [0.0244]	0.0015 [0.0006]	0.0009 [0.0003]
Firm level	0.1484 [0.0070]	0.5895 [0.0139]	0.0115 [0.0004]	0.0030 [0.0001]
Time level	0.0732 [0.0066]	0.4269 [0.0044]	0.0387 [0.0004]	0.0036 [0.0000]
Interclass correlation coefficients				
Between countries (%)	10	6	3	12
Between firms (%)	60	54	22	40
Across time (%)	30	39	75	48

Standard errors in brackets
Source Authors
$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

RIM model. The country-level variabilities of MV and EQ have decreased when RIM model is estimated. These findings show that a multilevel methodology is a useful approach for investigating the role of IC as a determinant of firm value in a cross-country context.

Table 6 presents results for the RIM models given in Eq. 4. The focus variable, VAIC, is found to have statistically significant and positive effects on EQ, ROE, and ROA. Thence, H2 is rejected against its alternative. In line with the previous literature, these findings show the importance of IC investments for firm profitability (Bayraktaroğlu et al., 2019; Li & Zhao, 2018; Singla, 2020). However, no significant relationship is detected between VAIC and MV. Thus, the null hypothesis H1 cannot be rejected. These findings imply that the present efficiency of IC is not an indication of future efficiency in developing countries. Previous studies have found a positive relationship between IC and firm value in developed countries (Nirino et al., 2020; Sardo & Serrasqueiro, 2017). Present market value reflects the expectations of shareholders about future firm performance. According to these findings, investors in developing countries do not consider the current intellectual capital in their valuation process.

As for the control variables, the findings are consistent with those of the mainstream literature. ROE is found to have a positive effect on MV. The investors accept current profitability as an indicator of future profitability. ML has negative and significant coefficients in all models. Firms with high levels of indebtedness are less profitable with lower market values. The coefficient of SIZ is positive and significant for all models in Table 6. Since large firms are unlikely to go bankrupt, they are less likely to suffer from indirect bankruptcy costs. These costs may decrease both profitability and value. RD of a firm is found to have a positive effect on MV, EQ, and ROA. Firms with a reported research development expense have higher firm values, better earnings qualities, and a higher return on assets. MtB has positive and significant effects on MV, EQ, and ROE. Thus, firms with a higher growth opportunity are more valuable and more profitable. TAN has a positive and significant effect on MV. However, its significance level is only 10%. Like firm size, asset tangibility is an indicator of the financial strength of the firm. All other things equal, firms with a larger number of fixed assets are more valuable. On the other hand, TAN has a negative and highly significant effect on EQ, ROE, and ROA, an increase in fixed asset investments decreases current profitability. Lastly, CUR has a negative and significant impact on MV and EQ. The current ratio is an indicator of the working capital investment. Investing in working capital decreases the market values of firms. CUR has a positive effect on ROA. When the total assets are constant, an increase in CUR is either the result of a decrease in TAN or an increase in long-term debt. Decreasing TAN increases profitability for service firms, which operate in more knowledge-based and less capital-intensive industries.

As a robustness check, the models presented in Eq. 4 are re-estimated with decomposing VAIC into HCE, SCE, and CEE components. The results are displayed in Table 7. CEE is found to be the most influential predictor of firm performance. In line with the findings of Ting et al. (2020), it has a negative effect on MV. However, the magnitude of the coefficients is not large enough to offset the insignificant effects

Table 7 Results for random intercept model with IC components

Dependent variable				
	MV	EQ	ROE	ROA
ROE	0.0514^{***} [0.0086]	–	–	–
HCE	0.0000 [0.0000]	-0.0000^{***} [0.0000]	0.0000 [0.0000]	0.0000 [0.0000]
SCE	0.0000 [0.0000]	2.9001^{***} [0.0254]	0.0000 [0.0000]	0.0000 [0.0000]
CEE	-0.0393^{***} [0.0135]	3.2873^{***} [0.0322]	0.2627^{***} [0.0071]	0.2355^{***} [0.0027]
LEV	-0.6623^{***} [0.0127]	-0.3763^{***} [0.0247]	-0.1104^{***} [0.0067]	-0.0786^{***} [0.0023]
SIZ	1.0190^{***} [0.0024]	0.9919^{***} [0.0044]	0.0129^{***} [0.0009]	0.0097^{***} [0.0004]
RD	0.0516^{***} [0.0070]	0.0911^{***} [0.0132]	-0.0009 [0.0037]	0.0012 [0.0013]
MtB	0.1158^{***} [0.0008]	0.0004 [0.0017]	0.0020^{***} [0.0004]	0.0003^{*} [0.0002]
TAN	0.0599^{***} [0.0167]	-0.0320 [0.0333]	-0.0608^{***} [0.0077]	-0.0283^{***} [0.0028]
CUR	-0.0140^{***} [0.0008]	-0.0093^{***} [0.0020]	0.0010^{**} [0.0004]	0.0022^{***} [0.0001]
Constant	0.0493 [0.0475]	-5.4158^{***} [0.0768]	-0.0472^{***} [0.0144]	-0.0673^{***} [0.0071]
Industry Effect	Yes	Yes	Yes	Yes
Observations	32,614	26,169	31,448	31,597
Variance components				
Country level	0.0247	0.0362	0.0009	0.0005
	0.0077	0.0121	0.0004	0.0002
Firm level	0.1479	0.3936	0.0097	0.0026
	0.0029	0.0090	0.0004	0.0001
Time level	0.0719	0.2241	0.0383	0.0030
	0.0007	0.0023	0.0004	0.0000
Interclass correlation coefficients				
Between countries (%)	10	6	2	8
Between firms (%)	60	60	20	43
Across time (%)	19	34	78	49

Standard errors in brackets
Source Authors
$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

of HCE and SCE on MV. Overall, these results indicate that firms can increase their value in the short run by reducing CEE. The results indicate that CEE has positive and significant effects on EQ, ROE, and ROA, which is consistent with the previous literature (Chen et al., 2005; Clarke et al., 2011), These findings imply that CEE is the most crucial component of IC in developing countries. SCE does not affect any of the dependent variables except EQ. Similarly, HCE is found to have a significant effect only on EQ. Quality of earnings decreases with HCE and increases with SCE. These findings indicate that firm profitability increases with the efficiency of IC in developing countries. Results related to control variables are similar to the results of the models presented in Table 6.

5 Conclusion

This chapter provides a detailed literature review on the relationship between IC and firm value and it presents an empirical study on that relationship. Some studies have documented a positive relationship between IC and firm value. Some other studies have found that all or some of the IC components do not affect or negatively affect firm value. In a recent literature review, Bellucci et al. (2020) suggest analyzing the impact of IC on firm value in advanced and developing countries as a further research topic. Following their suggestion, this chapter investigates the impact of IC management on firm value in developing countries.

IC is measured using VAIC. The proxies of firm performance are determined as market value, earnings quality, return on asset, and return on equity. The results indicate that IC has a positive effect on earnings quality and profitability of sample firms. The relationship between VAIC and firm value is considered insignificant in this study. CEE is found to be the most effective component of VAIC. It has a negative effect on market value and has a positive effect on profitability. According to the results, SCE and HCE only affect earnings quality. Even though IC increases the current profitability, it does not affect the market value of the firm. These results imply that IC efficiency increases firm profitability in developing countries. However, investors in these countries do not value IC efficiency apart from its effect on the current profitability.

The findings are useful for both researchers and managers. As best known to the author, this is the first attempt for using a multilevel modeling approach to investigate the relationship between IC and firm value. Furthermore, the sample data set is one of the largest in terms of the number of sample firms and countries. These results can be used as a basis of comparison in future cross-country researches.

The results regarding VAIC and capital employed efficiency, which are shown to have positive effects on quality of earnings and profitability can be useful for managers in developing countries. Efficient management of IC can help them in increasing firm profitability. However, they should humble their expectations regarding the positive effect of IC efficiency on firm value.

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Intellectual Capital and Firm Internationalization

Ekaterina Panarina

Abstract The creation of a human-oriented economy and the rise of human capital in modern economic systems as a strategic resource for competitiveness can be considered the most significant advantage of the new globalization. In this chapter, we will discuss the role and importance of human capital and its international mobility, the talent management process that plays a strategic role in improving the competitiveness of enterprises and countries on the global level. Considering the importance of knowledge in the current times, the competition of today is shaped to foster the firms' intellectual capital and talent management. We will consider modern trends in the internationalization of countries and companies' business activities at macro-and microeconomic levels. Based on expert interviews, reports, and literature review the current situation in intellectual capital mobility would be highlighted. The relevance of the present work is determined by the need to research intellectual capital as the contemporary development trend in the context of the world economy globalization.

Keywords Intellectual capital · Human capital · Internationalization · Competitiveness · Globalization

1 Introduction

One of the fundamental tendencies in world economy development is globalization. Its processes are manifested, on the one hand, in deepening of connections between countries on the world economic arena and, on the other hand, in the intensification of contradictions between developed industrial countries and emerging markets, and increasing competition on the global scale.

As it is known, world markets are controlled by transnational and multinational corporations of the United States and other developed countries in Western Europe and Asia, succeeding in the innovation sphere of leading sectors in their national

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economies. The leadership of these countries is quite neutral due to the accelerated pace of innovation and development of information technologies. Accelerated progress of information technologies considerably transformed material production and management process.

In the contemporary context, quality, efficient use and multiplication of information resources directly affect the development and accumulation of intellectual capital of any nation. These resources are some of the most important factors in the development of competitive human capital, which is an "innovative person" who possesses advanced knowledge, versatile skills, and adequate conditions for their effective implementation and is aimed at invention, innovation, lean manufacturing, high-quality and conscientious work. An "innovative person" is the foundation and main source of extended reproduction of intellectual capital.

The relevance and relationship to the previous chapters of the present work is determined by the need to research intellectual capital as the contemporary development trend of economic theory; to analyze genesis, structure, and main components of intellectual capital and approaches to its measurement; to detect patterns of contemporary intellectual capital development in the context of the world economy globalization, and to study the matters of intellectual capital management. Globalization and intellectual capital mobility that is an objective of discussion for the present chapter, opens a new perspective for the countries to compete and attract talents, to create conditions for human capital outsourcing and global human resources attractiveness.

Foundations of the human capital theory were laid back in the last century by G. Becker, L. Walras, A. Marshall, J. Thünen, I. Fischer, T. Schultz, L. Baruch, D. Kendrick, O. Lange, F. Lundberg, F. Machlup, and T. Stewart whose views are still relevant. Knowledge management was studied in the works of G. Kleiner, R. Williams, J. Stonehouse and others. The need for intellectualized economic activity and the increased role of "human capital" and the application of valuable knowledge is described in the works of T. Sakaiya. Problems of intellectual capital development in the context of globalization are considered in the works of E. Holton, B. Yamkovenko, N. Bontis, etc.

The purpose of the present chapter is to identify specifics of the economic aspect of intellectual capital in the context of economic globalization and internationalization of businesses, and to study internationalization processes in the formation, development, and use of intellectual capital. In this chapter we will be discussing the trends of internationalization of intellectual capital in the contemporary world, main tendencies of personnel global mobility, personnel global mobility management and corporate culture, and the role of talent management in an international company.

2 Internationalization of Intellectual Capital in the Contemporary World

Intellectual capital is an active element, comprising knowledge, experience, information, means of its necessary protection as legally registered intellectual property, and is directly involved in value creation. Internationalization of intellectual capital is a process of intertwining and uniting national intellectual capitals, reflecting the influence of contemporary globalization trends, both positively and negatively.

On the positive side, processes of intellectual capital internationalization lead to the movement of scientific and professional personnel for the purpose of exchanging knowledge and skills, cyclic migration, development of education system, etc. Its negative effect manifests itself in the decrease of intellectual potential of the state, concentration of intellectual capital in the developed countries, which allows them to dictate their interests to other countries in the context of economic globalization.

As today, we live in the age of information economy, which is a knowledge-based economy where knowledge-generating technologies, exchange and use of intellectual resources become the source of competitiveness of enterprises. In the contemporary conditions of international business development, the main driver of corporate value, along with successful products and technologies, is intellectual capital, with human capital forming its basis. Stability and planned development of human capital are prerequisites for the successful implementation of the company's competitiveness strategy.

As it has been discussed earlier, intellectual capital is an active element that includes knowledge, skills, manufacturing experience of specific people, and information, in other words—intellectual resources that can be productively used to maximize the profit of an enterprise.

The basis for the formation of intellectual resources at contemporary innovative enterprises is the intellectual potential of personnel, its maximization and development. Human capital can one of the most effective resources, that can be deployed to improve competitiveness of a firm.

Internationalization and exchange of intellectual resources at an international level in a macro-environment contribute to the growth of knowledge, practical skills, creative and thinking abilities of people, i.e., competencies and abilities of the company's personnel.

At the enterprise level, international specialization and cooperation with foreign business partners, and workforce outsourcing are forms of appearance of internationalization. As a result of globalization, intellectual capital has become the most important commodity in the world market.

Internationalization of intellectual capital as part of the establishment of multicultural personnel at organizations reflects the influence of contemporary globalization trends on the quantity and quality of staff. The degree of the cultural diversity of human resources of an enterprise, produced by the influence of international cooperation and migration, serves as a source of competitiveness and development.

Internationalization of intellectual capital is viewed as a process of intertwining and uniting national intellectual capitals, which opens up new opportunities for improving production, creates intellectual rent as a marginal product of using scientific experience and ability to obtain, process and implement information.

In view of this, it should be noted that import of intellectual capital is very relevant for many countries today. Obviously, the export of intellectual capital negatively affects national economic growth, and from this perspective, it should be treated as flat deduction from internal investment resources or savings. The problem of departure of highly qualified specialists from the national science, production and culture is a major problem of decreasing national intellectual potential.

In the contemporary global world, transnational corporations of the United States, European Union and Japan determine global economic development by accumulating intellectual, research development and financial potential. Due to this, results of their activities belong largely to this group of countries, and economically less developed countries pay intellectual rent for opportunities to import and consume high-technology products, and in return export raw materials and low-technology goods.

However, the internationalization of intellectual capital in the contemporary world changes business values, and business power transforming the trends from the conservative Industrial age of doing business to the Human age of information and human-based economy, Table 1.

Under the conditions of globalization and shortage of qualified personnel that can meet the requirements of developing businesses, companies strive to attract and retain personnel resources, that are diverse demographically, ideologically and geographically.

Today key global factors affecting the development of trends in human resources are the following:

1. Economic climate;
2. Demographic transition;
3. Technologies and databases;
4. Gap between demand and supply of qualified personnel in the world.

Table 1 Industrial age and human age in economic development

The characteristics of the industrial age	The characteristics of the human age
Capitalism	Talents based economy
Priority—access to capital	Priority—access to talents
Age of business owners	Age of talented specialists
Age of employers	Age of applicants
Companies dictate terms	Applicants dictate terms
Unemployment due to excess of personnel	Unemployment due to lack of qualified personnel
Labor migration by way of exception	Widespread labor migration
One job for the life-time	Change of 10–14 employers by the age of 38

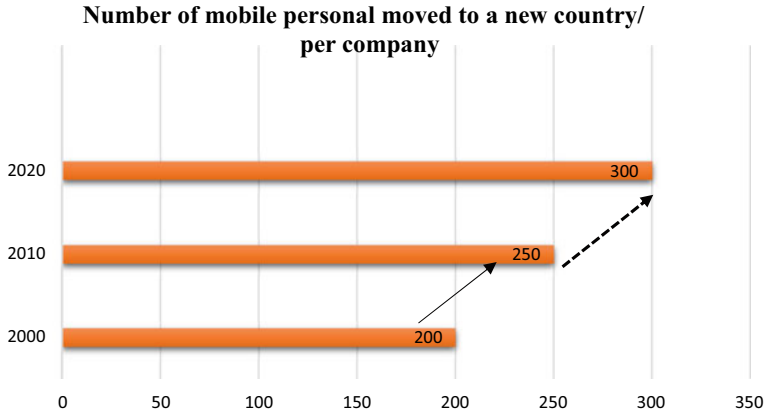

Fig. 1 Average number of employees participating in personnel mobility within large organizations. *Source* PwC (PriceWaterhouseCoopers) "Talent mobility 2020 and beyond", 2012 (database representing 900 companies that have been surveyed on assignment trends over the past 18 years)

Changes in economic climate re-direct globalization—emerging markets start to drive growth. New labor markets and new demand markets arise due to demographic shifts. In developed countries, there has been observed a declining birth rate and aging of the population, as compare to the developing countries rising. The rate of development and use of high technologies, especially communication and information transfer technologies, increases exponentially. The gap between demand and supply of personnel is determined by personnel deficit in different regions of the world. Explosive growth in the emerging markets considerably increases the number of specialists working abroad, Fig. 1.

The world is connected as it has never been before, and the power of collaboration is beginning to emerge. An explosion of activity in emerging markets has contributed to a significant increase in the need for companies to move people and source talent from all around the world. Personnel mobility develops according to rising the following business needs:

- The need to develop all-rounded leaders of the future to work in the international environment.
- The need to offer opportunities for career growth to attract and retain personnel under the conditions of intensifying competition to win talents.
- The acknowledgment that the organization can benefit from the two-direction exchange of knowledge, skills and experience—every market is a breeding ground for new ideas.

The success of any creative, innovative company is absolutely dependent on its employees, their ideas and intellectual resources. Companies have a great need to deploy their talent around the world, and as a consequence, international assignment levels and overall mobility is increasing significantly.

3 Main Tendencies of Personnel Global Mobility

Analysis of the global demographic situation and trends shows that new growth centers appear as BRICS countries (Brazil, Russia, India, China, and South Africa) and countries with emerging economies, including countries in Asia and Latin America prepare more qualified and talented personnel. Having access to the best talent continues to be a challenge for CEOs and business leaders—with 97% of CEOs in PwC's (PriceWaterhouseCoopers) annual global CEO survey saying that having the right talent is the most critical factor for their business growth. In addition, 79% of CEOs said they would be changing their strategies for managing talent as a result of the downturn—and 55% said they would look to change their approach to global mobility including international secondments.

Demographic changes, aging of the workforce in developed countries, and the mobility of work resources in emerging economies are causing fundamental changes in the internationalization of intellectual capital. The extensive growth of international mobility is a factor of the competitive ability of organizations working strenuously to attract international talents for their companies.

Organizations bring innovations into their approaches to global workforce mobility based on the need to adjust to changing requirements of the business world and to adapt to the preferences of different generations of workers. The urgent need for companies to strengthen skills in some disciplines, to attain expertise in certain regions and projects is creating considerable changes in international mobility. Previously, the main characteristic of personnel mobility was an average period of 3–5 years working abroad and then returning to headquarters or a local office. Now, mobility is based on a specific task or project. The main priority for companies becomes to have the right talents in the right places. Its achievement is based on the strategic need to optimize investments into mobility programs. Many solutions that are being developed, are directed at bringing mobility programs into compliance with the business realities of tomorrow:

- *Short-term personnel moves* for a year or less are becoming more popular, 20% of moves now last less than 12–37 months, compared with 10% in 2012. Short-term moves, as a rule, are more attractive to younger workers who would like to add to their experience, rather than to older workers with families who seek stability.
- *Project-oriented moves.* Organizations bring together specialists from different units for collaborative work on a specific project, and it requires a temporary move or frequent trips during project execution.
- *Extended business tours or long-term business trips* allow working in any place of the world without the need to move. This became an acceptable alternative for workers with families.
- *In-country mobility* is evolving in line with the efforts of companies to maximize their investments in mobility. It is easier and more effective to move qualified personnel for example from Shenzhen to Huangshan or from Mumbai to Ahmedabad than to involve someone from the United States or other developed markets.

- *Worker rotation programs* are often used in the development of high potential staff in specific industries and are becoming more and more international.
- *Unilateral relocation.* Organizations are moving their regional or global headquarters closer to the fastest-growing markets where their business interests are concentrated. This involves the constant relocation of key managers and their families.
- *Contracted work* is increasingly being used by organizations to meet short-term demand for certain professionals.
- *Virtual mobility*—technological innovations allow employers to bring together the best specialists, wherever they are located, to work and train together. Some candidates for cross-border mobility may not be ready to move. In such cases, alternatives to traditional mobility such as virtual meetings and short-term trips become relevant.

Personnel mobility develops in many new forms and manifestations. At the same time, the complexity of managing global mobility programs is significantly increasing, which can include a diverse set of approaches in the environment where organizations must quickly recruit talent, monitor risks, verify compliance, analyze costs and return on investment. HR departments must ensure that immigration, tax and social obligations are met.

The PwC's (PricewaterhouseCoopers, 2012) data reveals that assignee levels have increased by 25% over the last decade 2010–2020; and predicted further 50% growth in assignments in the next decade is a reality. There will be more assignees, more business travel, more virtual tools, and especially more quick, short-term, and commuter assignments. The growing importance of emerging markets creates a significant shift in mobility patterns, as skilled employees from emerging markets increasingly operate across their home continent and beyond, creating greater diversity in the global talent pool.

3.1 Personnel Global Mobility Management

Managing a multinational team must take into account the golden rule: visiting specialists must adapt to local conditions, rules, and traditions. The task of the recipient party (local staff and managers) is to help foreign specialists to adapt to new conditions. For the most part, they ensure professional, cultural, communicative and organizational adaptation.

Attracting, retaining, engaging and developing talents as part of human resources management practice is the task for HR office (Fig. 2).

HR managers of the companies face questions of how to work with international talents, what specialists to recruit, how to successfully compete for talents and protect human resources of their company in the long-term.

Major companies are working to align their global mobility programs more closely with business planning and talent management. The aim is to accelerate the response

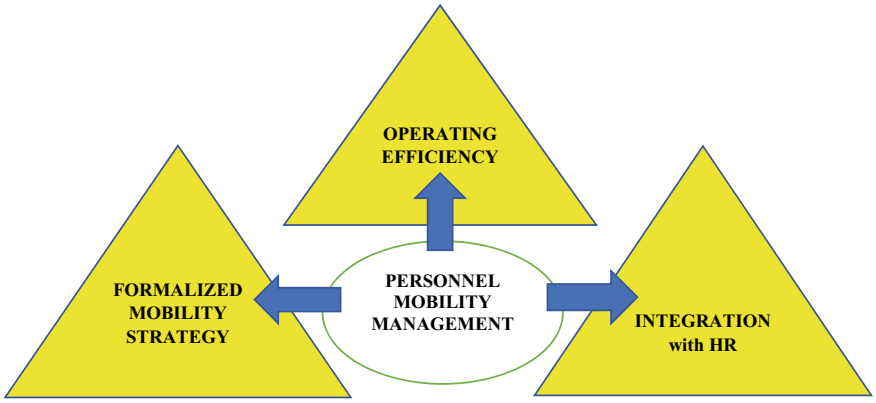

Fig. 2 Personnel mobility management. *Source* (2013) «Deloitte and touche regional consulting service ltd»

to the dynamics of economic growth engines and such demographic phenomena as the aging population and emergence of a new generation of employees in the market.

Human resources managers have always been responsible for managing staff mobility, compensation, and tax issues, as well as developing the global mobility policy of organizations. As talent management is gaining more strategic importance, HR's area of responsibility is expanding to include:

- Competing for talents on the global market and emerging markets.
- Hiring workers of rare qualifications.
- Developing leadership skills and ensuring employee continuity.
- Talent management must ensure that career-building ambitions and stimulating career opportunities are realized.

Staff mobility is playing an increasingly important role in attracting, retaining, and engaging talent. Today, the paramount challenge for HR professionals is to persuade organizations to go beyond the perception of international mobility purely through a quantitative prism and look into the long-term perspective of investing in staff mobility. Mobility strategies must become flexible, adaptable and constantly evolving to meet specific needs of different generations and groups of workers, and also of business in general. A large proportion of the workforce today is made up of working parents. Women are increasingly taking part in international mobility programs, over the past 10 years, their number in international movements has increased from 10 to 20%. The millennials who form the majority of the workforce since 2020 have a number of special characteristics that employers cannot ignore. Over the course of their careers, they plan to change employers several times in search of job satisfaction and rapid career advancement. Their focus is more on interest in work and opportunities than on monetary rewards. This trait is especially noticeable in Asia, where frequent employer changes are quickly becoming the norm. The dismissal

rate in Asia is currently 15%, as compared with 6% in Latin America. This may be further aggravated in the future.

Millennials are striving to work overseas, mainly in the US, UK and Australia (Table 2). More than half of people surveyed said they would be willing to work in a less developed country, only 11% would agree to work in India and 2% in China or Iran (PwC "Talent mobility 2020 and beyond", 2012 (survey of university graduates).

Millennials are captivating attention of employers who specifically target their mobility strategies to this growing segment of the workforce. Some large international organizations offer an international experience for their student recruits.

The selection criteria for managers and other categories of employees for assignment to work abroad is one of the most important personnel decisions for the international company. To assess an employee for a foreign assignment, it is customary to use seven basic criteria:

1. *Technical and managerial skills*. Skills are assessed based on the manager's past performance. It is assumed that effective application of technical, administrative, and management skills by the manager will enable him or her to cope with the assignment abroad.
2. *Motives and aspirations*. It is important to understand the reasons why the manager is interested in being assigned to an overseas office. It is preferable that the candidate is more interested in the host country and less so in financial incentives.
3. *Social skills*. The manager's ability to interact with people is also an important aspect of his or her activity. You need to understand people, to know the norms

Table 2 Top 20 countries for cross-border work (Millennial generation survey)

	Country	% voted
1	USA	58
2	Great Britain	48
3	Australia	39
4	Canada	33
5	Germany	32
6	France	31
7	Switzerland	28
8	New Zealand	23
9	Italy	23
10	Japan	23
11	Hong Kong	22
12	Singapore	21
13	Spain	20
14	Sweden	19
15	Denmark	16
16	Brazil	16
17	The Netherlands	16
18	Finland	14
19	Belgium	13
20	Norway	13

Source PwC "Talent mobility 2020 and beyond", 2012

of communication, to build an interaction system, both at professional and social levels.
4. *Diplomatic qualities*. The manager's ability to interact in the host country with business associations, government officials, and political leaders.
5. *Maturity and stability*. The manager must show oneself as a mature person, capable of reacting to various situations rationally and finding acceptable solutions.
6. *Family*. The ability of the manager's family to adapt to conditions in the new country.
7. *Other factors (gender, age)*. Relevance varies depending on the country of destination.

3.2 Personnel Global Mobility Management and Corporate Culture

Issues of human resources management culture occupy a key place in international management. The most important management decisions are implemented with the help of human resources management and effective corporate culture. Corporate culture is a system of personal and collective values that are accepted and shared by all members of the organization. It is customary to understand corporate culture as a set of rules, ways of solving problems of external adaptation and internal integration of employees.

In the international context of human resources management system, corporate culture is of particular importance. Moving managers from one country to another broadens their understanding of other business cultures and their interactions. For companies with headquarters and branches in different countries and regions, the international rotation of employees allows for a closer interconnection of divisions, unity of philosophy and approaches, and in general, contributes to achieving and maintaining business sustainability.

Management problems of international companies solved with help of culture tools include:

(a) Cultural communication barriers that hinder collaboration. Communication with representatives of other cultures can meet unforeseen difficulties along the way. Some communication failures due to cross-cultural differences are not precluded, including violations due to the denial of cross-cultural peculiarities; distortions in perception; stereotypes and stereotyped thinking; and snobbery and "ethnocentric arrogance".
(b) Inter-country differences in management styles. Developed countries in regions such as North America and Northern Europe adhere to democratic or participatory leadership styles. In contrast, developing countries have an authoritarian or paternalistic method of governance.
(c) Differences in approaches to problem definition and decision making. Company procedures reflect the values and norms of the people involved

in problem-solving. Thus, a multicultural, multinational team will work effectively once its members come to understand the nature of collective interaction.

(d) Possible conflict situations due to differences in labor motivation. As a rule, motives are determined by the social environment and marital status of a person. In countries with transition economies, material needs and desire for security prevail, which is associated with the general standard of living and material well-being. In developed countries desire for self-actualization comes to the fore.

(e) Differences in socio-cultural competencies and staff development. Sociocultural management competencies imply a certain openness and flexibility, which means awareness of their cultural interdependencies, tolerance towards other cultures, ability to assess possibilities of transferring know-how in the field of personnel management from the context of one culture to the conditions of another one.

The development of corporate culture can be traced in four dimensions:

1. *Mega-environment* of the international business has a fundamental impact on the development and dynamics of the company's culture at the global level.
2. *Macro-environment* corresponds to national level.
3. *Micro-environment* and its cultural specifics largely determine the corporate level.
4. At the personal level of an employee, culture is determined by *meta-environment*—in other words, by the person's cultural constants.

There are four main approaches to selecting personnel for participation in international mobility programs:

1. *Ethnocentrism*—for all key positions, both "at home" and abroad, management is selected from local leaders. This is often the case in companies with highly centralized management.
2. *Polycentrism.* Appointing to leading positions in the host country abroad national representatives of this country. This approach is based on trust in local management and a more detailed understanding of the local market in the country of location.
3. *Regiocentrism.* As part of the dynamics of this approach, it is assumed that global markets should be governed regionally, and appointment to key positions in the company is determined by the specifics of the region. The approach is applied when the company's products are sold around the world without modifications and only marketing takes into account the cultural differences of countries and regions.
4. *Geocentrism.* According to this approach, appointment to key positions is determined by the qualifications of the employee and does not depend on national and cultural background.

Human resources mobility management strategies must be comprehensive, flexible, and aligned with global mobility, talent management and the company's overall

Table 3 Main aspects of global personnel mobility

Global mobility aspect	Relevant characteristic
Influence of personnel global mobility on the development of companies	• International personnel mobility is an essential component of the company's success in the market, especially internationally • Global personnel mobility is part of corporate culture development • International mobility is perceived as part of career and talents development strategy
Key factors affecting staff motivation to participate in global mobility programs	• Career prospects associated with participation in international mobility • Self-development, increasing personal capitalization (value) in the eyes of employers and recruiters • Networking opportunities • Gaining a diversified experience
The main requirements for employees oriented to work in foreign missions	• Loyalty to the company • Adaptability • High development potential • Motivation to gain international experience
Transformation of manifestations and content of human capital global mobility in the international context	• The range of offered mobility formats is expanding. New flexible formats are emerging today to accommodate changes in the structure of the workforce • There are different categories of mobile personnel: "always mobile" workers, computers, short-termers, classic long-term assignments

business strategy, and also take into account the individual interests of employees. In a multinational team, building effective communications and employee interactions is of particular importance.

The considered aspects of global staff mobility can be summarized as follows (Table 3).

3.3 Talent Management in an International Company

Globalization and the war for talent have remained key trends in HR over the past years. The number of companies opening offices abroad is growing from year to year. To replicate best practices, share experience, ensure compliance with company standards, and train local personnel, companies actively send their employees to work abroad.

For the purposes of this work, 600 executives of international companies were surveyed on the subject of talent management and practices related to global personnel mobility (Figs. 3, 4 and 5).

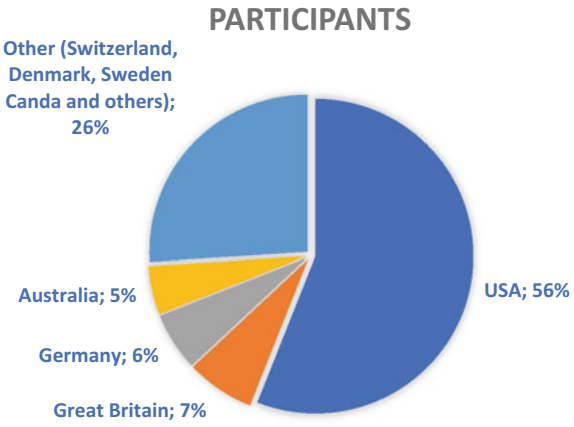

Fig. 3 General information on survey participants

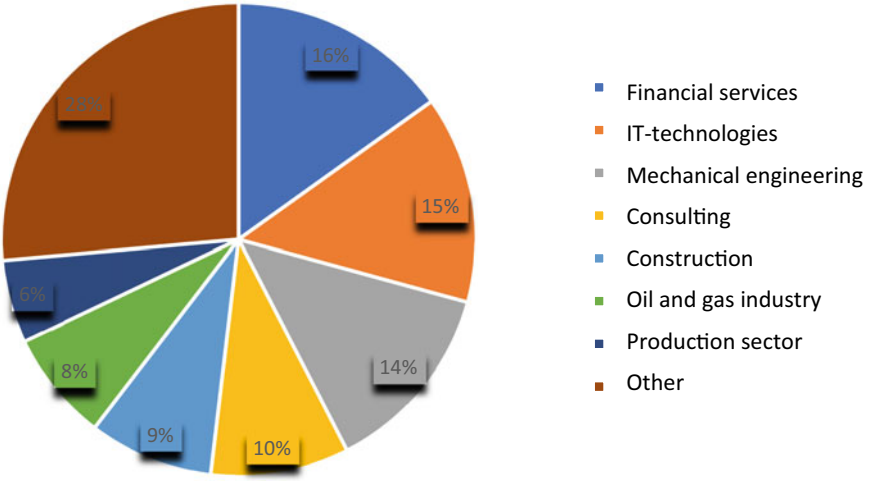

Fig. 4 Sector of company activity

- *How many employees are currently working abroad?*

According to our research, 32% of companies assigned from 10 to 50 employees for work abroad, 19% of responding companies assigned up to 10 employees for work abroad, and 13% of responding companies noted that they have more than 500 employees working abroad (Fig. 6).

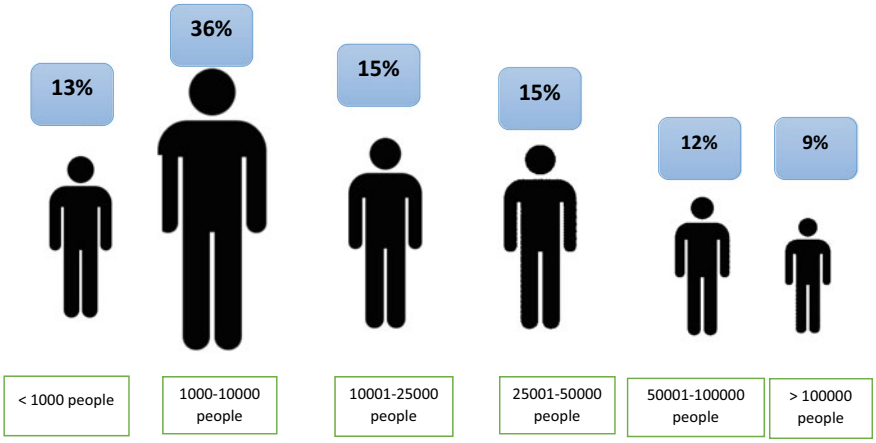

Fig. 5 Number of personnel in the company

Fig. 6 Number of employees currently in other countries

- *Why staff relocation is important for the business?*

According to the survey, the main goal of global mobility policy, according to 73% of responding companies, is to support the business goals of the company and the ability to adapt to changing requirements. Among the responding companies:

- 96% of companies relocate employees for a long term;
- 81% of companies offer employees short-term relocation programs;
- 47% of companies move employees to other regions for permanent residence.

Global mobility programs in many companies are an additional motivation tool. Companies can offer their promising employees the opportunity to live and work in another country so that they can broaden their outlook, gain new knowledge and experience and also expand their global network of contacts.

- *How is the work of seconded staff paid?*

Differing levels of the high inflation rate and fluctuating exchange rates significantly complicate the administration of international staff rotation programs. To solve these problems, companies use a flexible system of bonuses in addition to the fixed part of wages. The majority of respondents (61%) noted that the salaries of seconded

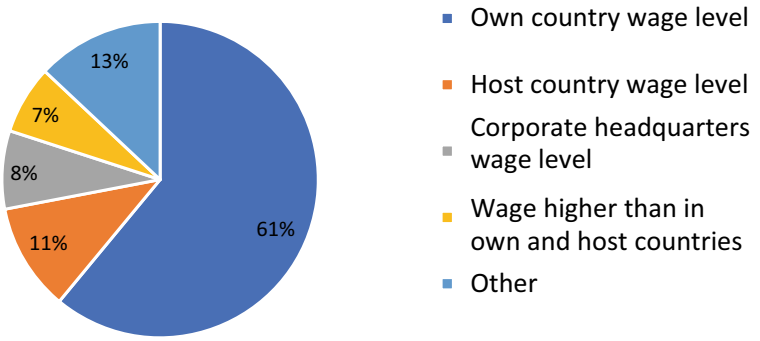

Fig. 7 Remuneration policy in regards to relocated personnel

employees correspond to the level of salaries of the country in which the employee works on a full-time basis. This is more often the case for companies with a large number of cross-border workers (66%) and for those companies whose employees are assigned to more than 50 countries (71%) (Fig. 7).

- *To what extent are relocation programs adapted to personnel needs?*

According to our survey, when companies are interested in increasing personnel mobility, they offer special conditions for spouses and children of employees. The number of companies that are ready to accommodate the move of their employee not only with their registered spouses and minor children but also with cohabitation partners (56%) is increasing every year. Apart from standard benefits for families of relocated employees (visa processing, provided accommodation and covered school tuition fees for children), 21% of respondent companies noted that they help spouses with job searches in the host country and reimburse training costs, 40% of respondents stated that they provide language learning services to spouses and children, and 38% of companies offer intercultural training for employees and their families.

- *What functions related to personnel relocation are most frequently outsourced?*

Half of the survey participants note that managing international personnel rotation programs requires considerable additional efforts from the company. To minimize labor costs, the majority of survey participants, use services of outside providers. The main purpose for outsourcing is to gain access to international resources of providers and their experience. The most popular outsourced functions are those related to tax compliance (87%), consulting on personal taxation in the host country (82%), migration support (76%). Payroll and cost reimbursement remain as a rule within the company (Fig. 8).

Participating executives predicted that over the next 5 years the need for cross-border personnel relocation will remain the same (41%), and 43% of companies suppose they will assign more personnel to other countries.

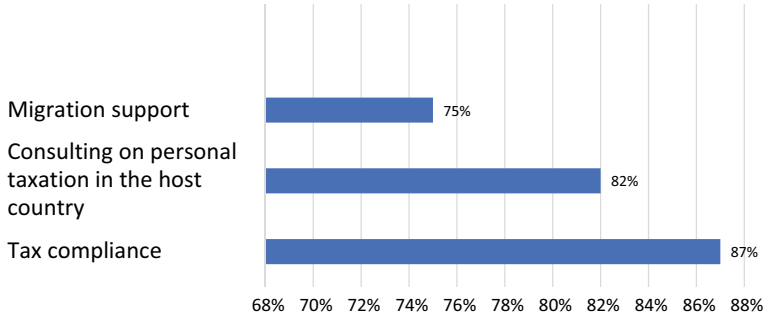

Fig. 8 Outsourced functions

In the realities of today, a "flexible workplace" is a prerequisite for attracting and retaining employees of Generations Y (Millennials) and Z.

Historically, the movement for creating flexible workplaces started at the end of the previous century, when organizations started initiatives for developing conditions for working mothers. Over time many various options have been created: reduced workweek, segregation of work scopes, remote work till the return to work. From the creation of this concept, a flexible workplace became a requirement for organizations, especially for generations Y and Z. By 2025, the generation of employees who are now 20 years old, will constitute 75% of the workforce in the world. For this new generation, life-work balance is of more value than the increase of compensations or development of competencies. A flexible workplace becomes of vital importance for the contemporary generation.

Leading companies realize the need for flexible working environments, but every organization must think through and determine how this flexibility will work in each specific case. It is preferable to determine general parameters that will set clear borders and will allow employees to have certain flexibility within these borders, choosing conditions that suit them. The ability of companies to attract and retain qualified employees, leaders of tomorrow, depends on the opportunity to balance the needs of their team with business needs. A flexible work environment may become the decisive factor in the battle for qualified personnel: one in three workers states that the opportunity to combine work and personal life is the most important factor when choosing a job, and remote work is a perfect choice. The use of mobile technologies and online tools allows working from any place in the world. Employees no longer want to be connected by location—with an open HR organization, they can work together from anywhere in the world, thus creating flexible workplaces is a logical process of internationalization and globalization.

Interestingly, the contemporary workforce is a conglomerate of full-time staff, contractors, and freelancers—people, who have no formal connection with the company. Workers today move more freely from one role to another through organizational and geographic borders. Global markets and products, fueled by the rapid growth of innovations, require employees that can easily adjust and adapt to rapidly

changing market trends. Companies expect employees to be quick-witted, think big, and have the necessary skills that they need to acquire in no time. An open and flexible personnel management organization is a contemporary technological and efficient way of doing business. New trends allow companies to leverage market changes and expand their talent networks to include "partner talent" (joint venture employees), "borrowed talent" (employees of their contractors or outsourced people), "freelancers" (independent, individual contractors), as well as "open employees" (people who are involved in the provision of services). This trend is ultimately changing the meaning of the "labor force" term.

An open personnel management organization is changing HR structure and workflow. The emergence of a global personnel market, encompassing specialists in different fields and directions, opens up new ways of recruiting, developing and managing personnel. Open distribution of ideas, practices, technologies and people allows to unite different regions of the world and make them interdependent.

4 Conclusion

Constantly changing environment, technologies, increasing competition, unstable current sanitary situation, economic and political changes around the world encourage businesses to seek new opportunities abroad to expand their firms' capabilities and competitiveness. Considering the importance of knowledge in the current times, competition is shaped to foster the firms' intellectual capital.

This chapter talks about the trends in intellectual capital internationalization, the personnel global mobility opportunities, and assumes the importance of intellectual resources in the internationalization process. The chapter's focus was to reveal the significance of some important factors in internationalization globally.

The study was based on expert evaluation method, interviews, reports, the findings from questioning the representatives of science and business, and literature review.

Internationalization in companies is driven mostly by the work experience of employees, the ability to transmit experience, and the international orientation of managers. These factors contribute to the development of technical knowledge and strategy development processes. Hopefully, the findings of the chapter will be significant for students, managers of global companies, entrepreneurs having strong intentions to expand their businesses and policymakers, concerning promotion and support of internationalization processes.

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Ekaterina Panarina has over 15 years of experience in an academic environment in different settings as teaching, running academic and applied research, coaching, administrative work, creating, building and growing entrepreneurial and marketing programs including curricular, co-curricular and extra-curricular components. Her diverse skills, qualifications, and personal values made her a recognizable individual for the area of business education and scholarly work in the area of Management, Marketing, Innovation, and Entrepreneurship. Her research is mainly in the areas of Marketing Analysis, Company Environment, Development Strategies, Business Competitiveness, Cluster Policy, and National Competitiveness. Dr. Panarina has more than 45 published research articles and collaborates actively with peers from different countries in the topics of marketing, entrepreneurship, innovation, and global business. Dr. Panarina is a Professor of the Marketing Department at Anahuac University (Mexico).

Relational Capital and Blockchain: Can Smart Contracts Redefine the Nature of Inter-organisational Cooperation?

José Brache and Anne Marie Zwerg-Villegas

Abstract The relational view posits that the relational capital derived from the social network process may facilitate the achievement of organisational strategic objectives in inter-organisational cooperation (Liu et al. in Journal of World Business 45:237–249, 2010). However, scholarly literature and business media are rife with examples of inter-organisational cooperation hindering the accomplishment of management goals (Brache and Felzensztein in International Business Review 28:25–35, 2019), with over fifty percent of alliances failing to meet their initial objectives (Kaplan et al. in Harvard Business Review 88:114–120, 2010). Blockchain technology introduces the opportunity to create, operate, and effectively regulate decentralized autonomous organisations (DAOs) with functions that include ownership, governance, decision-making, and profit distribution (Sims in New Zealand Universities Law Review 28:423–458, 2019). Smart contracts in the blockchain could serve as an automaton to efficiently modify cooperation behaviours, thus improving the potential for successful cooperation. Using a game theory approach to formulate a series of propositions, this study explores how smart contracts and blockchain technology help develop and manage relational capital. As a theoretical contribution, this chapter explains how smart contracts solve the natural frictions that arise in collaborative projects and offers a set of recommendations for policymakers and practitioners looking to engage in inter-organisational cooperation using smart contracts as a mediating tool.

Keywords Relational capital · Blockchain · Smart contracts · Inter-organisational relationships · Intellectual capital · Cooperation

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1 Introduction

The contemporary economy increasingly consists of global and inter-organizational alliances to source both tangible and intangible resources and foment the achievement of organizational strategic objectives (Brache & Felzensztein, 2019). However, despite the ubiquity of inter-organisational collaboration, only half of these arrangements succeed in meeting their objectives (Kaplan et al., 2010). Cooperation implies an investment on the part of each participating firm with the expectation of benefit. Game theory modelling clearly demonstrates the risks involved with collaboration and the rational tendency to defect.

Relational capital theory indicates that trust, communication, and commitment between co-operators improve the potential for success. Relational capital is a firm resource that results from the social network processes. In this regard, the relational view affirms that competitive advantages can be accessed beyond firm-level resources and might be embedded in intertwined collaborative relationships (Liu et al., 2010). Still, scarcity mindset and proprietary knowledge vulnerability in alliances moderates the beneficial influence of relational capital (Lee et al., 2007; Wiedmer et al., 2020).

Blockchain technology introduces an opportunity to create, operate, and effectively regulate decentralised autonomous organisations (DAOs) with functions that include ownership, governance, decision-making, and profit distribution (Sims, 2019). This implies that, while over fifty percent of alliances fail to meet their initial objectives (Kaplan et al., 2010), smart contracts in the blockchain could serve as an automaton that may efficiently modify cooperation behaviours. Thus, blockchain technology, including smart contracts, may resolve many of the negative cooperation behaviours leading to the failures amply reported in the cooperation literature.

This chapter explores how blockchain technology and smart contracts could develop and manage relational capital. A game theory approach formulates a series of propositions to guide academic researchers and practitioners in understanding the applications of blockchain technology in the development of intellectual capital. As a theoretical contribution, this chapter explains how smart contracts solve the natural frictions that arise in collaborative projects and offers a set of recommendations for policymakers and practitioners looking to engage in inter-organisational cooperation using smart contracts as a mediating tool.

1.1 Cooperation

The essential mathematical principles addressing the issue of cooperation can be found widely in the evolutionary dynamics literature stream. These principles create models for human populations as well as other species in regards to the evolution of cooperation. Game theory is commonly used in this field as an appropriate research tool (Xia et al., 2012).

Table 1 Payoffs according to the Prisoner's Dilemma

		Individual 2	
		Co-operate	Defect
Individual 1	Co-operate	Benefit-Cost, Benefit-Cost	−Cost, Benefit
	Defect	Benefit, −Cost	0, 0

Cooperation is a strategy that flourishes in nature and is present among many organisms. Humans are the "super co-operators" because of the high degree of complexity present in human–human cooperation. Mathematical models that simulate cooperation should include the fact that individuals who cooperate have a cost "C" to facilitate the receipt of a benefit "B" on the other cooperating individual's behalf. Defectors do not assume a cost and facilitate no benefit (Nowak, 2006). This scheme proposes a framework to understand the dynamics of cooperation and its possible outcomes. The standard payoffs for participating individuals are shown in Table 1.

Understanding the cooperation model portrayed in Table 1 enables the integration of context effects into the model. The context will affect each individual's cost and benefits entering a cooperation dilemma; therefore, context can be crucial in determining the cooperation equilibria. Relational capital now acquires a relevant role in cooperation dynamics.

1.2 Relational Capital

Contemporary inter-organisational cooperation is global in nature, which is inherently complicated and risky. Thus, relational capital becomes gradually more important as a predictor of cooperation success. Relational capital is a firm resource that results from social network processes. In this regard, the relational view affirms that competitive advantages can be accessed beyond firm-level resources and might be embedded in intertwined collaborative relationships (Liu et al., 2010). Literature suggests that relational capital plays a vital role in alliances dealing with the exchange of both tangible and intangible resources.

In the case of tangible resources, global competition increases the perception of scarcity, and the threat of scarcity impacts firm sales and purchasing decisions. Behavioural research demonstrates that the scarcity mindset foments competition rather than collaboration. Relational capital—based on trust, communication, and commitment (Lee et al., 2007)—may moderate scarcity-induced competitiveness. However, scarcity-specific supply chain research finds evidence that competitive behaviour continues, with less propensity for collaboration involving critical resource supplies, regardless of the extent of relational capital (Wiedmer et al., 2020).

As the global economy becomes dependent upon knowledge as a source of competitive advantage, inter-organisational cooperation increasingly involves information exchange and learning opportunities. Firms in "learning alliances," specifically, have the primary objective of internalizing critical information, knowledge, or capabilities from their partners (Khanna et al., 1998). However, firms in these alliances are in a delicate situation. If they contribute too little, the alliance will not flourish. If they contribute too much, the partner will reap the extent of the benefits. Relational capital helps balance these extremes by facilitating learning interactions while reducing opportunistic behavior (Lee et al., 2007).

1.3 Blockchain and Smart Contracts

Blockchain technology has a wide range of industry applications, given its capability to foment decentralization, tamper-proofing, transparency, and traceability (Wang et al., 2021). The smart contract is a specific blockchain technology providing security and financial benefits in commercial settings. Standard features include self-execution, self-enforcement, transparency, and flexibility (Wang et al., 2021). As such, smart contracts are especially useful in high-value financial transactions. We propose that the smart contract blockchain technology is useful in inter-organizational cooperation above and beyond relational capital. In high stakes alliances, whether due to high monetary investment, vulnerability of proprietary knowledge, or lack of trust between new partners, smart contracts provide a mechanism to ensure each partner's commitment and collaboration to at least a minimally agreed upon standard.

To demonstrate the usefulness of such blockchain smart contract technologies, we first model a series of inter-organisational export ventures in their absence. The scenarios evaluated using the following model highlight the logical and rational tendency for each firm to defect.

2 The Model

The following models consider two firms (Firm 1 and Firm 2) that cooperate in an export venture. Both firms have the choice to cooperate or defect and must make the decision simultaneously. They may communicate before deciding. If they decide to cooperate, they may cooperate at five different levels. Each level represents the cost of the firm related to the specific export venture. C1 represents the cost to Firm 1; C2 represents the cost to Firm 2. Table 2 depicts the matrix of choices.

The total income that each firm will secure from the cooperative action (the export venture) is the benefit. B1 is the benefit for Firm 1. B2 is the benefit for Firm 2. Consistent with game theory, we propose that each firm's benefit as a direct result of

Table 2 Cost matrix of choice combinations

C1/C2	1	2	3	4	5
1	1,1	1,2	1,3	1,4	1,5
2	2,1	2,2	2,3	2,4	2,5
3	3,1	3,2	3,3	3,4	3,5
4	4,1	4,2	4,3	4,4	4,5
5	5,1	5,2	5,3	5,4	5,5

Table 3 Payoff matrix

		Firm 2	
		Cooperate	Defect
Firm 1	Cooperate	B1-C1, B2-C2	−C1, B2
	Defect	B1, −C2	0, 0

the cooperative action will be a function of the cost matrix of choice combinations: $b_i = F_i$ (Cost Matrix of Choice Combinations).

In this model, we present the following separate functions for Firm1 and Firm2.

$$B1 = C1 * \lambda + C2 * \beta \tag{1}$$

$$B2 = C1 * \pi + C2 * \alpha \tag{2}$$

where

λ The return that Firm1 achieves from its own investment (cost).
β The return that Firm1 achieves from the investment (cost) of Firm2.
π The return that Firm2 achieves from its own investment (cost).
α The return that Firm2 achieves from the investment (cost) of Firm 1.

Table 3 represents the final payoffs corresponding to each firm.

2.1 Evaluating Multiple Scenarios

Initially, we evaluated the resulting payoff matrices of 17 different scenarios that reflect different value combinations of λ, β, π, and α at all levels of the cost matrix of choice combinations. Nash equilibriums are identified in each case. λ, β, π, and α capture the internal and external factors affecting the firm's performance.

The chosen scenarios are built as a matrix on the following logic, giving the Firm 1 example. The same would apply to Firm 2.

Table 4 Scenario values

Scenario	λ	β	π	α
1	1.2	0.2	1.2	0.2
2	0.2	0.2	1.2	0.2
3	1.2	0	1.2	0.2
4	0.2	0	1.2	0.2
5	1.2	0.2	0.2	0.2
6	0.2	0.2	0.2	0.2
7	1.2	0	0.2	0.2
8	0.2	0	0.2	0.2
9	1.2	0.2	1.2	0
10	0.2	0.2	1.2	0
11	1.2	0	1.2	0
12	0.2	0	1.2	0
13	1.2	0.2	0.2	0
14	0.2	0.2	0.2	0
15	1.2	0	0.2	0
16	0.2	0	0.2	0
17	1	0	1	0

- Recover + Margin: The firm recovers its own investment (C1 in the case of Firm 1), has a profit on its own investment (C1), and also has a profit on the investment of the other firm (C2).
- Does Not Recover + Margin: The firm does not recover its own investment (C1 in the case of Firm 1), does not have profit on its own investment (C1), but does have a profit on the investment of the other firm (C2).
- Recovers + 0 Margin: The firm recovers its own investment (C1), has a profit on its own investment (C1), but does not have a profit on the investment of the other firm (C2).
- Does Not Recover + 0 Margin: The firm does not recover its own investment (C1), does not have profit on its own investment (C1), and does not have profit on the investment of the other firm (C2).

Table 4 provides the values for each variable in each of the evaluated scenarios.

In each of the potential payoff scenarios below, Nash equilibria are highlighted in italic.

	Scenario 1																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	*0.4*	*0.4*	−1	0.2	*0.6*	*0.6*	−1	0.2	*0.8*	*0.8*	−1	0.2	*1*	*1*	−1	0.2	*1.2*	*1.2*	−1	0.2
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0.6	*0.6*	−1	0.2	*0.8*	*0.8*	−2	0.4	*1*	*1*	−2	0.4	*1.2*	*1.2*	−2	0.4	*1.4*	*1.4*	−2	0.4
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0.8	*0.8*	−3	0.6	*1*	*1*	−3	0.6	*1.2*	*1.2*	−3	0.6	*1.4*	*1.4*	−3	0.6	*1.6*	*1.6*	−3	0.6
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	1	*1*	−4	0.8	*1.2*	*1.2*	−4	0.8	*1.4*	*1.4*	−4	0.8	*1.6*	*1.6*	−4	0.8	*1.8*	*1.8*	−4	0.8
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	1.2	*1.2*	−5	1	*1.4*	*1.4*	−5	1	*1.6*	*1.6*	−5	1	*1.8*	*1.8*	−5	1	*2*	*2*	−5	1
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 2																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	−0.6	0.4	−1	0.2	−0.4	0.6	−1	0	−0.2	0.8	−1	0.2	0	1	−1	0.2	0.2	1.2	−1	0.2
	0.2	−1	*0*	*0*	0.04	−2	*0*	*0*	0.6	-3	*0*	*0*	0.8	−4	*0*	*0*	1	−−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	−1.4	0.6	−1	0.2	−1.2	0.8	−2	0	−1	1	−2	0.4	−0.8	1.2	−2	0.4	−0.6	1.4	−2	0.4
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	−2.2	0.8	−3	0.6	−2	1	−3	1	−1.8	1.2	−3	0.6	−1.6	1.4	−3	0.6	−1.4	1.6	−3	0.6
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	−3	1	−4	0.8	−2.8	1.2	−4	1	−2.6	1.4	−4	0.8	−2.4	1.6	−4	0.8	−2.2	1.8	−4	0.8
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	−3.8	1.2	−5	1	−3.6	1.4	−5	1	−3.4	1.6	−5	1	−3.2	1.8	−5	1	−3	2	−5	1
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 3																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	*0.2*	*0.4*	−1	0.2	*0.2*	*0.6*	−1	0	*0.2*	*0.8*	−1	0.2	*0.2*	*1*	−1	0.2	*0.2*	*1.2*	−1	0.2
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0.4	*0.6*	−1	0.2	*0.4*	*0.8*	−2	0.4	*0.4*	*1*	−2	0.4	*0.4*	*1.2*	−2	0.4	*0.4*	*1.4*	−2	0.4
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0.6	*0.8*	−3	0.6	*0.6*	*1*	−3	0.6	*0.6*	*1.2*	−3	0.6	*0.6*	*1.4*	−3	0.6	*0.6*	*1.6*	−3	0.6
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	0.8	*1*	−4	0.8	*0.8*	*1.2*	−4	0.8	*0.8*	*1.4*	−4	0.8	*0.8*	*1.6*	−4	0.8	*0.8*	*1.8*	−4	0.8
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	1	*1.2*	−5	1	*1*	*1.4*	−5	1	*1*	*1.6*	−5	1	*1*	*1.8*	−5	1	*1*	*2*	−5	1
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*

	Scenario 4																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	−0.8	0.4	−1	0.2	−0.8	0.6	−1	0.2	−0.8	0.8	−1	0.2	−0.8	1	−1	0.2	−0.8	1.2	−1	0.2
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	−1.6	0.6	−1	0.2	−1.6	0.8	−2	0.4	−1.6	1	−2	0.4	−1.6	1.2	−2	0.4	−1.6	1.4	−2	0.4
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	−2.4	0.8	−3	0.6	−2.4	1	−3	0.6	−2.4	1.2	−3	0.6	−2.4	1.4	−3	0.6	−2.4	1.6	−3	0.6
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	−3.2	1	−4	0.8	−3.2	1.2	−4	0.8	−3.2	1.4	−4	0.8	−3.2	1.6	−4	0.8	−3.2	1.8	−4	0.8
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	−4	1.2	−5	1	−4	1.4	−5	1	−4	1.6	−5	1	−4	1.8	−5	1	−4	2	−5	1
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*

	Scenario 5																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	0.4	−0.6	−1	0.2	0.6	−1.4	−1	0.2	0.8	−2.2	−1	0.2	1	−3	−1	0.2	1.2	−3.8	−1	0.2
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0.6	−0.4	−1	0.2	0.8	−1.2	−2	0.4	1	−2	−2	0.4	1.2	−2.8	−2	0.4	1.4	−3.6	−2	0.4
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0.8	−0.2	−3	0.6	1	−1	−3	0.6	1.2	−1.8	−3	0.6	1.4	−2.6	−3	0.6	1.6	−3.4	−3	0.6
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	1	0	−4	0.8	1.2	−0.8	−4	0.8	1.4	−1.6	−4	0.8	1.6	−2.4	−4	0.8	1.8	−3.2	−4	0.8
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	1.2	0.2	−5	1	1.4	−0.6	−5	1	1.6	−1.4	−5	1	1.8	−2.2	−5	1	2	−3	−5	1
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.06	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 6																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	−0.6	−0.6	−1	0.2	−0.4	−1.4	−1	0.2	−0.2	−2.2	−1	0.2	0	−3	−1	0.2	0.2	−3.8	−1	0.2
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	−1.4	−0.4	−1	0.2	−1.2	−1.2	−2	0.4	−1	−2	−2	0.4	−0.8	−2.8	−2	0.4	−0.6	−3.6	−2	0.4
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	−2.2	−0.2	−3	0.6	−2	−1	−3	0.6	−1.8	−1.8	−3	0.6	−1.6	−2.6	−3	0.6	−1.4	−3.4	−3	0.6
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	−3	0	−4	0.8	−2.8	−0.8	−4	0.8	−2.6	−1.6	−4	0.8	−2.4	−2.4	−4	0.8	−2.2	−3.2	−4	0.8
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	−3.8	0.2	−5	1	−3.6	−0.6	−5	1	−3.4	−1.4	−5	1	−3.2	−2.2	−5	1	−3	−3	−5	1
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.06	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 7																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	0.2	−0.6	−1	0.2	0.2	−1.4	−1	0.2	0.2	−2.2	−1	0.2	0.2	−3	−1	0.2	0.2	−3.8	−1	0.2
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0.4	−0.4	−1	0.2	0.4	−1.2	−2	0.4	0.4	−2	−2	0.4	0.4	−2.8	−2	0.4	0.4	−3.6	−2	0.4
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0.6	−0.2	−3	0.6	0.6	−1	−3	0.6	0.6	−1.8	−3	0.6	0.6	−2.6	−3	0.6	0.6	−3.4	−3	0.6
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	0.8	0	−4	0.8	0.8	−0.8	−4	0.8	0.8	−1.6	−4	0.8	0.8	−2.4	−4	0.8	0.8	−3.2	−4	0.8
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	1	0.2	−5	1	1	−0.6	−5	1	1	−1.4	−5	1	1	−2.2	−5	1	1	−3	−5	1
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*

	Scenario 8																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	−0.8	−0.6	−1	0.2	−0.8	−1.4	−1	0.2	−0.8	−2.2	−1	0.2	−0.8	−3	−1	0.2	−0.8	−3.8	−1	0.2
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	−1.6	−0.4	−1	0.2	−1.6	−1.2	−2	0.4	−1.6	−2	−2	0.4	−1.6	−2.8	−2	0.4	−1.6	−3.6	−2	0.4
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	−2.4	−0.2	−3	0.6	−2.4	−1	−3	0.6	−2.4	−1.8	−3	0.6	−2.4	−2.6	−3	0.6	−2.4	−3.4	−3	0.6
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	−3.2	0	−4	0.8	−3.2	−0.8	−4	0.8	−3.2	−1.6	−4	0.8	−3.2	−2.4	−4	0.8	−3.2	−3.2	−4	0.8
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	−4	0.2	−5	1	−4	−0.6	−5	1	−4	−1.4	−5	1	−4	−2.2	−5	1	−4	−3	−5	1
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*

	Scenario 9																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	*0.4*	*0.2*	−1	0	*0.6*	*0.4*	−1	0	*0.8*	*0.6*	−1	0	*1*	*0.8*	−1	0	*1.2*	*1*	−1	0.2
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0.6	*0.2*	−1	0	*0.8*	*0.4*	−2	0	*1*	*0.6*	−2	0	*1.2*	*0.8*	−2	0	*1.4*	*1*	−2	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0.8	*0.2*	−3	0	*1*	*0.4*	−3	0	*1.2*	*0.6*	−3	0	*1.4*	*0.8*	−3	0	*1.6*	*1*	−3	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	1	*0.2*	−4	0	*1.2*	*0.4*	−4	0	*1.4*	*0.6*	−4	0	*1.6*	*0.8*	−4	0	*1.8*	*1*	−4	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	1.2	*0.2*	−5	0	*1.4*	*0.4*	−5	0	*1.6*	*0.6*	−5	0	*1.8*	*0.8*	−5	0	*2*	*1*	−5	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 10																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	−0.6	0.2	−1	0	−0.4	0.4	−1	0	−0.2	0.6	−1	0	0	0.8	−1	0	0.2	1	−1	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	−1.4	0.2	−2	0	−1.2	0.4	−2	0	−1	0.6	−2	0	−0.8	0.8	−2	0	−0.6	1	−2	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	−2.2	0.2	−3	0	−2	0.4	−3	0	−1.8	0.6	−3	0	−1.6	0.8	−3	0	−1.4	1	−3	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	−3	0.2	−4	0	−2.8	0.4	−4	0	−2.6	0.6	−4	0	−2.4	0.8	−4	0	−2.2	1	−4	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	−3.8	0.2	−5	0	−3.6	0.4	−5	0	−3.4	0.6	−5	0	−3.2	0.8	−5	0	−3	1	−5	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 11																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	*0.2*	*0.2*	−1	0	*0.2*	*0.4*	−1	0	*0.2*	*0.6*	−1	0	*0.2*	*0.8*	−1	0	*0.2*	*1*	−1	0.2
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0.4	*0.2*	−1	0	*0.4*	*0.4*	−2	0	*0.4*	*0.6*	−2	0	*0.4*	*0.8*	−2	0	*0.4*	*1*	−2	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0.6	*0.2*	−3	0	*0.6*	*0.4*	−3	0	*0.6*	*0.6*	−3	0	*0.6*	*0.8*	−3	0	*0.6*	*1*	−3	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	0.8	*0.2*	−3	0	*0.8*	*0.4*	−4	0	*0.8*	*0.6*	−4	0	*0.8*	*0.8*	−4	0	*0.8*	*1*	−4	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	1	*0.2*	−3	0	*1*	*0.4*	−5	0	*1*	*0.6*	−5	0	*1*	*0.8*	−5	0	*1*	*1*	−5	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*

	Scenario 12																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	−0.8	0.2	−1	0	−0.8	0.4	−1	0	−0.8	0.6	−1	0	−0.8	0.8	−1	0	−0.8	1	−1	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	−1.6	0.2	−2	0	−1.6	0.4	−2	0	−1.6	0.6	−2	0	−1.6	0.8	−2	0	−1.6	1	−2	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	−2.4	0.2	−3	0	−2.4	0.4	−3	0	−2.4	0.6	−3	0	−2.4	0.8	−3	0	−2.4	1	−3	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	−3.2	0.2	−4	0	−3.2	0.4	−4	0	−3.2	0.6	−4	0	−3.2	0.8	−4	0	−3.2	1	−4	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	−4	0.2	−5	0	−4	0.4	−5	0	−4	0.6	−5	0	−4	0.8	−5	0	−4	1	−5	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*

	Scenario 13																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	0.4	−0.8	−1	0	0.6	−1.6	−1	0	0.8	−2.4	−1	0	1	−3.2	−1	0	1.2	−4	−1	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0.6	−0.8	−2	0	0.8	−1.6	2	0	1	−2.4	2	0	1.2	−3.2	2	0	1.4	−4	2	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0.8	−0.8	−3	0	1	−1.6	−3	0	1.2	−2.4	−3	0	1.4	−3.2	−3	0	1.6	−4	−3	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	1	−0.8	−4	0	1.2	−1.6	−4	0	1.4	−2.4	−4	0	1.6	−3.2	−4	0	1.8	−4	−4	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	1.2	−0.8	−5	0	1.4	−1.6	−5	0	1.6	−2.4	−5	0	1.8	−3.2	−5	0	2	−4	−5	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 14																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	−0.6	−0.8	−1	0	−0.4	−1.6	−1	0	−0.2	−2.4	−1	0	0	−3.2	−1	0	0.2	−4	−1	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	−1.4	−0.8	−2	0	−1.2	−1.6	−2	0	−1	−2.4	−2	0	−0.8	−3.2	−2	0	−0.6	−4	−2	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	−2.2	−0.8	−3	0	−2	−1.6	−3	0	−1.8	−2.4	−3	0	−1.6	−3.2	−3	0	−1.4	−4	−3	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	−3	−0.8	−4	0	−2.8	−1.6	−4	0	−2.6	−2.4	−4	0	−2.4	−3.2	−4	0	−2.2	−4	−4	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	−3.8	−0.8	−5	0	−3.6	−1.6	−5	0	−3.4	−2.4	−5	0	−3.2	−3.2	−5	0	−3	−4	−5	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 15																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	0.2	−0.8	−1	0	0.2	−1.6	−1	0	0.2	−2.4	−1	0	0.2	−3.2	−1	0	0.2	−4	−1	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0.4	−0.8	−1	0	0.4	−1.6	−2	0	0.4	−2.4	−2	0	0.4	−3.2	−2	0	0.4	−4	−2	0
	0	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0.6	−0.8	−3	0	0.6	−1.6	−3	0	0.6	−2.4	−3	0	0.6	−3.2	−3	0	0.6	−4	−3	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	0.8	−0.8	−4	0	0.8	−1.6	−4	0	0.8	−2.4	−4	0	0.8	−3.2	−4	0	0.8	−4	−4	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	1	−0.8	−5	0	1	−1.6	−5	0	1	−2.4	−5	0	1	−3.2	−5	0	1	−4	−5	0
	0.2	−1	*0*	*0*	0.4	−2	*0*	*0*	0.6	−3	*0*	*0*	0.8	−4	*0*	*0*	1	−5	*0*	*0*

	Scenario 16																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	−0.8	−0.8	−1	0	−0.8	−1.6	−1	0	−0.8	−2.4	−1	0	−0.8	−3.2	−1	0	−0.8	−4	−1	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	−1.6	−0.8	−2	0	−1.6	−1.6	−2	0	−1.6	−2.4	−2	0	−1.6	−3.2	−2	0	−1.6	−4	−2	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0.8	−4	*0*	*0*	0	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	−2.4	−0.8	−3	0	−2.4	−1.6	−3	0	−2.4	−2.4	−3	0	−2.4	−3.2	−3	0	−2.4	−4	−3	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	−3.2	−0.8	−4	0	−3.2	−1.6	−4	0	−3.2	−2.4	−4	0	−3.2	−3.2	−4	0	−3.2	−4	−4	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	−4	−0.8	−5	0	−4	−1.6	−5	0	−4	−2.4	−5	0	−4	−3.2	−5	0	−4	−4	−5	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*

	Scenario 17																			
	Firm 2																			
	1,1				1,2				1,3				1,4				1,5			
Firm 1	*0*	*0*	−1	0	*0*	*0*	−1	0	*0*	*0*	−1	0	*0*	*0*	−1	0	*0*	*0*	−1	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	2,1				2,2				2,3				2,4				2,5			
	0	*0*	−2	0	*0*	*0*	−2	0	*0*	*0*	−2	0	*0*	*0*	−2	0	*0*	*0*	−2	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	3,1				3,2				3,3				3,4				3,5			
	0	*0*	−3	0	*0*	*0*	−3	0	*0*	*0*	−3	0	*0*	*0*	−3	0	*0*	*0*	−3	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	4,1				4,2				4,3				4,4				4,5			
	0	*0*	−4	0	*0*	*0*	−4	0	*0*	*0*	−4	0	*0*	*0*	−4	0	*0*	*0*	−4	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*
	5,1				5,2				5,3				5,4				5,5			
	0	*0*	−5	0	*0*	*0*	−5	0	*0*	*0*	−5	0	*0*	*0*	−5	0	*0*	*0*	−5	0
	0	−1	*0*	*0*	0	−2	*0*	*0*	0	−3	*0*	*0*	0	−4	*0*	*0*	0	−5	*0*	*0*

From the results of the scenario evaluations, as summarized in Table 5, we report these findings: (1) cooperation equilibria only appear as a choice when both firms recover their investment (cost), i.e., C1 for Firm 1 and C2 for Firm 2; (2) in all cases in which firms do not recover their investment (cost), there is a strictly dominant strategy to defect for both firms; (3) in all cases in which firms do not recover their investment (cost), and there is a strictly dominant strategy to defect, the payoffs for Firm 1 and Firm 2 depend on the degree of cooperation chosen and not all combination of the Cost Matrix Choice Combination provide a positive result for both players. Even when both Firm 1 and Firm 2 decide to cooperate, their payoffs might be negative.

An additional scenario (Scenario 17), where $\lambda = 1$, $\pi = 1$, $\beta = 0$ and $\alpha = 0$, shows no requirement of a positive return greater than the investment (cost) of each firm for cooperation to appear as a Nash equilibrium. All that is required is investment (cost) recovery (Table 5).

Table 5 Matrix of Nash Equilibriums resulting from the payoffs of the different scenarios considering all the cost matrix choice combinations

	Recovers cost + Margin	E	Does not Recover + Margin	E	Recovers + 0 Margin	E	Does not recover + 0 Margin	E
	A		B		C		D	
Recovers cost + Margin	*$\lambda = 1.2$ $\beta = 0.2$ $\pi = 1.2$ $\alpha = 0.2$*	*C, D*	$\lambda = 1.2$ $\beta = 0.2$ $\pi = 0.2$ $\alpha = 0.2$	D	*$\lambda = 1.2$ $\beta = 0.2$ $\pi = 1.2$ $\alpha = 0.0$*	*C, D*	$\lambda = 1.2$ $\beta = 0.2$ $\pi = 0.2$ $\alpha = 0.0$	D
A	*AA (1)*		AB (5)		*AC (9)*		AD (13)	
Does not Recover + Margin	$\lambda = 0.2$ $\beta = 0.2$ $\pi = 1.2$ $\alpha = 0.2$	D	$\lambda = 0.2$ $\beta = 0.2$ $\pi = 0.2$ $\alpha = 0.2$	D	$\lambda = 0.2$ $\beta = 0.2$ $\pi = 1.2$ $\alpha = 0.0$	D	$\lambda = 0.2$ $\beta = 0.2$ $\pi = 0.2$ $\alpha = 0.0$	D
B	BA (2)		BB (6)		BC (10)		BD (14)	
Recovers + 0 Margin	*$\lambda = 1.2$ $\beta = 0.0$ $\pi = 1.2$ $\alpha = 0.2$*	*C, D*	$\lambda = 1.2$ $\beta = 0.0$ $\pi = 0.2$ $\alpha = 0.2$	D	*$\lambda = 1.2$ $\beta = 0.0$ $\pi = 1.2$ $\alpha = 0.0$*	*C, D*	$\lambda = 1.2$ $\beta = 0.0$ $\pi = 0.2$ $\alpha = 0.0$	D
C	*CA (3)*		CB (7)		*CC (11)*		CD (15)	
Does not recover + 0 Margin	$\lambda = 0.2$ $\beta = 0.0$ $\pi = 1.2$ $\alpha = 0.2$	D	$\lambda = 0.2$ $\beta = 0.0$ $\pi = 0.2$ $\alpha = 0.2$	D	$\lambda = 0.2$ $\beta = 0.0$ $\pi = 1.2$ $\alpha = 0.0$	D	$\lambda = 0.2$ $\beta = 0.0$ $\pi = 0.2$ $\alpha = 0.0$	D
D	DA (4)		DB (8)		DC (12)		DD (16)	

*E = Equilibria, C = Cooperate, D = Defect

*Scenario number in parentheses ()

3 Conclusions

This chapter explores the factors that determine the emergence of cooperation equilibria in an export cooperation venture by modelling and evaluating several possible scenarios that account for firms' internal and external factors in cooperation projects. The evaluation of the proposed model demonstrates that when firms cooperate and choose among different cooperation levels, their cooperation levels do not affect the emergence of cooperation equilibria. The factors that condition the emergence of cooperative equilibria are the returns of cost for each of the firms involved in the cooperative endeavour. Thus, according to the proposed model, if $\lambda \geq 1$ and $\pi \geq 1$ simultaneously, cooperation equilibria emerge. This implies that firms will cooperate only with the assurance of recovering the costs invested in the cooperative venture. Otherwise, the logical and rational outcome of the simulation game would be to defect.

Given the tendency to defect, additional measures are required to foment inter-organisational cooperation, including relational capital. We suggest that blockchain technologies such as smart contracts are the contemporary mechanism to promote trust between potential co-operators. The models indicate that firms remain committed when they have the assurance of cost recovery. With their inherent characteristics of self-execution, self-enforcement, transparency, and flexibility (Wang et al., 2021), smart contracts can provide this assurance. Even in cases where the cooperating firms have no prior experience on which to develop the trust, communication, and commitment of relational capital, smart contracts could supersede this limitation.

4 Practical and Managerial Contributions

The most important practical implications for policymakers and managers point to creating cooperative environments that allow for sustainable cooperation strategies. For policymakers, this might include creating special programs that guarantee the recovery of the costs from export cooperative ventures. Such programs should increase cooperation and firm export performance. For managers, this chapter should motivate cooperative alliances when there is the assurance of recovering the costs involved in the cooperative export venture.

The markets are increasingly recognizing the potential of blockchain technologies to facilitate inter-organizational transactions. This chapter suggests that firms and governments consider their potential, particularly those of smart contracts, as a mechanism of promoting inter-organisational cooperation such as that between export venture partners.

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Human Capital, Economic Growth, and Sustainable Development Goals: An Evaluation of Emerging Economies

Suborna Barua

Abstract Economies often follow a 'growth first' approach and prioritize building economic capital over human capital. The cases of most of the world's developed economies suggest that a persistent and consistent trend of human capital development in the right direction is essential to prosper economically and socially. However, emerging economies appear to mobilize most of their resources toward economic growth, assigning the issues of human or intellectual capital a secondary or lower priority. The approach can limit emerging economies' growth potential, while it contradicts and restricts the progress towards sustainable development goals. This chapter examines the current state of national human capital and economic growth patterns in the context of sustainable development in the world's 22 emerging economies. The chapter begins with reviewing the current literature on the role of human capital on economic growth, and then analyzes the economic growth and human capital development patterns in the selected economies at the world level and across regions and income groups. The chapter then assesses the human capital relevant SDG indicators to assess the economies' progress and identify the existing gaps. Finally, the chapter briefly highlights the challenges and actions needed by emerging economies to make human capital work for sustainable growth and development. The chapter offers a novel contribution to the current literature about evaluating the state of human capital and its priority and relationship against economic growth in the world's major emerging economies. Furthermore, the discussions could help to align human capital with the current growth strategies and the progress towards the SDGs.

1 Introduction

Economies often follow a 'growth first' approach, where they prioritize growing economic capital over intellectual. An intellectual capital augmented growth is a condition where economic growth and intellectual capital drive each other. Human

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capital lies at the heart of intellectual capital. The cases of most of the world's developed economies suggest that a persistent and consistent trend of human capital development in the right direction is essential to prosper economically and socially. With scarce economic resources, economies may achieve desired economic growth; however, they cannot sustain in the long-run, mainly because of the inability to protect and best utilize the available resources. Without a continuous quality improvement of human capital (e.g., through advancement in technology), a nation would not survive and beat the global competition. Despite its significance, developing economies mobilize their most resources for achieving faster economic growth, assigning the issues of human or intellectual capital a secondary or lower priority (Rana and Barua, 2015; Rahman et al., 2019). The approach can limit many emerging economies' growth potential and contradicts, while restricting their progress towards sustainable development goals (SDGs).

The majority of the emerging economies that are considered the engine of future global economic growth belong to the developing economy group (Barua and Barua, 2021). Many of these emerging economies are confronted with multi-faceted social, economic and political barriers and challenges. The economies often follow the standard 'industrialization' model of economic development and divert most of their efforts to attract investments in the real sector, such as infrastructure, industries, and businesses (Barua, 2021; Barua and Aziz, 2021). As such, capital allocation to human capital relevant sectors such as education, innovation, and technology remains relatively low. This approach often contradicts over the long-run, where they develop industries but do not have enough skilled people to run and manage them, limiting the countries' actual growth potential. There are several reasons why growth potential becomes limited: first, while massive factories and industries are built, lack of skilled human capital forces to run and operate them with lower efficiency and effectiveness; second, low or no skilled human resources cannot improve their quality of life resulting in lower social development; third, industrial development in the absence of necessary human capital raises dependency on foreign human resources significantly; and fourth, furthering technological innovation across the society becomes difficult as people remain poorly skilled in terms of the technological advancement. As a result, it is essential that the emerging economies—the future growth engine and leaders for the world economy—prioritize both economic growth and human capital development equally. However, the real-world scenario seems not much encouraging as human capital development remains a no or lower priority in most emerging economies globally.

This chapter aims to examine the current state of national human capital and economic growth patterns in the context of sustainable development in the world's major emerging economies. Based on relevant rankings, the chapter considers 22 emerging economies listed by the International Monetary Fund (2015) that show a high-growth pattern and evaluate human capital development patterns in these economies. The chapter first reviews the current literature on the concepts and measurements of human capital. Based on the literature, the chapter examines the link between human capital and economic growth in the context of the world and the selected economies. Detailed analysis and evaluation are presented about how

national human capital development has evolved in the selected economies globally and by grouping the countries in four regions and three income groups. Finally, the chapter highlights the critical challenges for the emerging economies and stresses the actions required to that economic growth and human capital drive each other. All considered the chapter calls for a shift in the priority from traditional economic growth to intellectual and human capital augmented economic growth in emerging economies. Concerning the current literature, the chapter offers a novel contribution by evaluating the state of human capital and its priority and relationship against economic growth in the world's fast-growing economies. Furthermore, the discussions could help align human capital with the current growth strategies and the progress towards the SDGs. Finally, the chapter could offer policy-makers in emerging economies a basis to understand the role and significance of and required actions for human capital augmented growth.

The chapter is organized in seven sections: section two reviews the literature; section three and four analyze the human capital and economic development patterns at the world level and for the emerging economies, respectively; section five evaluates the human capital relevant SDG progresses of the emerging economies; section six highlights the challenges and actions required; followed by a conclusion in section seven.

2 Human Capital and Economic Growth

Human capital is described as the abilities, skills, and knowledge of human beings (United Nations, 2009). Human capital elements are acquired partly through formal and informal education, although pure human capital theory considers public health an integral part. As such, human capital development (often measured by the level of expenditure in education) refers to two dimensions: one, the acquisition of abilities, skills and knowledge, and the other, increases in the number of population with the right skills, knowledge, and experience that are drivers of economic growth (Adelakun, 2011).

Economic growth recently takes a shift from traditional to a sustainable perspective that considers broader welfare aspects of development instead of considering pure macroeconomic objectives as the only goals (United Nations, 2015). Sustainable development stresses meeting the current needs without sacrificing future generations' resources, where human capital is a central ingredient (Arrow et al., 2004; Barua, 2020). A large body of the literature suggests that human capital is a significant driver of economic growth. Human capital's necessity for economic growth traces back to Adam Smith and other eighteenth century philosophers and economists stressing the role of labour productivity through technological changes in building nations' wealth (Klenow and Rodriguez-Claire, 1997; Hall & Jone, 1997; Easterly & Levine, 2001). An effective and efficient technological change, either innovation or imitation, utilizes human capital as inputs (Nelson & Phelps, 1966; Romer, 1989, 1990; Abramovitz, 1986).

The consideration of human capital, i.e., skilled labour, in economic theories, traces back to the 1960s and 1970s (e.g., Goode, 1959; Mincer, 1958; Becker, 1962, 1975). Human capital is also considered the key to long-term economic growth by the endogenous growth theories (e.g., Lucas, 1988; Mankiw et al., 1992). As a human capital effort, investment in education enables poverty and hunger reductions, increases in school attendance, networking opportunities, and more economic opportunities, which eventually promote socio-economic development (Hanushek & Woessmann's, 2008). Since human capital is an input in the production process, investment in it boosts productivity growth and economic growth (Lucas, 1988; Nelson & Phelps, 1966; Uzawa, 1965). Human capital is also a key for an economy to drive its innovation, technological advancements, and other physical resources toward higher growth (Akpolate, 2014; Amaghionyeodiwe, 2009; Khembo & Tchereni, 2013; Liao et al., 2019). Hence, sustainable development is impossible without continued and significant investment in human capital (Kanayo, 2013; Lucas, 1988). However, there are also different evidence on the relationship between human capital and economic growth. For example, Temple (1999) and Bils and Klenow (2000) show a weak link between the two, while Levine and Renelt (1992) show no significant impact of human capital on economic growth.

Dessus's (1999) suggest that with the increases in education enrollment, the quality of education falls, which causes many developing countries failing to achieve higher growth in the long-run. De Gregorio and Lee (2003) suggest a substantial improvement in both physical and human capital in developing countries in Africa and Asia. The developing countries in Latin America fall relatively behind, meaning that they have a significant room for economic development by improving human capital quality (OECD, 2017; OECD/ECLAC/CAF, 2016). The countries perhaps need to learn from other nations with high-skill populations, such as Estonia, Switzerland, and the US. The key reason why developing countries fall behind is their poor investment in education. It leads to a higher net marginal social return of expenditure on primary education than tertiary education in these countries. For developing countries, particularly, people with higher education levels generally earn more which allows them to improve the quality of their lives (Weiss, 1995).

Schultz (1963, 2009) suggests that the labour pool's increased educational levels significantly raise economic growth in developing countries. As a result, improving human capital quality through investment in education can pave the avenue for sustainable economic development, particularly the SDGs (United Nations, 2009). The literature provides ample evidence on the significant and positive role of expenditure and investment in education on developing countries' economic growth, including the emerging economies (Akpolate, 2014; Psacharopoulos & Patrinos, 2004; Alexiou, 2009; Terada-Hagiwara & Kim, 2010). While emerging economies are considered the future economic leaders of the world and the engine of global economic growth, many of them are still capital-starving. While many of these countries show a tremendous economic growth performance driven by massive investments in physical resources (e.g., infrastructure), the pattern is unlikely to sustain in the long-run if investment in human capital is not raised consistently over time. If the

quality and capacity of physical resources are not complemented by human capital development, many economies may fail to sustain their economic growth.

3 Human Capital and Economic Growth: Evidence at the World Level

Before moving into the discussion about emerging economies, it is essential to look at the state of human development at the global level. Figure 1 shows the average estimates of the Human Capital Index (HCI) calculated by the World Bank for 217 countries worldwide. However, the dataset contains HCI available for 2010, 2017, 2018 and 2020 only and does not provide continuous estimates for every year. The HCI ranges from 0 to 1 calculated based on six broad indicators—Expected years of school, Factors of children under five not stunted, Harmonized test scores, Learning adjusted years of school, Probability of survival and survival rates. Figure 1 presents the averages of HCI across all countries for four years, given data availability.

Figure 1 suggests not much encouraging sign for human capital development globally. Although global HCI value shows significant improvement in 2017 from 2010, it seems to remain similar over the following years. There is no significant improvement from 2017 to 2020, while the weighted average HCI indicates a declining trend of human capital quality. Figure 2, however, shows a positive sign. For the selected years, economic growth shows a positive relationship supporting the empirical evidence available. Countries with a larger size of GDP is associated with a greater level of HCI values. Figures 1 and 2 together suggest that while human

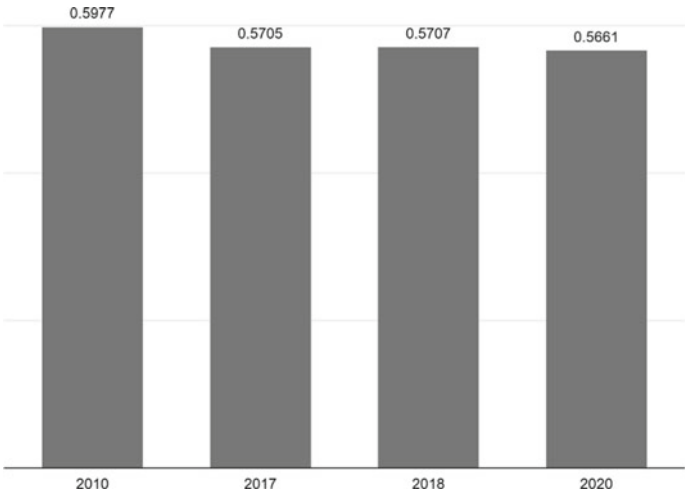

Fig. 1 Global patterns of human capital development. *Source* Author's developed based on World Bank Data

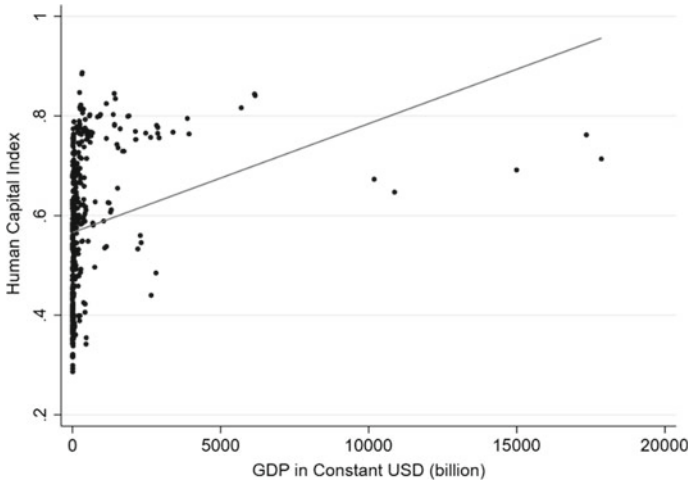

Fig. 2 Human capital versus economic growth, all countries included in the HCI database. *Source* Author's developed based on World Bank Data

capital quality improves with increases in the size of the economy, in absolute term, human capital quality has not improved much over the last ten years.

4 Human Capital and Economic Growth in Emerging Economies

The quality of human capital in the emerging economies is perhaps more critical than elsewhere. Without a continued and significant lift up in human capital quality, many emerging economies will not be able to maintain the 'emerging' status and emerge as a true economic powerhouse in the world. However, the role of human capital in economic progress in an emerging economy context remains mostly unexplored. A handful of empirical studies show that human capital is a significant driver of economic growth in emerging countries alongside other factors such as financial development (see, for example, Sarwar et al., 2020). In this consideration, this section reviews the performance of emerging countries in terms of human capital development and economic growth. To do so, a total of 22 emerging economies listed by the International Monetary Fund (2015) is considered. Table 1 shows the list of the 22 economies and their distribution across regions and income groups.

Table 1 List of emerging economies

Country	Region	Income group[a]
Argentina	Latin America	Upper middle income countries
Bangladesh	Asia	Lower middle income countries
Bulgaria	Europe	Upper middle income countries
China	Asia	Upper middle income countries
Colombia	Latin America	Upper middle income countries
Hungary	Europe	High income countries
India	Asia	Upper middle income countries
Indonesia	Asia	Upper middle income countries
Malaysia	Asia	Upper middle income countries
Mexico	Latin America	Upper middle income countries
Morocco	Africa	Lower middle income countries
Pakistan	Asia	Lower middle income countries
Peru	Latin America	Upper middle income countries
Philippines	Asia	Lower middle income countries
Poland	Europe	High income countries
Romania	Europe	High income countries
Russian Federation	Europe	Upper middle income countries
South Africa	Africa	Upper middle income countries
Thailand	Asia	Upper middle income countries
Turkey	Asia	Upper middle income countries
Ukraine	Europe	Lower middle income countries

Source Author' developed
[a]as per the 2019 World Bank lending classification

4.1 Human Capital in Emerging Economies at the Global Level

Figure 3 shows the HCI index patterns for the 22 companies listed as emerging countries worldwide by the International Monetary Fund (2015). The lowest consistent human capital quality is evidenced by Bangladesh, India, Pakistan, and South Africa, with an HCI value of less than 0.5. On the other hand, the best performers are Russia, Hungary, Poland, Bulgaria, and China, with an HCI value of over 6.5. While many countries significantly improved human capital quality over the period from 2010 to 2017, South Africa and Turkey walk the opposite path. Between 2017 and 2018, all countries had an improvement, however, by a low margin. In 2020, a majority of the countries showed a slight decline in human capital quality.

Figure 4 shows the average HCI values over the years to better understand the overall improvement across the emerging countries. In line with Fig. 3, from 2010 to 2017, there is a fall in the average HCI value, indicating an overall decline in the emerging economies' human capital quality. While some improvement is noticed between 2017 and 2018, HCI value again falls noticeably in 2020. All considered, emerging economies do not show any sign of significant improvement in human capital from 2010 to 2020 at the global level. Following the world level evidence presented earlier, Fig. 5 shows a positive association between higher economic

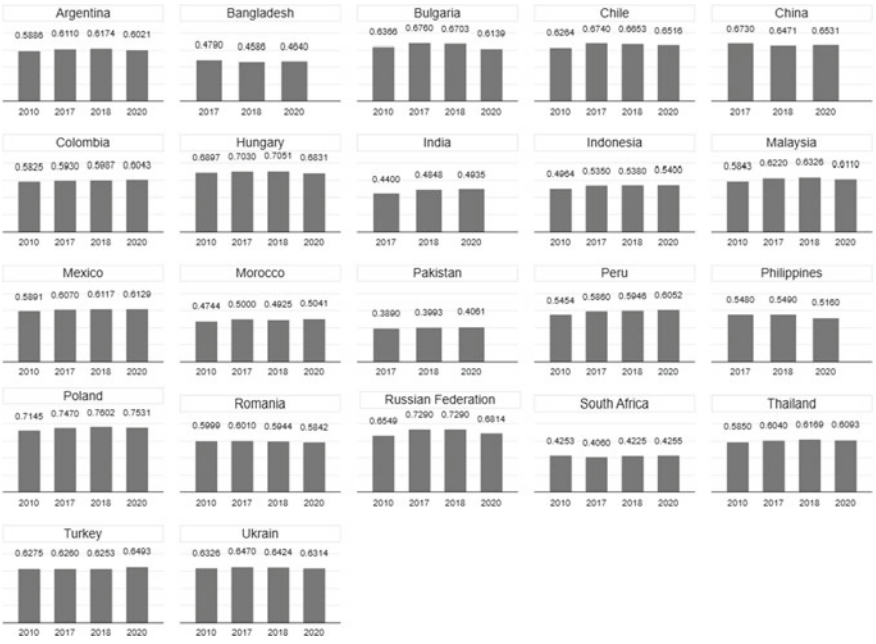

Fig. 3 Human capital development in emerging economies. *Source* Author's developed based on World Bank (2020) Data

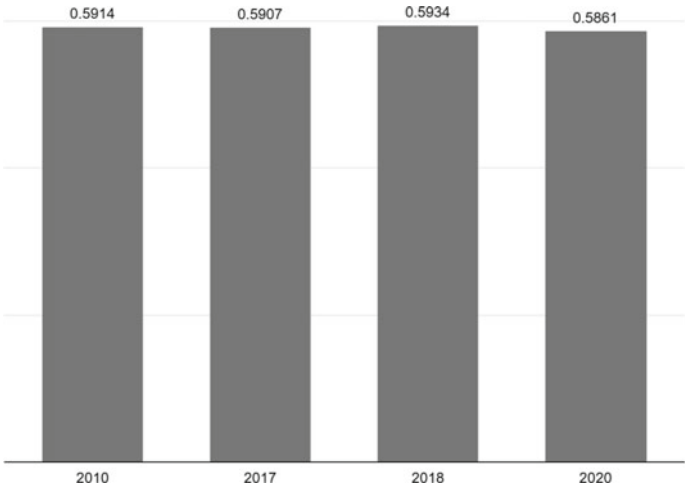

Fig. 4 Average human capital index values in emerging economies. *Source* Author's developed based on World Bank (2020) Data

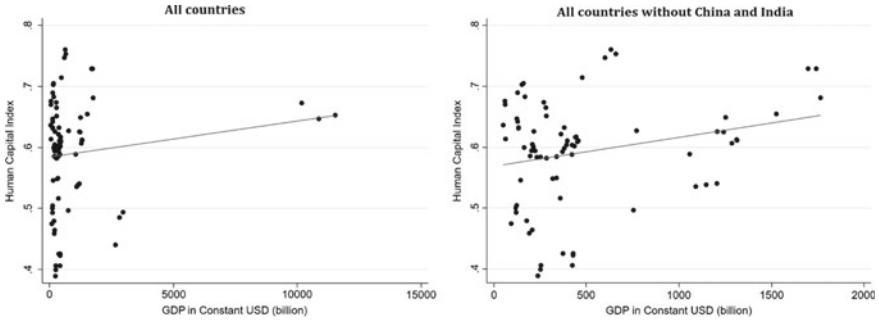

Fig. 5 The relationship between GDP and Human Capital Index at the world level. *Source* Author's developed based on World Bank (2020) Data

growth and human capital development. It indicates a general notion that emerging economies with a larger economic size have a better developed human capital.

4.2 Human Capital in Emerging Economies at the Regional Level

Figure 6 shows the HCI values by averaged across the emerging economies by region. From a regional view, Latin America and Europe show consistently higher HCI levels than Asia and Africa. The two regions appear to be the greatest achiever in terms

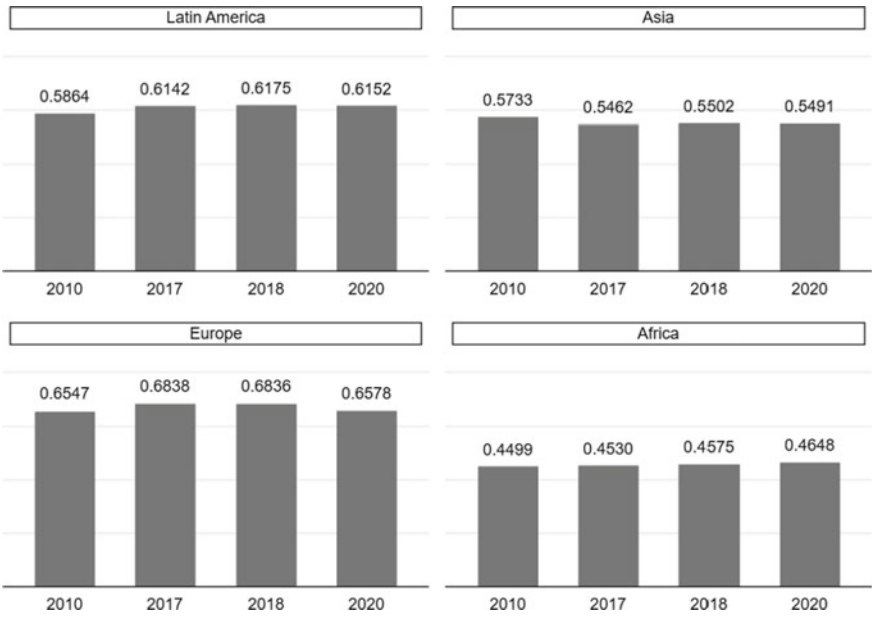

Fig. 6 Average human capital index values in emerging economies by region. *Source* Author's developed based on World Bank (2020) Data

of human capital between 2010 and 2017. Average HCI values for Latin America and Europe have increased by almost 4.7% (0.278 index points) and 4.4% (0.0291 index points), respectively. Among the four regions, Asia appears to be the poorest performer as the region sees a decline in the HCI value. It indicates a likely reduction in human capital quality between 2010 and 2017. In line with the earlier discussions, HCI values show a declining trend from 2017 to 2020 for all regions, indicating a gloomy picture for human capital development across the emerging economies.

Figure 7 show the relationship between HCI values and economic growth for the four regions based on the available data. In line with earlier discussions, emerging economies a larger size of GDP in Africa appear to have a lower human capital. Lower HCI values can explain the country-wise patterns in Fig. 3 for South Africa compared to Morocco's relatively higher values for the four years. Europe and Asia show a positive relationship, signifying that emerging economies with larger economy size have a greater HCI value in the two regions. In general, it means these countries have achieved higher growth while improving their human capital quality. On the other hand, Latin America shows a relatively flat line suggesting that these economies have not significantly lifted the level of human capital alongside whatever economic growth they have achieved for the four years.

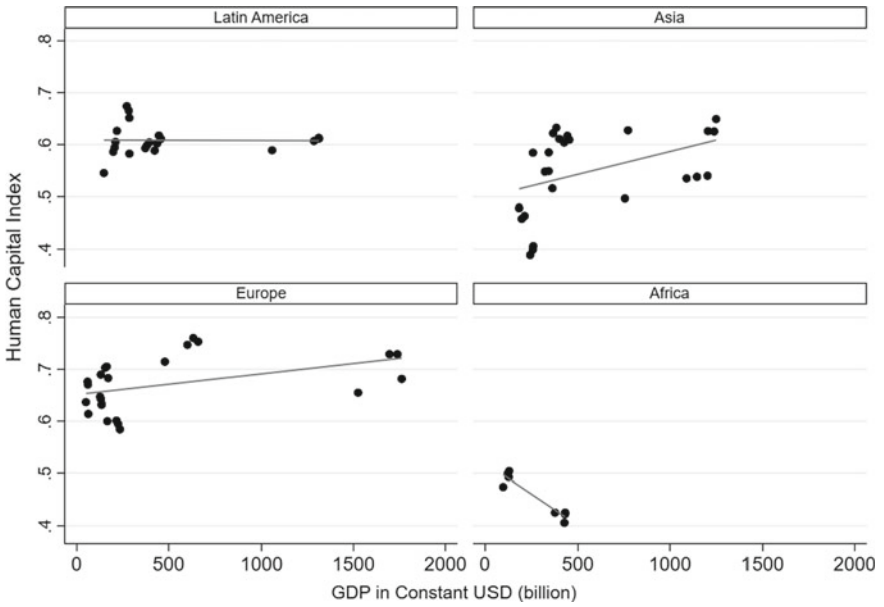

Fig. 7 Human capital index and economic growth in emerging economies by region. *Source* Author's developed based on World Bank (2020) Data

4.3 Human Capital in Emerging Economies Across Income Groups

Figure 8 shows another perspective of human capital development in emerging economies. Among the countries studied, Lower Middle Income Countries (LMICs) consistently perform poorer over the four years. A consistent decline in the HCI value is evident for the LMICs. On the other hand, both High Income and Upper Middle Income Countries have lifted their HCI performance from 2010 to 2018. In particular, between 2010 and 2017, the High Income Countries have significantly geared up human capital quality by about 3.6% (2.36 index points), while the LMICs see a large fall by 7.4% (−0.04 index points). It suggests an increased disparity of human capital quality between the rich and the poor nations within the emerging economy bracket. In 2020, however, countries across all income groups experienced a fall in human capital quality.

Figure 9 shows the relationship between HCI values and economic growth in the emerging economies clustered by income group. In line with the earlier discussion, emerging economies in High Income and Upper Middle Income Countries show a positive association between GDP and HCI values, indicating that the countries have improved human capital quality with a larger and growing economic size. While the fitted lines' steepness for both regions suggests a noticeable improvement in human capital development linked with economic growth, the level of improvement

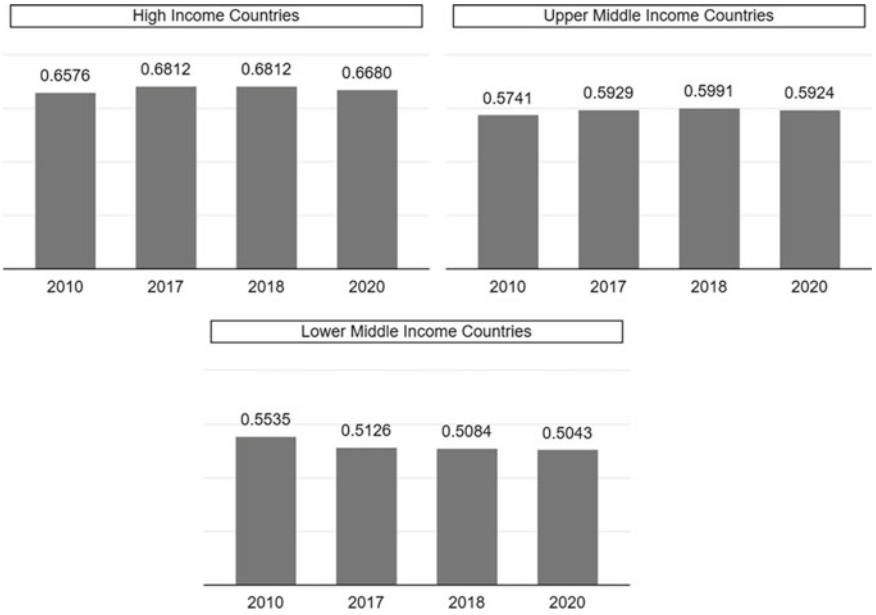

Fig. 8 Average human capital index in emerging economies by income group. *Source* Author's developed based on World Bank (2020) Data

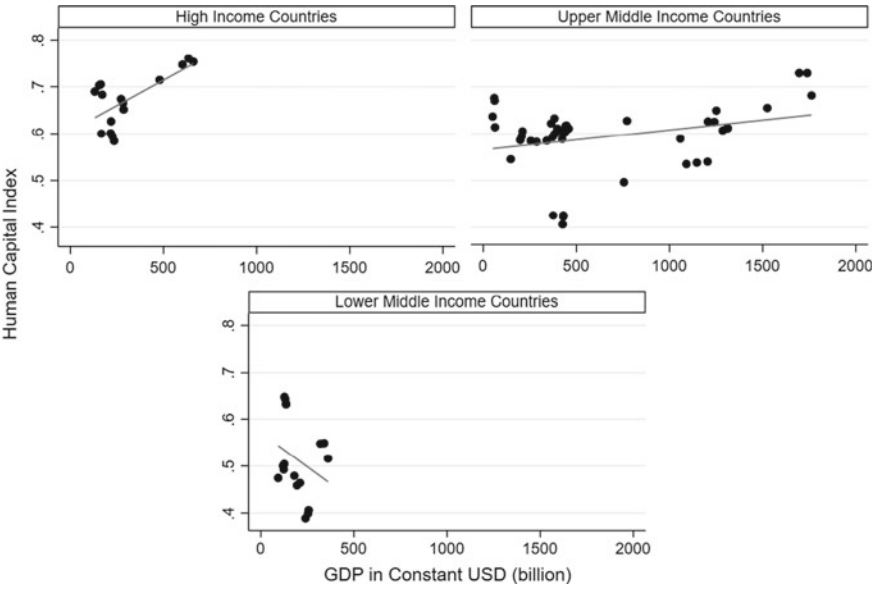

Fig. 9 Human capital and economic growth in emerging economies by income group. *Source* Author's developed based on World Bank (2020) Data

is significantly greater in European economies reflected by a relatively steeper fitted line. On the other hand, emerging economies in Africa seem to walk the opposite path. In line with the earlier discussion, GDP size appears to negatively associate with HCI values, indicating that these countries probably have undermined human capital development while fostering economic growth. In other words, these countries have seen deteriorating human capital over the years despite achieving economic growth.

5 Human Capital Related SDGs: How Do the Emerging Economies Perform?

The inconsistent and declining human capital development patterns are a firm barrier for emerging economies in achieving sustainable development. One of the most important goals that directly address human capital development is 'Goal 4—Ensure inclusive and equitable quality education and promote lifelong opportunities for all. While there are other goals (e.g., Goal 3—Ensure healthy lives and promote well-being for all at all ages) that interfere with human capital development, education remains the most significant and critical ingredient for human capital development. The patterns observed earlier in this chapter do not seem to be conducive for emerging economies to achieving Goal 4 by the SDG achievement timeline of 2030. To further validate and complement the observations on the HCI patterns, it could be useful to examine some selected Goal 4 progress indicators for the 22 emerging countries being studied. The UN-STATS provide a comprehensive Global SDG Indicators Database on all the SDGs' progress, where specific indicator-wise progress data are available for Goal 4.

Figure 10 presents the progress of Target 4.1—Indicator 4.1.2—the percentage of children or young people completing primary or secondary education. Figure 9 shows that average completion rates across the emerging countries have increased significantly since 2000. While primary level completion rates (above 80%) are consistently higher than the secondary levels, upper secondary level completion rates remain consistently lower over the entire period. Average completion rate across all levels of education stands about 83.7% for the emerging economies. However, the increasing patterns across all education levels seem unstable and fluctuating, suggesting concerns over the achievement's long-run consistency. As the total population grows in the emerging economies, the countries will need to cover more people into education. A highly fluctuating pattern reflects concerns about the countries' ability to ensure a high, consistent and increasing completion rate.

Alongside completion rates, participation rates are equally important. Similar to completion rates, Fig. 11 shows that participation rates—overall and by sex—follow a highly fluctuating pattern over the years from 2000 to 2018. Alarmingly, the overall average proportion of youth and adult participating in any formal and non-formal education and training remains substantially low consistently over the period. The maximum rates achieved were noticeably below a 20% mark over 2015–2017, with

Fig. 10 Average primary and secondary education competition rates (percentage) among of children or young people by education level, 2000–2018. *Target 4.1—By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes. Source* Author's developed based on UN-Stats (2020) Data

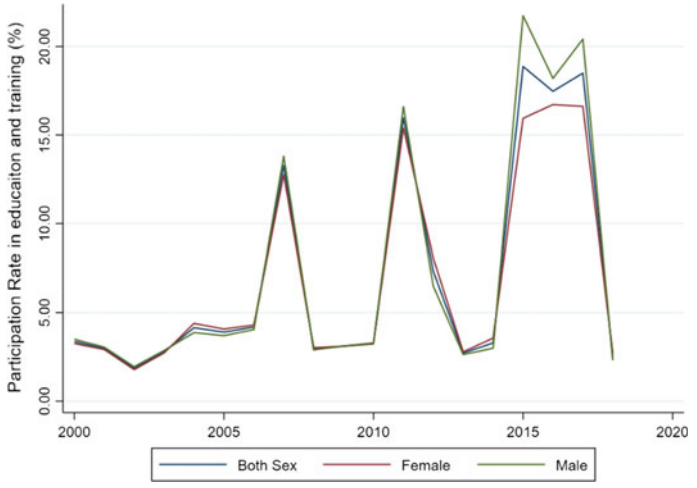

Fig. 11 Average participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex (Indicator 4.3.1), 2000–2018. *Target 4.3—By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university. Source* Author's developed based on UN-Stats (2020) Data

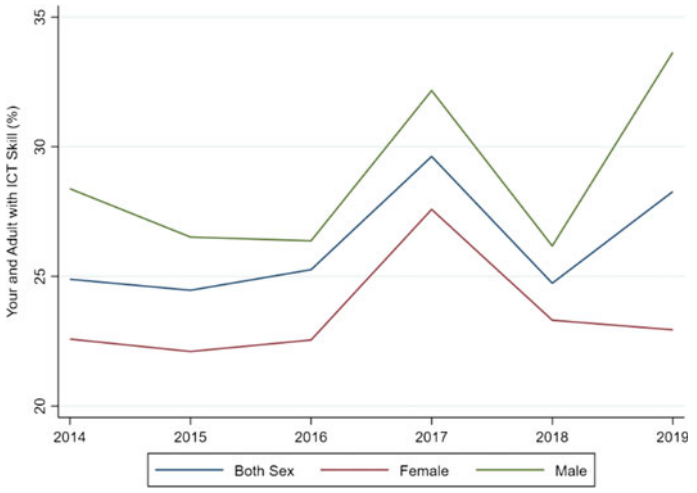

Fig. 12 Indicator 4.4.1—Proportion of youth and adults with information and communications technology (ICT) skills, 2014–2019. *Target 4.4: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship. Source* Author's developed based on UN-Stats (2020) Data

male participation edging slightly higher and female dipping significantly lower than the mark. As a matter of great concern, participation rates across all groups fall below 5%, which resembles the patterns seen during the early 2000s. Overall, a substantially low average participation rate coupled with a highly fluctuating pattern over a decade signifies severe underinvestment in education in the emerging economies.

To transform the increasing number of population into real human capital, access to technology and education focused on technology remains the key. Building up human capital with updated technology skills is requires substantial investment and prioritization. Figure 12 shows that despite phenomenal progress in technologies, the average proportion of youth and adults with ICT skills remains low at some higher than 25%. A stark reality is that while the proportion of males tends to be some over the 30% mark, the proportion of females fares around 15% on average. The low rates of ICT skill among the youth and adult—who fuels the nations' growth through demographic dividend—poses a significant concern for the emerging economies. Particularly, a substantially low proportion of females signifies significant gender discrimination and disparity. Overall, the patterns indicate substantial underinvestment and lower priority in these countries to ensure access to ICT skills and enable the youth and adult to transform into true human capital.

A key reason why the youth and adult do not get skilled in ICT is inadequate or no access to ICT related facilities and infrastructure. Figure 13 shows that with a fluctuating pattern, the proportion of schools with internet access for pedagogical purposes drastically falls since 2014. As of 2018, on average, 74% of the schools had internet access where schools delivering primary education falls significantly below

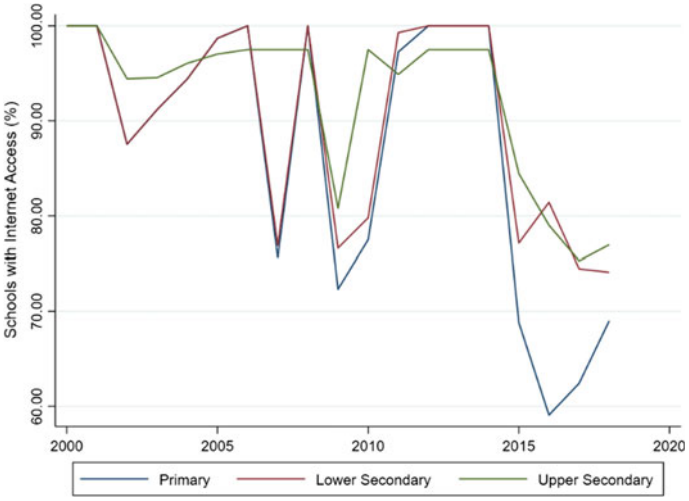

Fig. 13 Indicator 4.a.1: Schools with access to the internet for pedagogical purposes, by education level (%), 2000–2018. *Target 4.a—Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all*. *Source* Author's developed based on UN-Stats (2020) Data

the 70% mark. The patterns suggest that primary education faces noticeably lesser access to the internet for pedagogical purposes than the secondary levels.

All considered the progress of the four indicators for Goal 4 raises significant concerns. In line with HCI patterns discussed in the previous section, the four Goal 4 indicators suggest that the emerging countries' progress toward the human capital relevant SDGs remains significantly lower than needed. It puts the SDGs' achievement by 2030 under significant threat for these countries. The way to overcome the gap is to make human capital development a top policy priority and invest heavily through larger budgetary allocations and foreign sources.

6 Making Human Capital Work for Sustainable Development in Emerging Economies

The main challenge for most emerging economies in building human capital aligned with the SDGs is the lack of investment capacity. Many emerging economies heavily rely on foreign sources including overseas development assistance and financing from the multilateral development institutions (e.g., the World Bank) in the forms of grants, aids, and loans to finance its education and skill development infrastructure. By the very definition of an emerging economy, these countries experience consistent and fast economic growth. In doing so, most of these economies divert the majority of their local and foreign funding toward physical capital building such as infrastructure

and industrial development. Often, the budgetary allocation to the human capital relevant sectors such as education and health remains so low that the allocations never meet the actual need. Thus, problems persist and keep deepening over the years. Therefore, because resources are limited and economic growth receives the topmost priority, human capital development consistently remains a lower priority in most emerging economies. For example, in Bangladesh's case, the education sector's budgetary allocation constitutes only 11% in 2020–21, while the physical infrastructure sectors received about 29% of the allocation (MOF, 2020). In addition to capital constraints, there are other challenges as well, for example, the lack of a strategic human capital plan and long-term goals at the national level, inefficiency and corruption across all levels of the human capital relevant (e.g., education) sectors, the lack of coherence between the goals and plans of human capital relevant sectors (e.g., a consistent approach toward nutrition and primary and secondary education), the lack of necessary infrastructure and the lack of adequate and appropriately skilled human resources at the top tier who can lead the transformation (e.g., more rightly skilled teachers and trainers could create more teachers with similar skills).

To overcome the less-than-par progress in human capital development, the emerging economies need to undertake coordinated and integrated policy measures with a long-term orientation. It will require a massive investment in the human capital relevant sectors such as education and health. However, the investment size cannot be increased substantially overnight, which is why the countries need to take a long-term approach. A gradual increase in the fiscal allocation and foreign assistance to the right sectors and their effective utilization could transform a majority of the population, particularly the youth and the adult, into a real human capital over the longer term. It means the countries need to priorities both physical and human capital together to achieve truly sustainable development.

7 Conclusion

People are at the heart of the economic system in any economy. Emerging economies need to mobilize massive investment to transform their growing population into real human capital. While many of these economies demonstrate a faster economic growth driven by the expansion of physical resources, it may not sustain in the long-run if their people remain less skilled and deprived of education and other relevant opportunities. As such, investing in people is fundamental in making economic progress sustained in the long-run. The emerging economies need to realize that investing in people may not have a short-term gain. Still, it pays off with rippled benefits across the economy and society over a longer period. Given the poor progress of human capital development in emerging economies, it is perhaps the high time that human capital development and related sectors such as education receives a high priority of the governments alongside economic growth. If the emerging economies' governments could devise effective strategies and policy frameworks that take building both physical and human capital together as a top priority, economic growth achieved in the long-run would be

significantly larger and sustained. Of course, as a spill-over effect, an improvement in human qualities, the nations could achieve greater social security and well-being.

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Managing Intellectual Capital for Open Innovation: Components and Processes?

Muhammad Faraz Mubarak, Monika Petraite, and Kristina Kebure

Abstract Open innovation (OI) and Intellectual capital (IC) remain important in innovation and management research. In this chapter, we aim to address the linkage of Knowledge Management (KM) processes, practices, and strategies with the dimensions of IC, to ultimately enhance open innovation. In addition, this chapter also contributes towards establishing the connection between the fields of IC and KM. In this regard, we have also discussed the role of absorptive capacity. Moreover, the relationship of IC and OI paradigm is established by raising the question that how IC and OI are related to each other, with respect to the dimensions and process? And how IC can improve open innovation's success? Since KM is considered a stimulus in this connection, whereby, we address the question that how KM synergizes with intellectual capital? And how it further enhances the interplay of intellectual capital and open innovation? In a nutshell, the novelty of our chapter is also the combining and using of IC and KM for improving the open innovation which has not carried out previously in this way. To answer the questions raised in this chapter, we adopted a literature review methodology in which we have reviewed the literature including research papers and book chapters on the areas of IC, OI and KM. In next sections, the main concepts of this study including Intellectual Capital, Open Innovation, and Knowledge Management are theorized. Further than, the connections of IC & KM, and IC & OI are explained. After that, a conceptual model is presented, followed by the summary and practical implications.

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1 Introduction

The notion of open innovation is in the limelight of innovation and management researchers, especially in recent years by explaining the firms' external collaboration and cooperation to augment their intellectual assets (West et al., 2014). In this interaction, firms aim to enhance their odds of success by utilizing the knowledge expertise, and resources of partners while reducing the risks embedded with innovations (Belderbos et al., 2010). In addition, open innovation (OI) perspective also stresses the importance of firms' own intangible resources or assets—such as skills, intellectual property, competencies, knowledge, structures, and relationships. These allied assets play an interactive role along with the assets of external collaborative partners. In this tone, Intellectual capital researchers have already shown a keen interest in these intangibles and encapsulated the three streams including human, structural, and relational capital into Intellectual capital (IC) (Ahmed et al., 2019; Bontis, 1998; Mubarik et al., 2019). Besides, open innovation and intellectual capital research directions have not much converged to form a more synergistic and multifaceted process for managing the innovation. In doing so, scholars of open innovation and intellectual capital have mostly been dwelling in their own silhouettes (Chen, 2009; Rogo et al., 2014; Michelino et al., Michelino, Caputo, et al., 2014, b) rather than bringing these two concepts together to augment (or extend) the level of scholarship by enriching the literature on innovation management and organizational studies. This reflects a critical gap in the existing scholarly discussion (Marr et al., 2003; Macchi et al., 2014; Mubarik et al., 2018). It is noteworthy to mention, that absorptive capacity is also considered as a keystone of open innovation in this perspective—which is in fact firms' competence and ability to integrate and utilize the knowledge, ideas, and technologies from external partners or firms in internal operations (Cohen & Levinthal, 1990)—is also influenced by intellectual capital which enhances open innovation success. Innately, absorptive capacity is an intellectual competence that is enhanced with the help of intellectual capital (Harison & Koski, 2010).

In this interplay of open innovation and intellectual capital, knowledge—*either it is tacit or explicit*—remains as an important factor either it is (managing or opening of) innovation or formation of assets based on intellect(ual Capital). Therefore, managing knowledge is another important variable to be considered in this connection. Especially its linkage with IC. Knowledge Management (KM) is defined as doing what is needed to get the most out of knowledge resources, including both explicit and tacit knowledge (Sabherwal & Becerra-Fernandez, 2003). The literature on IC and KM shares a common and broader objective of understanding the role of knowledge and its management in firm's success and competitiveness (Argote et al., 2003; Grant, 1996; Nonaka & Takeuchi, 1995). While the literature on IC examines the nature of organizational knowledge and its different types, and also how they affect firm performance (Roos et al., 1998), whereas the KM literature discusses with the processes and practices for managing IC (Alavi & Leidner, 2001; Sabherwal & Sabherwal, 2005). Although the core concepts in KM to IC field have been being

contemplated since a decade barely, however, the attractiveness and efficiency of research on this area is triggered because of multi-disciplinary approach within the business management research field. As the inter-relatedness of these concepts is conceivable in theory, nonetheless, a limited understanding lasts about the formation and accumulation of firms' intellectual capital through managing knowledge in a dynamic way (Marr et al., 2003; Nonaka et al., 2000). As a result, very few discussions are performed on the association of KM and IC (Seleim & Khalil, 2011). In the investigation of the relationship of IC, or organizational knowledge, questions related to the processes through which the firms manage knowledge and appropriate its value receive less attention (Eisenhardt & Santos, 2002). Hence, we aim to address the linkage of KM processes, practices, and strategies with the dimensions of IC, to ultimately enhance open innovation. Furthermore, research on KM with respect to managing the pools of different types of knowledge rooted in the processes, relationships, and people—which is linked with social, relational, and human capital—has received a limited amount of attention (Easterby-Smith & Prieto, 2008; Nahapiet & Ghoshal, 1998). Therefore, this chapter also contributes towards establishing the linkage between the fields of IC and KM. Moreover, researchers have discussed the role of IC to improve the KM, by infusing absorptive capacity in KM processes, which in turn facilitate intellectual capital—still the scarcity of discussion on this relation is visible (Seleim & Khalil, 2011)—hence we also discuss the role of absorptive capacity in this connection the role of knowledge and its management in firm success and competitiveness (e.g., Nonaka & Takeuchi, 1995; Grant, 1996 Argote et al., 2003). The literature on IC examines the nature of organizational knowledge and its different types, and also how they affect firm performance (Roos et al., 1998), whereas the KM literature deals with the processes and practices for managing IC (Alavi & Leidner, 2001; Sabherwal & Sabherwal, 2005).

The literature on KM and IC share the same broad objective: understanding the role of knowledge and its management in firm success and competitiveness (e.g., Nonaka & Takeuchi, 1995; Grant, 1996; Argote et al., 2003). The literature on IC examines the nature of organizational knowledge and its different types, and also how they affect firm performance (Roos et al., 1998), whereas the KM literature deals with the processes and practices for managing IC (Alavi & Leidner, 2001; Sabherwal & Sabherwal, 2005).

Against this backdrop, the current chapter contributes by discussing the relationship of IC and OI paradigm by raising the question that how IC and OI are related to each other? In which dimensions and process? And how IC can improve open innovation success? Since KM is considered a stimulus in this connection, whereby, we address the question that how KM synergizes with intellectual capital? And how it further enhances the interplay of intellectual capital and open innovation? In a nutshell, the novelty of our chapter is combining and using the intellectual capital and knowledge management for improving open innovation which has not been carried out previously in this approach. In order to answer the questions raised in this chapter, we have adopted a literature review methodology in which we have reviewed the literature including research papers and book chapters on the areas of IC, OI, and KM. In the next sections, the main concepts of this study including

Intellectual Capital, Open Innovation, and Knowledge Management are theorized. Further then, the connections of IC & KM, and IC & OI are explained. After that, a conceptual model is presented, followed by the summary and practical implications.

2 Intellectual Capital

Organizations should deploy and manage their IC resources to maximize value creation (Peng, 2011). The IC term was first introduced by Galbraith (1969) as a form of knowledge, intellect, and brainpower activity that uses knowledge to create value. Since then, different views of IC have been emerged (Benevene & Cortini, 2010). Edvinsson and Sullivan (1996), for instance, view IC as a knowledge that can be converted into value. Stewart (1997) refers to IC as the aggregation of all knowledge and competencies of employees that enable an organization to achieve competitive advantages. In addition, IC is defined to include all non-tangible assets and resources in an organization, including its processes, innovation capacity, and patents as well as the tacit knowledge of its members and their network of collaborators and contact (Bontis, 1998; Benevene & Cortini, 2010; Mubarik et al., 2018). Despite its multidimensionality, we have conceptualized IC as consisting of three basic interrelated dimensions: human capital (HC), organizational (or structural) capital (SC), and relational (or customer) capital (RC) (Bontis, 2000; Shujaat et al., 2019; Ahmed et al., 2019) as shown in Fig. 1.

Human capital is considered as all the human-related resources and explains the collective tacit knowledge, skills, and competencies—which mainly streamline the internal operations and cooperation. Structural capital refers to the explicit knowledge of firm rooted in its structures, processes, and corporate culture. Lastly, relational capital encapsulates the firm's relationship with the external partners and stakeholders in which the knowledge is exchanged. It acknowledges and manages the deeply rooted knowledge in external relations (Bontis, 1998; Edvinsson & Sullivan, 1996; Mahmood and Mubarik, 2020; Mubarik et al., 2019). Hence, open innovation and intellectual capital are markedly connected. Open innovation perspective is considered as shared and collaborative innovation approach which can be built and expanded upon relational capital, whereby human and structural capital can also facilitate this interaction appropriately.

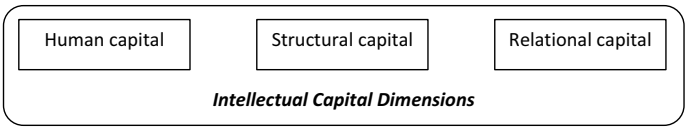

Fig. 1 Dimensions of intellectual capital

3 Open Innovation

The main idea of Open Innovation (OI) is opening-up the innovation process. Chesbrough et al. (2006) defined OI as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and to expand markets for the external use of innovation, respectively". There are three processes of OI: *outside-in*, *inside-out* and *coupled* (Gassmann & Enkel, 2004) *Outside-in* refers to internal use of external knowledge and *inside-out* OI refers to external exploitation of internal knowledge. *Coupled* OI when is a combination of outside-in and inside-out (Chesbrough et al., 2006), as shown in Fig. 2.

As competitive dynamics compel organizations to seek alternatives for survival and growth, the innovation process is constantly changing, and new ways of developing products, processes, services, and businesses are pursued (OECD & Eurostat, 2005). Open Innovation (OI) paradigm has been introduced by Chesbrough in 2003 with a method that external and internal ideas for innovation development by deploying outside and inside pathways to the market. In over 16 years OI has become one of the most interesting research areas and important for academia and practice. OI is based on the purposeful management of organizations' knowledge flows, both external knowledge and internal knowledge transferred from the organization's environment to be used for innovation activities and to increase its efficiency. OI improves innovation performance (West & Bogers, 2014). The development of open innovation paradigm has evolved since 2003 and has been defined as "*a distributed innovation process based on purposively managed flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model*" (Chesbrough & Bogers, 2014). In order to implement open innovation, the organization must be guided by several management levers that simultaneously change organizational structure, process mechanisms, strategy, and organizational levels as well as adaptation to organizational improvement in the development of open innovation (Chiaroni et al., 2009). Such organizational changes include the review and development of specific capabilities.

From the literature review, the main idea behind open innovation is that organizations open their innovation borders and let the information flow outside from the company, and, in the meantime, they are able to use external knowledge and resources to create value (Bereczki, 2019; Mubarak & Petraite, 2020). Nowadays, OI does not refer only to the collaboration between two firms anymore. There are several cases where many actors are embedded in an OI ecosystem, with the goal

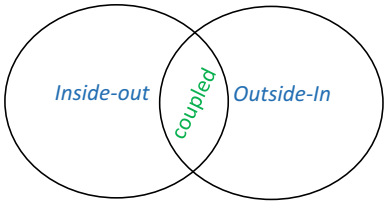

Fig. 2 Open innovation dimensions (Inspired by Chesbrough, 2003)

to achieve, together, something new, to create new opportunities (Valkokari et al., 2017). Key factors for open innovations are openness, participation, contribution, relationships, collaboration.

According to the OI paradigm, purposeful firm interaction with external organizations leverages internal R&D efforts, subsequently enhancing innovativeness. Indeed, outside the organizational boundaries, a wide range of ideas, competencies, and technologies may be incorporated to boost a company's competitive advantage. Consistently, many studies have demonstrated the benefits of OI in terms of innovation performance (West & Bogers, 2014). Thus, firms must take up the challenge to enhance their collaborative skills and effectively gather knowledge, technology, and ideas from their partners. Such capability is usually referred to as absorptive capacity and has been studied in terms of openness to new ideas (Fey & Birkinshaw, 2005); knowledge-oriented responsiveness; practice-updating propensity upon receipt of new information (Jantunen, 2005); or the extent of external knowledge acquisition, assimilation, transformation, and exploitation (Jansen et al., 2005). Therefore, absorptive capacity is a knowledge-based asset (Jurado et al., 2009; Xie et al., 2018a, b) with the ability to translate inter-organizational knowledge acquisition into innovation (Xie et al., 2018a, b).

4 Knowledge Management

The attention of Researchers of management has increased exponentially towards knowledge management (Von Krogh et al., 2000; Nonaka &Takeuchi, 1995; Serban et al., 2007). Until the 1990s, the scientific community disagreed on a widely accepted classification for design, although it was widely used in companies, institutions, public administrations, and many other organizations. In management literature, Nonaka and Takeuchi (1995) fixed-term: when the resource-based approach referred to knowledge as the basic source of competitive advantage. Since then, so-called knowledge management has become widespread. Dalmaris et al. (2007) argued that through knowledge management "the executives of companies hope to balance their knowledge assets and achieve results that exert a positive contribution on their balance sheets, and also on the life of each of their employees". According to Randeree (2006, p. 145) "*knowledge management is taking an increasingly fundamental role in the business of many organizations, as they realize that competitiveness depends on the effective management of intellectual resources*". KM can be defined as a system or a framework that integrates processes, technology, and people to achieve sustainable results by increasing performance through learning (Gorelick & Tantawy-Monsou, 2005). Knowledge management contributes to the organizing, motivating, planning, and controlling of processes, people, and systems in a firm in order that knowledge assets are continuously improved and used efficiently (Rajesh et al., 2011). Different approaches to the dimensions of the term have emerged in the knowledge management literature. Knowledge management is recognized as includes the identification, acquisition, generation, validation, fixation, dissemination, embodiment, realization,

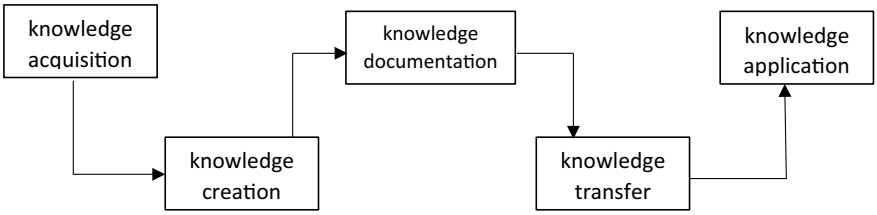

Fig. 3 Process of knowledge management

and use of knowledge (Johnston & Blumentritt, 1998). Zack (1999) assume that knowledge management includes the acquisition, development, storage, retrieval, dissemination, and delivery of knowledge. For instance, Bennett and Gabriel (1999) consider knowledge management as a process covering the involves knowledge capture, storage (i.e., documentation), dissemination, and use of knowledge. Nevertheless, Gold et al. (2001) defined knowledge management as the capability of the knowledge process that emerges from knowledge conversation, application, acquisition, and protection. Knowledge management (KM) entails the efforts of an organization's managers to facilitate the acquisition, creations, storage, development, and deployment of knowledge by firms (Rowley, 2001). Knowledge generation is the process of acquiring both outside and inside knowledge. Marr et al. (2003) define KM as processes and practices that organizations use in order to improve the effectiveness of the generation and application of their knowledge and intellectual capital. Salojarvi et al. (2005), however, view KM as a process that encompasses activities in all relevant managerial areas. KM entails five fundamental processes of knowledge acquisition (KA); knowledge creation (KC); knowledge documentation (KD); knowledge transfer (KT); and knowledge application (KAP) (Seleim & Khalil, 2011), as shown in Fig. 3.

These five KM processes are not necessarily sequential but rather iterative and overlap (Lee & Choi, 2003). The effective management of knowledge necessitates a thorough understanding of the relationships not only among the KM processes themselves but also between the KM processes and the intellectual assets of an organization. Furthermore, knowledge is acquired, created, documented, transferred, and applied by using two distinct strategies of knowledge management—called codification and personalization. These strategies play a key role in upgrading the knowledgebase of firms (Greiner et al., 2007, p. 4)—which is particularly important for the knowledge-based business. Codification entails a people-to-papers approach which deals with knowledge storing and distribution through an efficient electronic document system (Cho & Lee, 2002). By this means, firms improve their explicit knowledge stock by maintaining databases and information systems. On the other hand, personalization is the people-to-people approach that manages the tacit knowledge of firms by transferring the knowledge (internally or externally) through the networks of relationships (Seleim et al., 2011), as shown in Fig. 4.

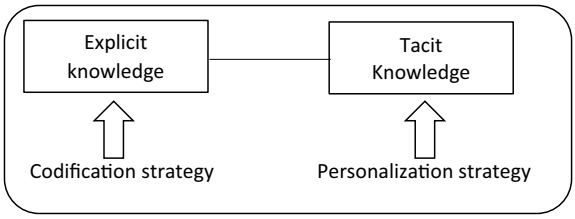

Fig. 4 Knowledge management strategies

5 Intellectual Capital and Knowledge Management

In modern management schools of thought, intellectual capital and knowledge management conceptions are deep-rooted with each other. Amongst those, dynamic capability perspective (Teece et al., 1997; Zahra and Nielsen, 2002; Zahra & George, 2002), the resource-based view of the firm (Parahald & Hamel, 1990; Penrose, 1959, etc.), and knowledge-based theory of the firm (Grant, 1996; Kogut & Zander, 1996; Nonaka, 1994; Spender, 1994, etc.) are renown. These schools of thought propone that firms can achieve sustainable competitive advantage through their competence to generate, apply, and obtain value from their knowledge and intellect with the help of (continuous) learning. Organizational performance and competitiveness are driven with the help of intellectual capital and knowledge management (Curado, 2008; Nonaka et al., 2000). In order to maneuver with increasingly tougher business conditions, firms are compelled to use knowledge management to complement and capitalize intellectual capital while improving their absorptive capacity to further succeed in innovation-related interactions (Benevene & Cortini, 2010; Seleim & Khalil, 2007). Since knowledge management and intellectual encompass the holistic assortment of intellectual and knowledge-based endeavors that is why they are conceptually interrelated (Lamond et al., 2010; Nonaka et al., 2000). In doing so, knowledge management encapsulates two components of the intellectual capital stock of a firm, and organizational learning flows (Bontis, 1996). Nevertheless, the association of knowledge management and intellectual capital is pivotal for organizational effectiveness as their interplay and influence on each other are strongly considered (Shih et al., 2010). Although the core concepts in KM and IC area have been contemplated for a decade barely, however, the attractiveness of research on this area is triggered because of the multi-disciplinary approach within the business management research field (Seleim et al., 2011; Ahmed et al., 2019). As the inter-relatedness of these concepts is conceivable theoretically, however, a limited understanding exists about the creation and accumulation of firms' intellectual capital through managing knowledge in a dynamic way (Marr et al., 2003; Nonaka et al., 2000). As a result, very few discussions are made on the association of KM and IC (Seleim & Khalil, 2011). Moreover, researchers have discussed the role of IC to improve the KM, by infusing absorptive capacity in KM processes, which in turn facilitate intellectual capital—still the scarcity of discussion on this relation is visible (Zhuo & Fink, 2003; Seleim & Khalil, 2011).

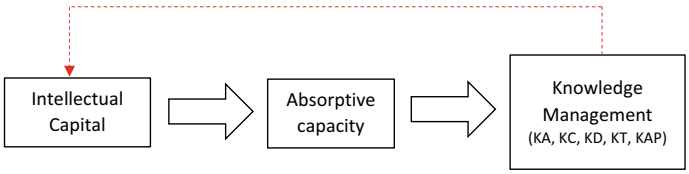

Fig. 5 Interplay of intellectual capital and knowledge management

The inception of Intellectual capital drives with its extensive acknowledgment that knowledge is an important asset for firms (Mubarik et al., 2019). With this view, intellectual capital and knowledge management are inter-related and complement each other in diverse ways by managing a wide range of intellectual activities from knowledge generation to leveraging it (Zho & Fink, 2003). Intellectual capital covers the firms' knowledge stock at a specific time accumulated through the activities of knowledge flow which covers the processes of knowledge management (Seleim & Khalil, 2011; Shih et al., 2010). Intellectual capital management and knowledge management are also considered as a combination of managerial activities for recognizing and capitalizing the knowledge-based assets of firms through knowledge creation and sharing (Remirez et al., 2007). Researchers (such as Schiuma & Lerro, 2008; Mubarik et al., 2020) describe that enhancing the organizational flows and management approaches to create knowledge-based assets is critical for intellectual capital management endeavors. In fact, Intellectual capital is strongly believed as closely associated with each other. In this setting, when intellectual capital is maintained through knowledge management activities and intellectual capital is used to enhance the knowledge management process by instilling absorptive capacity, which becomes a strong source for achieving sustainable competitive advantage in firms (Seleim & Khlail, 2011; Benevene & Cortini, 2010). We have shown this interaction in Fig. 5.

Theoretical roots of intellectual capital can be traced from strategic, and measurement (tactical) perspectives (Roose et al., 1997). Whereby the former perspective highlights the creation & usage of knowledge as well as the connection between knowledge and value creation, while the lateral highlights the operational and practical application of knowledge related processes that enable knowledge acquisition, generation, sharing, and utilizing it, which, accumulates intellectual capital stock as a result (Zhou & Fink, 2003).

Intellectual capital help firms to generate and manage knowledge through human, structural and relational capital (Van Buren, 1999; Wu & Tsai, 2005). In this interaction, relational or social capital is considered as a vital source to improve knowledge management. Nevertheless, its role can also be deemed as complementary to and parallel with other intangibles including human and structural capital which are further related to the process of managing tacit and explicit knowledge (Nonaka, 2005). Moreover, the knowledge of firms should be codified and converted into explicit through codification strategy, which can be facilitated by intellectual capital dimensions. Subsequently, the said knowledge should be institutionalized and regulated in order to reinforce its ownership while utilizing it to create value for the firm

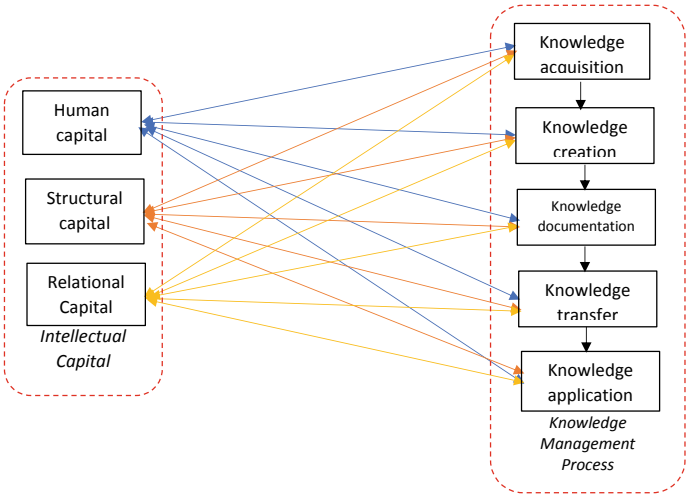

Fig. 6 Association of intellectual capital and knowledge management

(Shih et al., 2010; Seleim et al., 2007, 2011). In this process, intellectual capital—*especially structural capital*—can play important role in knowledge acquisition, creation, documentation, application, and its transfer (Seleim et al., 2004; Khalique et al., 2011) to the partners in innovation-based interaction such as open innovation. The interaction of intellectual capital dimensions with the knowledge management process is shown in Fig. 6.

6 Intellectual Capital and Open Innovation

Intellectual Capital theory orientation has influenced the OI paradigm by infusing the support of intangible assets' support. An essential element of OI is strong partnerships based on innovation that encompasses both quality and quantity. Relationship capital requires both the density and usefulness of the partner networks of an organization. Thus, the OI, therefore, differs from IC with a clear emphasis on innovation, motivated not only by the amount of relative capital accumulated so far but also by strategic business to strengthen in-house R&D endeavor. Another element relates to the human resource in collaboration with external partners. Some authors highlighted that this approach to generate ideas externally depends on a single organization (du Chatenier et al., 2010). Human capital is related to IC theory. Another keystone that refers to OI is s the use of IP with a focus on obtaining a financial return from unused inventions (Chesbrough et al., 2006; Greco et al., 2018). Looking from the IC theory point of view, the core element of structural capital is a firm intellectual property. Michelino et al. (b; Michelino, Caputo, et al., 2014) note that most common OI-related indicators can be directly or indirectly related to IC. Looking into the bridge

between OI and IC, we are supporting our assumption that OI depends on the organization's IC with additional strategic usage of such capital. OI practices are stimulated by IC components and this has been proven by Rogo et al. (2014).

According to the literature analysis, more studies are needed on the respective OI and IC. Chen et al. (2015) propose the integration of IC and OI by proposing a framework of three IC components (human, structural, and relational capital) and by dividing the IC into two domains: internal (i.e., the focal organization's characteristics), and external (i.e., those of a different organization cooperating with it). Both domains are categorized into traditional human, structural and relational capital classifiers, but some variations between internal and external structures seem dubious. For instance, the same author explains internal structural capital as "the mechanism and structure of the company, including its information systems, databases, operation flows, and corporate culture" (Chen et al., 2015, p. 6) and external structural capital as "the information systems, databases, operation flows, and corporate culture of the cooperative organizations" (Chen et al., 2015, p. 7). Hence, the IC of external organizations is part of the IC of the central firm itself. IC internal and external stocks can't be confusing, although external subjects can influence internal IC. According to the proposed framework by Chen et al. (2015), it can be considered that the OI is consistent with IC theory with a need to clarify how the two theories are connected. With human capital, organizations are able to strengthen capabilities that would improve the use of external knowledge (Jansen et al., 2005; Xie et al., 2018a, b). Few studies have looked at the positive relationship of structural and human capital on collaborative innovation success. In order to increase innovation performance, a few organizational factors are needed for the development of collaboration (Foss et al. 2010). Cabello-Medina et al. (2011) demonstrated human capital has a significant influence on the organization's innovation in relation to improved social capital and human resource management practices. For instance, Lazzarotti et al. (2015) claim that social and organizational precursors of absorptive capacity are mediating factors between openness and performance. In 2016, the same authors underscored the importance of such management systems (conceivably researched structural capital) for the effect within a collaboration of academic-partner on innovation performance (Lazzarotti et al., 2016). It can be stated that the intangible assets mention above, which help to pursue the results of the OI, can be treated as absorptive capacity in terms of the human and structural capital, given their expanded potential in the sense of external knowledge assimilation to contribute on collaborative results of organization's (Serban and Luan, 2002; Fabrizio, 2009). Hence, HC and SC are proposed as an anchor of absorptive capacity, with a successive, increasing role in the OI's success. If this rationale is extended to relational capital, the aforementioned connection may be presumed to result in lower returns, given that organizations with a certain level of highly qualified human capital or a high level of internal knowledge, are less oriented on collaborative projects and may give priority to internal innovations.

According to OI, increasing strong synergies with other organizations means increasing the ability to obtain external ideas, competencies, knowledge, technology and some other intangibles, that further offer greater opportunities for innovation.

This is in line with the technology transfer theory (Allen, 1977) and resource-based approach (Wernerfelt, 1984) as organizations had to merge their own resources with these other organizations (Vanhaverbeke & Clood, 2006). Thus, valuable partnership collaboration could become an improvement in organizational performance, too many intense collaborations or the persistent selection of distinct types of partners can be detrimental due to the over collaboration phenomena (Duysters & Lokshin, 2011; Greco et al., 2016; Laursen & Salter, 2006). Many authors highlighted that IC is closely related to organizational innovation as its contribution to higher innovativeness and innovation performance. Higher innovation performance, in turn, leads to a more significant competitive advantage and more significant business value. According to Užienė (2015), IC management focused on one company and internal knowledge processes. However, with the OI paradigm, the boundaries of the company open-up and new challenges arise that need to be explored. Even though there are not so many studies on the IC effects on OI, Rogo et al. (2014) were the first who identify how IC components encourage OI practices. According to Zambon et al. (2015) studies, intellectual capital has a positive impact on innovation performance. OI has been explored from the business model, design, culture, leadership, and other domains' point of view, but there is still little knowledge of how to manage and assess intellectual capital toward OI. Fey et al. (2005) studied absorptive capacity in terms of openness to new ideas. Barrena-Martínez et al. (2020) presented the relationship between OI and IC and the strong connection between IC and OI, with a strong emphasis on the positive role of the three IC components as enhancers of OI-related innovation. Inspired by Barrena-Martinez et al. (2020) we have illustrated the relationship between IC and OI in Fig. 7.

Looking from Open Innovation (OI) perspective all three components of IC are important and support OI. Xie et al. (2018a, b) highlighted that HC and SC are fostering organization capability for external knowledge acquisition and assimilation. Barrena-Martínez et al. (2020) analyzed that in low-tech firms OI success depends on HC than on SC, and in SMEs OI success is positively driven by SC and HC, while large firms' OI success is positively driven by RC. For instance, Bontis

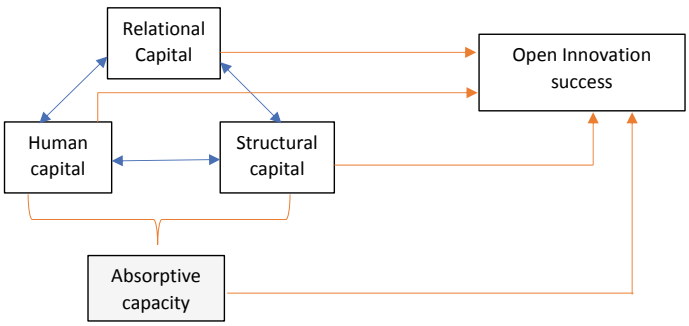

Fig. 7 Relationship between intellectual capital and open innovation (Inspired by: Barrena-Martíneza et al. 2020)

(2002) pointed out that HC is a source of innovation and strategic renewal. Looking from an individual potential point of view, collaboration and individual innovation, as well as the individual desire to share knowledge are key preconditions for an open approach to innovation. In addition, knowledge and skill employees create a unique value to the firm. Taking into account SC component of IC is important as it analyzes what mechanisms and structures of the organization can be able to help individuals to pursue networking outside and within the organization and is fostered by knowledge integration to combine different technological skills (Chapman et al., 2018; Chiaroni et al., 2010; Dost et al., 2018). Podmetina et al. (2013) has discussed how positive effect of capabilities like SC and HC on RC. In fact, RC component of IC that includes all organizational relationship, consolidate ability of organizations to network extensively and collaborate with all stakeholders. It means, that all organizational relationships are involving knowledge share and exchange (Kong, 2010). The knowledge inflows or outflow are increasing the ability to generate more innovative ideas within the organization. It can be concluded that knowledge exchange that is implemented through the organizational RC is able to improve OI and in addition is improving IC of the organization. Hence, IC and OI are related as they are future-oriented and creating value (Roose et al., 2001; Veltri et al., 2011). As Sumita (2008) mentioned that without such assessment it can neither optimize the allocation of resources by selecting and concentrating nor rationally use external assets. Al-Ali (2003) mentions that IC is an important indicator for the success of collaboration during OI. Furthermore, the organization's RC development fosters OI success and accumulates various benefits from collaboration with external partners.

7 Summary

As an output of this study, we hereby propose a conceptual model to effectively manage intellectual capital for open innovation (Fig. 8). In this connection, knowledge management is considered as an important element that facilitates the knowledge flow in all three facets of open innovation. Beforehand, it is influenced by the absorptive capacity created through intellectual capital which further effects open innovation as well. The components of the knowledge management process and intellectual capital dimensions are inter-related with each other. The flow of explicit and tacit knowledge in respective domains of the knowledge management process is managed through Codification and personalization strategy. Codification strategy, which is also called people-to-documents (P2D), deals with acquiring the documented knowledge from partners, also handles the documentation of knowledge into databases and firm archives. Moreover, it also helps to transfer the documented knowledge to external partners and also assists to apply the knowledge by helping through documented processes and manuals. Personalization strategy also helps firms to acquire tacit knowledge through relationship management and people to people (P2) approach. Also, it plays a role to utilize the tacit understanding of the firm to create new knowledge, which can be subsequently documented through codification

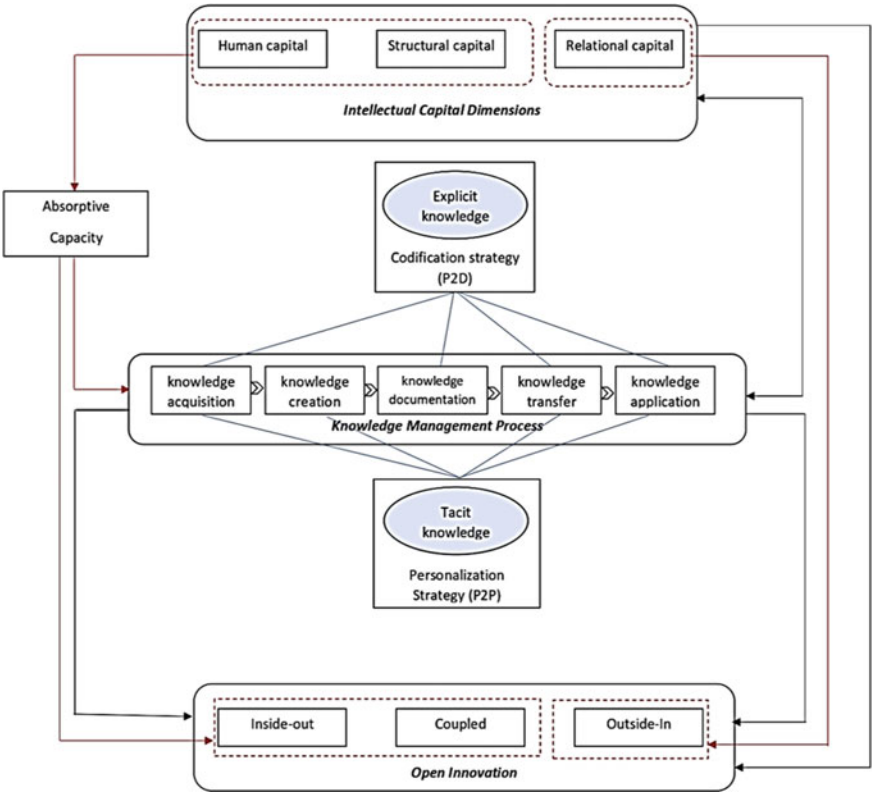

Fig. 8 Improving open innovation through intellectual capital and knowledge management

strategy. Moreover, personalization facilitates to transfer of the firms' tacit knowledge, experience and understanding to outside partners through sharing of personal experience and networking with partners. Most importantly, it complements codification strategy by facilitating the documented process and knowledge with tacit understanding, experience, and skills of people. All these activities in knowledge management are inter-related with all three dimensions of intellectual capital which are human capital, structural capital, and relational capital. With human capital, it is associated in the form of tacit experience & skill and explicit education and knowledge. With structural capital, it relates to the tacit practices, cultures, and processes of firms. Also, with the explicit and codified processes, it is well connected. Furthermore, tacit knowledge is deeply rooted in the relationship with outside and inside the firms. Especially with outside where the outside-in approach is preferred relational capital plays an important role to manage such knowledge and intangible resources, which is further facilitated by the personalization strategy (P2P) of knowledge management. Furthermore, intellectual capital drives absorptive capacity which

not only enhances the knowledge management process but also improves open innovation by influencing firms' competencies and capacities to effectively undertake inside-out and coupled innovation activities. With the help of relational capital and tacit knowledge management strategy of personalization (P2P), outside-in knowledge, experience, and collaborative relationships are managed in a better way. Therefore, we establish that intellectual capital dimensions and knowledge management complement each other which positively effects the open innovation process. Also, intellectual capital and open innovation interplay enhance the open innovation by managing absorptive capacity and all three aspects of open innovation.

8 Implications and Future Directions

The model of this study can suffice an instrumental role to enhance open innovation in firms. Furthermore, firms can also utilize this model to enhance their knowledge management practices while increasing their absorptive capacity through intellectual capital, which of course, can also lead to improving open innovation—inside-out and coupled innovation process directly and outside-in process indirectly. The manager could utilize the conceptualization of this study to utilize and fine-tune their existing knowledge management practices, strategies and policies with the help of Intellectual Capital management. This step can enhance the competitiveness and performance of firms. In addition, firms—especially innovative and technological ones—can use the insights of managing Intellectual capital and knowledge management not only to upgrade their competitiveness but also improve their overall performance, as well as innovation performance with the help of effectively adopting open innovation process. In doing so, they will get diverse knowledge, expertise, knowledge, ideas, as well as assets from their external partners without incurring extra costs. It will not only reduce the R&D costs but also enhance the relationships with various prominent players in the industry. The very practice will encourage coopetition, co-creation with the help of collaborative open innovation settings by replacing the conventional atmosphere of ferocious competition that also consumes huge budgets. However, several issues in collaboration still exist which impede this collaborative innovation-based relationship that should be studied in future studies. These issues include trust (and distrust) in collaboration partners, dissimilar cultures, values and language, distance from each other, and a few others. In this regard, we further suggest drawing the reflections from various theories such as intellectual capital theory, social exchange theory, the theory of contract, knowledge exchange approach, paradoxical theory, and some others in this context. We hereby further propose to test this model empirically in future research, whereby Intellectual capital and knowledge management could be undertaken as components or drivers for open innovation. In addition, we also suggest testing this model in various firms by considering their heterogeneities with respect to size (SMEs, large, etc.), nature (technological, non-technological, innovative, non-innovative firms), and scope (local, international, multinational, etcetera).

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The Proliferation of Intellectual Capital Through Leadership

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Abstract The transformation of the economy from manufacturing to knowledge has relegated the importance of capital assets and brought intellectual capital to the fore. With this change, the firms must understand how they can better utilize their intellectual capital. This chapter has attempted to divulge the role of leadership in developing intellectual capital. The chapter has established the correspondence between the type of leadership and intellectual dynamics of the environment firm is operating in. Transactional leadership is more suited to a stable environment where the leader instructed employees are able to achieve the desired result. Transformational leadership is useful when there are changes that are well grasped by the leaders and they can motivate employees to adjust themselves to the emerging changes. Finally, servant leadership develops the type of intellectual capital that is useful for a highly vibrant environment. Leadership instead of selling their vision, facilitate employees to search for new ideas.

1 Introduction

Since its inception, the life of the human on earth has been under strain. The ensuing struggle to cope with the available resources diligently, taught humanity to have efficient use of the available resources. The industrial revolution initiated in Europe,

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and then spreading all over the world enabled humanity to increase its production manifolds. The whole of the nineteenth century and the first half of the twentieth century followed a stable market phenomenon. European nations, specifically the colonial powers, reaped the benefits of increased production. The idea of mass production is well suited to increased production capacity. In all this productive zeal, the employees, apart from managers, were required to provide just the operating hands. The thinking had to be done by a few intelligent and resourceful at the top. So, it was the physical being of the person that was being put to use; the organizations wanted the employees to be maximally productive. The ideas of scientific management were meant to achieve this end. The focus on efficient production did not last too long. The end of colonialism after the Second World War and the subsequent rise in the number of producers caused the economy to be competitive. Producers, in the competitive economy, find themselves pressed to come up with new products and services (Porter, 1990). As the firms groped for the new products and services, the world moved from the manufacturing economy into the knowledge economy where ideas were the essence and the resulting products or services were the packaging of the idea.

The knowledge economy produces ideas (Powell & Snellman, 2004). A firm that is able to produce more useful ideas will be more competitive (Falciola et al., 2020). Conversely, the one lacking in the ability to produce ideas will slowly recede to a secondary position in the short run and will vanish in the long run. IBM moving from top position to a second category player in the field of computer, Nokia losing grounds to the new entrants such as i-phone and Samsung and the complete disappearance of Blackberry are some of the notable examples manifesting the pulverizing effects of shying away from new ideas. Along with this epoch changing idea of knowledge economy getting firm roots, the two management gurus came up with their prophetic vision for the future. First, Schumpeter came up with the idea of innovation (Schumpeter, 1912). Condemning the stagnant economy, Schumpeter was of the view that entrepreneurs employing new ideas provide a productive leap to the economy (Schumpeter, 1912). According to him, employing the new idea, entrepreneurs initially reap abnormal profit and then through imitation and profusion, the idea becomes a normal one and consequently reducing profit to normal as well (Pol et al., 2006). Though forsaken at his time because of his views of radical change, today his ideas of change are readily accepted as a panacea for crisis-ridden capitalism. Second, Peter Drucker came up with a new idea for employees. Introducing the term knowledge employee, an employee that uses knowledge as the main asset in its work, he commented that the in future the source of the competitive edge will not be the capital assets, but the human assets known as employees (Drucker, 2006). Ideas driven Schumpeterian Economy led by entrepreneurs and run by knowledge workers brought the world where the physical assets of the firm were less important and knowledge asset of the firm was more important. Though the change had occurred, the nomenclature was not yet clear. Knowledge economy with altogether new structure was still searching for a name to this structure.

The reality unnamed remains unnoticed. The reality not well understood may get the wrong name. The initial nomenclature of intangible assets was too hazy for

encapsulating the organization's knowledge base. The erstwhile description of organizational knowledge such as intangible assets, knowledge management, and intellectual property either narrowed or broadened the reality. Drucker (2006) and Stewart (1997) came up with the term intellectual capital to depict organizational knowledge resources. Intellectual capital is a multi-dimensional construct that includes human capital, structural capital, and relational capital (Bontis, 1998). Human capital, usually considered to be the dominant part of intellectual capital, is the knowledge skills, and experience owned by the employees. Relational capital yet individual possession is formed through the networking of the employees. Employees, over time, build relationships with colleagues within the organization and with the other stakeholders out of the organization; these relation based networks have knowledge embedded in them that is used by the employees of the organization. Structural capital, in contrast to human capital and relational capital, is the knowledge owned by the firm. Structural capital, in simple words, is defined as the part of knowledge left with the organization when employees leave it. Over time, a firm codifies and stores knowledge in its database, processes, and culture that is known as structural capital. The combined value of human, structural, and relational capital determines the total stock of knowledge available with the firm.

Once the importance of intellectual capital has been realized there is an important issue that needs to be explored. How can intellectual capital be developed? The idea has been studied from multiple perspectives in HR. The role of knowledge-based HR to affect intellectual has been studied (Kianto et al., 2017). Similarly, the role of strategic HR in affecting intellectual capital has also been studied (Teo et al., 2014). One of the important areas that needs to be explored for its fruitful effect on intellectual capital is leadership. Leadership, a process of bringing a change through the use of influence, can affect intellectual capital. The proposed book chapter attempts to delineate the relationship between the two.

2 Intellectual Capital

Think of a fief in the medieval world that is being purchased by a lord along with all of the peasants working on it. The lord purchasing the land looks at the physique of the peasants along with looking at the fertility of the land. He cannot ignore the strength of the toiling hands. Now come to the organization working in the knowledge economy in the twenty-first century. A billionaire is going to purchase a software firm located in the outer precinct of a small city of the developed world. The whole firm consists of not more than four rooms and the whole edifice of the firm does not cover more than 120 square yards. Additionally, the building looks shoddy. Yet the billionaire is ready to pay the sum of the amount that is 20% more than the market price of the firm. A careless onlooker might consider the billionaire a lunatic, but that is not the case. The firm, apparently unattractive, has great growth potential. With four of the top ten software engineers of the country on its payroll, and being the favorite

employer for the software developers, the firm with its accumulated knowledge base and strong relation with customers has a worth of not less than $15 million.

The above given two hypothetical transactions depict the transformation of a firm's valuation from an agrarian world into a knowledge economy. The firm in the knowledge economy uses the available knowledge to produce products and services. As knowledge has come to the forefront by replacing the capital as the main driver of the firm's performance, a need was felt to come up with a new conceptualization of the firm. Historical terms like intangible assets were felt to be doing injustice with the resource that is playing a pivotal role in a firm's performance. Contrary to the steam power and physical power, the firms in the knowledge economy were making the use of power emanating from intellect so the term intellectual capital appears to be the appropriate one. An attempt is being made to explain intellectual capital. Intellectual capital is the total stock of knowledge available to the firm. This stock of knowledge resides in three forms namely; human capital, relational capital, and structural capital.

2.1 Human Capital

A better understanding of human capital can emerge when we move from simple work to complex work. Simple work is the one that requires little or no training to undertake. For instance, an employee is required to move a load from one place to the other. Looking at another person doing the same job just for once is enough to do it. Simple jobs are mostly structured ones that have little variance in them. With the available standard procedures, such works require little knowledge and a low level of skills. Additionally, such jobs do not offer much learning content. Conversely, a complex job is one that requires extensive knowledge and training. Conducting surgery on a patient with a rare disease requires knowledge of pathology, knowledge, and skills of the procedures to conduct surgery and knowledge of dealing with any complexion arising during the process. A surgeon who will conduct such surgery has the support of his medical qualification and years of experience. Complex jobs do not lend themselves to standard procedures. The possible variation either in the intensity of illness or the level of complexities can make cases differ from each other thus eliminating the availability of a standard procedure. Additionally, the complexity of the job provides great learning content.

Irrespective of the level of complexity, every job requires knowledge and skills. Collectively knowledge and skills are named competencies. Employees working in the organization use their competencies to accomplish the jobs assigned to them. Though the competencies do not make the whole of the human capital, they are the basic to start with. Another component of human capital is the attitude of the employee. With the competencies, employees can do the job, with a positive attitude towards the job they will do the job. For instance, there are two soldiers well trained to guard the post at the border. Suppose, one of them works diligently to guard the outpost while the other is even ready to sell the outpost to the enemy. Though

the competencies are the same, there is a difference in attitude. Many jobs along with competencies require a particular type of attitude. Some jobs require resilience. Thomas Edison, a prolific inventor, stands out as an epitome of resilience. With thousands of failures to his name, the inventor still went on to come up with his invention. Some jobs require the employee to be accommodative towards others. Jobs requiring teamwork cannot come to fruition if the team members miss out on being accommodative.

With the rising competition, the need for being innovatively agile is becoming highly important. With the ever-growing demand for new products and services along with the pressure to reduce cost the organizations are strained to innovative their products and procedures. Employees who can respond to the demand for innovativeness are in high demand. If innovativeness is the ability of an employee to combine the existing knowledge to come up with new solutions, the agility to innovate is the speediness of such an enterprise. Along with competencies, attitude, and innovative agility that remain in the repertoire of individual employees (Bontis, 1998); there are some facets of human capital that are collectively enacted by the employees of the firm. A firm's culture, values, and philosophy really either unleash or stifle the true potential of the employees.

2.2 Structural Capital

Nothing exists in a vacuum and nothing allows a vacuum. When we think of an entity, as an organization, the structure is required. Similarly, the knowledge of the firm also demands a structure to exist. The organization decides its strategies, processes, protocols, and procedures. The continuous interaction gives birth to a typical culture that informally tunes all to the working in the organization. Along with it organization develops its database, decides its technological base to provide the structure for the organizational knowledge to exist. Structural knowledge is the codified and explicit knowledge of the organization. It also includes the copyrights and patents that it has attained over time.

Suppose a firm has the best of human capital and it is quite effective in making good use of it. But, not one so fine morning, the firm wakes up to find that its best human capital has left, of course for supposedly greener pastures shown by one of the competitors. With the minds to run the firm gone, the firm halts to a standstill. As no firm can afford to be in such a situation, the firm wants the knowledge to be shared with the other employees and transformed into the knowledge of the organization. The latter component, the knowledge of the firm, is named structural capital. It is the non-human knowledge of the firm that remains with the firm even if all the employees leave it. Because human capital is a dominant part of intellectual capital, its departure will even affect the firm with a sound structural capital. However, the speed of recovery will be faster for the firm with better structural capital as compared to the one lacking in structural capital. The absence of structural capital can be best visualized with an analogy. A man with multiple handicaps hires a driver to drive

him through a desert where there is no road track and the flying sands transform the landscape within minutes. Because of an altercation, the driver decides to leave the employer in the middle of the desert while the employer is asleep. The awaking employer awakens to the heartbreaking reality of a hovering death. Now, bring in another supposition, the family mounts a search for the person if they fail to connect with him within six hours. The presence of such a routine (a type of structural capital) may or may not ward off the disaster, but the absence of such a routine even bodes worse.

The structural capital, the non-human storehouse of knowledge in the organization, includes organizational processes, procedures, technologies, information resources, and intellectual property rights (Malhotra, 2003). They are being explained in the proceeding lines. Organizations are in continuous search for improved processes. One of the ways available to the firm is to utilize the existing human capital. The employees combine their knowledge to come up with improved processes. Organizations, realizing the value of these new processes, internalize them and make them part of their procedures for the other employees to follow. Thus the firm can convert the implicit knowledge into explicit knowledge. Organizations do not just accumulate their knowledge through the creative potential of their employees. The learning also comes from the mistakes made by the employees. The firm keeping a record of its failures and drawing lessons from it can use the legacy system for confronting similar issues in the future.

In the era of the knowledge economy, it is not the amount of information available that counts. Instead, the firm's ability to speedily access the available relevant information for the sake of decision making provides the firm with a competitive edge. Firms cannot think of any competitive advantage if they fail to invest in technology and information resources. Finally, one of the most value ensuring facet of structural capital is intellectual property rights. The intellectual copyrights emanate from human capital. Employees of the firm combining their knowledge in newer ways come up with novelty that brings in copyrights and patents. Equipped with these intellectual property rights firm not only ensure monopoly profit in the short run, but it also gives it the confidence to produce more intellectual property rights.

Apart from being beneficial in itself, structural capital enables the firm to make good use of human capital. A firm that has organizational structure synch with its goal is more ensured of its success. Similarly; if a firm does not have a capable system to track its actions, it will not be able to utilize its human capital up to its true potential.

Employees have their competencies, attitude, and innovative agility. Through interactions, employees learn from each other. Similarly, the organization strives to document useful practices manifested by individual employees. By documenting the procedures used by the employees, firms convert the implicit knowledge possessed by the employees into explicit knowledge possessed by the firm. Thus the firm can transform human knowledge into non-human one that can be passed onto other employees through different exposures. India makes good use of absorbing foreign knowledge and practices. A firm desirous of working in India is legally required to

have a specific number of Indians in their top management. At the end of the specified period, there is a transfer of knowledge along with the transfer of technology.

2.3 Relational Capital

A firm is an entity that interacts with others to maintain its existence. A firm goes to society to get its employees. It cannot think of running its business without getting the supplies required for the business. Once the product or service is ready, the firm has to get connected with the customers to sell its product or service. A firm is not only required to maintain the quality of its offering. It is additionally required not to indulge in any activity that can bring into a bad light (Ahmed et al., 2019; Mubarik et al., 2016a, b). The resulting loss of customer confidence is a bitter pill to swallow.

Relational capital is the quality of relationships a firm maintains with the external stakeholders. The relational capital of a firm either stems from the network it maintains with its stakeholders or the reputation it builds (Shujaat et al., 2019). A firm that has strong networks and can maintain a good reputation has strong relational capital. Conversely, the slack in either or both of them will weaken the relational capital. Though all the stakeholders are important for the firm, we limit our discussion to the three; suppliers, distributors, and customers. First, the strength of the relationship with the suppliers is of immense importance. The trusting relationship between the two really quickens the speed of transactions. At the operational level, a good relationship with suppliers ensures the steady flow of material needed for production. At a strategic level, the supplier cannot only take charge of the firm's inventory, but it can also provide valuable imminent changes in the market. Second, customers are the reason for a firm's business. Think for a while a firm does not have a single customer to serve. Though the firm has a physical existence, the drying up of its revenue stream means its instant financial death that will take no time to announce the firm's legal demise. Apart from corporate buyers, the common consumer bases its transactional decision on the firm's reputation. After the first encounter, the customers use their satisfaction along with the prevailing reputation of the firm to continue its relationship with the firm. As the firm can maintain the quality of its offering based on human and structural capital so it can be said that relational capital is maintained through the other two components of intellectual capital.

3 Leadership

From the overawing Egyptian pyramids to the burgeoning Empires of the past, humanity has succeeded in leaving its admirable or abominable footprint. The thing that made all these possible was a toiling effort. The thing that made the toiling effort possible was the leadership providing vision, direction, and motivation. There is no ambit of human activity that can be void of leadership. Leadership, using its

influence, provide the direction and motivation to attain the shared goal. In simple words, the success of the human endeavor is dominantly attributed to leadership.

Despite being all ubiquitous and greatly vital, leadership has evaded an agreed-upon definition. According to Burns, it is the most observed and the least understood phenomena. There are more than a hundred definitions of leadership. The common point among these definitions is the influence. The leader is the one who can influence others. Under the influence of the leader, followers have been able to accomplish what otherwise could have been next to impossible. Leading the diaspora of Israelites out of Egypt, discovering America while being on a trail to find an alternate route to India, and abolishing slavery are some of the instances that could have been impossible if Moses, Columbus, and Abraham Lincoln had not been there. For this chapter, without much ado, we follow the following definition of leadership: "Leadership is an influence relationship among leaders and followers who intend real changes and outcomes that reflect their shared purpose. (Daft & Lane, 2015)".

Of course, the types of leadership do not limit themselves to transactional, transformational, and servant leadership. The three of them encompass most of the leadership styles. Transactional leadership, driving its influence from the positional power, makes the employees work for the organizational ends to get theirs. Transformational leadership, using personal influence, influences the employees to regard the organizational vision to be theirs and motivates them to work for their attainment. Finally, servant leadership, turning the idea of leadership upside down, bring the leader to serve the followers. The service extended to the employees subsequently works as an influencer to motivate the followers to work for the attainment of their goals and in the process help, the firm attains its goals. After discussing transactional, transformational, and servant leadership briefly, an attempt is being made to describe how leadership can work for the development of intellectual capital.

3.1 Transactional Leadership

This type of leadership brings the leader and follower into a transactional relationship. The leader has a task to accomplish and the follower needs to satisfy. The leader employs the services of the follower with a promise of reward in form of an agreed-upon pay. The leader with a plan assign a job to the employee with completely delineated processes. A good employee is the one who follows the instruction fully. At the end of the transaction, the employee gets his or her reward while the leader gets the task accomplished. The good employee, the obedient one, is rewarded while the bad employee, the one who deviated from the instructions, is punished. The type of leadership is effective in a stable environment; with consistent processes, managers learn the best practices that are conveyed to the employees. Employees by following the given instructions succeed in achieving the goal of the firm. Suppose, the environment is not a stable one, and because of the changes the leadership does not have the luxury of knowing the best way to perform the job. In such a situation,

the effectiveness of transactional leadership comes into question. In short, transactional leadership uses positional power to direct and discipline the employees and is effective when the environment is stable.

3.2 Transformational Leadership

With the end of stable processes, the need for the obedient employee also ends. The employee with a vision cannot reach it if the employees are not ready to embrace the change. Change because of its inherent complexity cannot be fully scripted so there is a need for employees who can adjust themselves as the need arises. Suppose a customer with a genuine complaint approaches the employee of the firm. The firm, unfortunately still instructs its followers to follow the guidelines. The employees following the instruction turn away the customer. In a time of competition and change, such behavior would be disastrous. By turning away the customer, the firm has shut the door of the business to itself.

So, transformational leadership is the leadership that transforms the employees and the organization. Transformational leadership, instead of using positional power, comes up with its idealized influence. Backed by knowledge, character, or any other personal charisma, transformational leaders attract followers. Followers strongly identify themselves with their leaders and try to emulate them. The transformational leader does not use a standardized procedure to deal with the employees. Looking at the needs of followers, the transformational leader comes up with a different method to deal with each of them. This individualized consideration not only grooms the employees but also further strengthens the bond between the two. The overused cliché, 'Your attitude determines your altitude.' is the strategy used by the transformational leader. The leader instills a 'Can do' spirit among employees. Transformational leaders make their followers believe in them and push them to come up with new ideas in their work. Finally, transformational leadership gives them inspirational motivation to go beyond their self-motive and work for the shared vision of the group or the firm. The idea of transformational leadership sounds inspiring, but there is a flip side to it. If employees have their vision that is better than the vision of the leader, how effective will transformational leadership be in that case?

3.3 Servant Leadership

Capitalist enterprises, regarding the customers as their source of earning, always regarded them in high esteem. But the same level of respect was not accorded to the employees. Regarded as abundant and substitutable, the employees were considered a resource well used when it was well exploited. The famous words of Dr. Abdul Kalam, the former president of India, correctly reflect the distrusting attitude of employees towards their employers. The scientist cum politician says, *"If you fall in*

your life, neither your boss nor your client will offer you a helping hand; your family will."

This distrusting attitude is not without reason. The focus on power and wealth made the leadership think regarding the employees in a utilitarian way; focusing on the cost and benefit equation. The employee's value was determined by its ability to produce value for the firm. It was always the growth of the firm and the leader that valued; the growth of the employee was either a secondary or a non-issue. Leaders using their power, emanating either from their position or self, made the employee work (Avolio et al., 1999). The balance of relationships between the leader and employee took a turn. With the speedy change engulfing the world, the firm could not draw its competitive edge from its capital. In the speedily changing world, the competitive edge emanates from the firm's ability to come up with new ideas (Mahmood & Mubarik, 2020). The source, ensuring the constant flow, is its employees. No firm can afford to be complacent in its utilization of employees thus slacking in its ability to maintain a competitive edge. With the newly acquired pivotal role, the employees could not be forced to follow someone's vision, they had one of their own and needed a helping hand. Servant leadership was the timely response (Greenleaf, 2002). The definition given by Eva and colleagues curtly describes it (Eva et al., 2019), *"Servant leadership is a (1) other-oriented approach to leadership (2) manifests through one-on-one prioritizing of follower individual needs and interests, (3) and outward reorienting of their concern for others within the organization and the larger community."*

4 The Role of Leadership in Developing Intellectual Capital

Leader, ensconced at the top of the hierarchy, plays a vital role in the performance of a unit. Numerous examples speak of the importance of leadership in turning the tide. Lee Iacocca, brought into Chrysler, proved to be the difference. Without him, Chrysler was doomed, with him it is an epic where the dead is resurrected by the magic wand. Securing a $1.5 billion loan from the federal government, getting concessions from the unions, and introducing new car lines, Iacocca accomplished that was beyond the imagination. The skimming of any discussion on leadership describes the role of leadership as a vision setter, motivator, morale builder, and guide. The said description of the leader hides more than it tells. The leader also builds the organization. This organization building is the process that explains the role of a leader in building the intellectual capital of the organization. The leader, definitely not alone, sets the direction of the organization. Once the direction is set, moving in the direction requires resources. In the terms of intellectual capital, leadership is required to build these resources.

4.1 Leadership and Human Capital

Leadership, along with being a part of human capital, also plays an active role in developing human capital. A firm led by weak leadership will suffer as leadership fails to set the sails in the right direction, motivate and guide the employees (Mubarik et al., 2016a, b, 2018). Conversely, good leadership can help the firm in meeting its goal as it strategically sets the direction for the firm, motivates, and guides the employees. Moreover, the role of leadership does not end here. A leader works for the development of human capital by providing training.

The type of leadership practiced by the one in the lead will develop different types of human capital. A leader, dominantly practicing transactional leadership, would be producing human capital different from the ones developed by leaders following transformational leadership. Leader, practicing transactional leadership, focuses on efficiency, provide the employee with the resources required, and afterward providing constructive feedback along with contingent reward produces work behavior that is highly focused on a narrow number of skills that will result in specialized human capital. Specialized human capital is useful for a firm that is working in a stable environment. The highly focused approach adopted by the followers results in specialized human capital. In presence of specialized human capital, a firm can work well when its product or service is high in demand. Operating in a dynamic world brings such a strategy into question as changes may cause demand to decline starkly thus rendering specialized human capital useless.

In contrast to transactional leadership, transformational leadership sells the vision of the firms to employees and motivate them to go beyond the demands on hand. There is evidence that employees led through transformational leadership take initiative, share knowledge, and indulge in job crafting (Afsar & Umrani, 2019). All these activities continuously add to their skills in different domains. Consequently, employees led through transformational leadership are transformed into all-rounders capable of doing multiple tasks. Additionally, transformational leaders work to change the work attitude of the employees. Employees, under the said leadership, are ready to help others, share their ideas and give useful feedback.

The other genre of leadership that is being considered in this chapter is servant leadership. Servant leadership, unlike transactional and transformational leadership, uses service towards the employees as an influence. Servant leadership encourages employees to work for their growth while keeping an eye on community development (Liden et al., 2008). Instead of selling their vision, servant leaders motivate the employees to have their vision and work to attain it. Such an employee-centric focus develops employees who are well-balanced between generalized work skills and social skills. The enhanced generalized skills with the added social skills transform the employees into team players. Though servant leadership is regarded as useful for a stable environment (Gregory Stone et al., 2004), we suggest that servant leadership is also useful in a dynamic environment. Though servant leadership does not sell its vision, it can easily build consensus by sharing the issue and asking the input from the employees (Page & Wong, 2000). As employees are empowered, respected, and

valued they will readily share their ideas around the leader's floated idea resulting in a consensus for the issue on hand.

4.2 Leadership and Relational Capital

Relationship is a value-neutral word. Quality of relationship is more appropriate when the task is to see the effect of leadership on relational capital. We posit that a leader, through its dominant style, can convey an approach to the employees which they will mostly use while dealing with the customers, suppliers, and other stakeholders. Transactional leadership uses contingent rewards; it promises to provide a particular reward when the other transacting party fulfills certain requirements. As the rewards are attached to the string of fulfillment of a set of requirements, the process requires occasional checks. Dealing with suppliers, through a transactional mindset, maintains good relations as long as promises are kept. Similarly, while dealing with customers the transaction based leadership keep the relation tenuous that may break under the strain of hardships. The strategic failure by Nokia to shy away from Android was the lapse caused by the transactional leadership focusing on a transaction while missing the whole picture.

The supply chain developed by Toyota is the embodiment of transformational leadership in dealing with the suppliers. Toyota works to build long-term relationships with its suppliers. From sharing quality control tools to sharing production plan with the suppliers, Toyota makes the suppliers feel them be a part of Toyota. On the other hand, by facilitating the customers' design of their experience, hotels reap large benefits from enhanced relational capital. Despite the higher relational strength, the use of transformation leadership may cause some glitches. One of the misgivings is regarding the parochial mindset; transformation leadership remains limited to the organization and sometimes completely misses the larger community. Strategies based on the organization's benefits may prove to be counterproductive for the overall society that in turn may erode the relational capital by attenuating the social networks. Additionally, there has been an increased concern about the unethical practices by transformational leaders. WorldCall and Enron are some of the examples where relational capital melted away under the heat of public furor.

The solution to the problem of not including the large community in its framework and being prone to leadership ethical issues can be well resolved by servant leadership. Servant leadership intends to develop more servant leaders to serve the overall community. The idea of servant leadership is even well-tuned to the idea of sustainability. Instead of concentrating on short-run profit, servant leader thinks what is more appropriate for the overall community (Laub, 1999; Spears, 1998). When Mercs decided to administer its medicine to cure blindness in Africa, the decision might have been puzzling for the people focusing on profit. Mercs with its decision have earned a brand image manifesting care. Moreover, a leader accustomed to serving others is less prone to indulge in unethical practices, thus protecting the firm from a sudden erosion of relational capital.

4.3 Leadership and Structural Capital

The span of structural capital is too wide to list down it to a few components. For the sake of simplicity, we consider organizational culture, processes and routines, and intellectual property to be the facets of it. The decision to develop structural capital is a strategic one. The firm, though can change it through strategic renewal, spends a lot of time planning the structural capital (Khan et al., 2020a, b). Especially, the types of database, management information system, and the type of technology to incorporate. Additionally, structural capital influences and get influenced by the other two components of intellectual capital. In presence of a supportive culture, simple routines, human capital grows faster because of knowledge sharing. Conversely, the quality of human capital helps the firm to develop quality structural capital. The pursuit and attainment of innovation and copyrights build on human capital. Moreover, structural capital coupled with human capital can help build relational capital. With friendly culture, easy routines, and amicable people, all who interact with the firm help in improving the relations. Suppliers, distributors, and customers like working with a firm with friendly processes and friendly people. Similarly, relational capital is a source for new ideas that can help in improving the processes.

The interplay between structural capital and the other two components of intellectual capital shows how much room leadership has for its influence. A firm led by transactional leadership always focuses on the outcome and presupposes that the environment will remain stable. The culture developed by transactional leadership has high power distance, it develops routines that are well defined allows no room for experimentation. Such a leadership invests in those systems that don't need changes over time. The structural capital developed by transactional leadership is slow to incorporate changes. Its performance, in a stable environment, is trustworthy. However, with evaporating stability, the use of structural capital meant for a stable environment comes into question. In such a situation, the place for much-vaunted transformational leadership is created. Transformation leadership, with an intent to transform the firm and employees, develop a culture that is based on two-way communication. Listening to employees and morphing it into their vision, garners support for change. With the culture to accept change, transformational leadership questions its assumptions about the existing system and invest in R&D. Additionally, transformational leader regularly scans the environment and adjusts the sails so the firm can benefit from positively and proactively reply to the emerging changes. The only problem with the transformational leader is the aura it develops around the person of leadership. Many of the followers, quietened by the idealized influence of the leader, fail to share their thoughts thus hindering the intellectual capital to reach its true potential.

The idea of transformational leadership was well suited to the workers of the manufacturing economy where innovation and change were envisioned by a few at the top. But, the working of the knowledge economy is different. With an increased dynamism, an individual or a group of people cannot be relied upon to build new ideas. The whole organization needs to be in search of new ideas. To enable all to pursue

innovation, the firms are required to facilitate employees to follow their vision (Khan et al., 2020a, b). So unlike transformational leadership which requires employees only to play second fiddle to the leader, servant leadership comes up with culture, processes that encourage employees to share their ideas and take initiative. Such behavior even encourages the customers, distributors, and suppliers to share their ideas. Servant leader thinks beyond the boundaries of the organization. It considers the whole community to be the target of learning.

5 Conclusion

The discussion in the chapter can culminate with two takeaways. First, leadership plays an important role in the development of intellectual capital. Second, the type of intellectual capital is influenced by the type of leadership exercised by the leadership. The point of concern for the leadership is to model their leadership according to the type of environment it is operating upon. Transactional leadership suits a stable environment while transformational leadership is useful when a firm operates in a dynamic environment. Moreover, servant leadership is found to be more suitable for knowledge workers.

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Efficient Utilization of Intellectual Capital for Sustainable Development: A Case of Pakistan

Hina Amin and Wasim Abbas

Abstract Intellectual capital (IC) is the concept of modern economics and accountancy. There are three critical components of intellectual capital—human capital, structural capital, and relational capital. Collectively, these components are essential parts of any organization. It would not be wrong to say that a tangible asset is nothing without intellectual capital. Simultaneously, the business model of sustainable growth covers long-term preservation and improvement of the organization's intellectual capital. Academicians and practitioners believe that organizational sustainability is associated with its culture and sometimes with its policies and SOPs. Many studies have claimed that organizations can ensure sustainable development by using intellectual capital. It is instrumental in optimizing current organizational performance. This chapter's prime objective is to explain the theoretical and practical understanding of intellectual capital, its significance, dimensions, and its utilization for the sake of sustainable development. In aggregate, this chapter helps the readers to comprehend the concept and importance of intellectual capital in a modern economy. The chapter's structure starts with IC's worldwide practices and ends with Pakistan's business practices for sustainable development, current intellectual capital utilization, and suggested action plans for better output.

1 Introduction

Intellectual capital (IC) is one of the most critical factors in the current business environment. It is not only helpful for the development of organizations but also enhances the competitive strength of organizations. It is an important way for the value creation of any business. However, the best results can only be possible through its effective utilization. It is a challenge for businesses to sustain their optimum performance in an

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uncertain environment where the competition is high, and customers are aware. In this scenario, companies should be adaptable enough for their survival. Organizational performance depends on employees' quality, structural elements, innovations, and technical development. Collectively, these factors are related to intellectual capital and results of investment in research and development areas. Knowledge and intellectual capital are the two most significant areas for any knowledge-intensive organizations or knowledge-based economy. The consideration of intellectual capital requires at the strategic level in different organizations. Organizations can ensure efficient results (optimum consumption of organizational resources) and innovative solutions to modern problems through intellectual capital management. Corporate culture, structure, and processes should be conducive to managing intellectual capital (Kamukama et al., 2010).

Today, sustainability is also a primary concern for organizations at the global level. The concept emphasizes addressing the present needs without compromising future needs (Boudreau & Ramstad, 2005). Sustainability follows the long-term approach. Mainly, the purpose of this concept is to save the natural environment. Many organizations are executing sustainable practices, i.e., Ford Motor Company's board of directors developed a sustainable committee charter. The focus of this committee is on the sustainable growth of the business. According to them, sustainability is about taking care of customers' needs, not just in the present but future (Ford, 2012). The business model of sustainable growth covers long-term preservation and improvement of social capital, financial capital, and environmental protection. Academicians and practitioners believe that organizational sustainability is associated with its culture and sometimes with policies because relevant policies help develop sustainability (David & David, 2016). Through the effective utilization of intellectual capital, organizations can achieve sustainable development. For better understanding, this chapter's next heading will cover the background and concept of intellectual capital.

2 What is Intellectual Capital?

Intellectual capital (IC) always remains crucial for organizational growth, success, and an added advantage if used efficiently. The current era's business requirement consists of two critical aspects; (1) digitalization and (2) sustainability. According to the strategic management principle, the only way to get a sustainable competitive advantage is to manage and prepare your human capital (David & David, 2016). Todericiu and Stăniţ (2015) stated that excellent quality intellectual capital is an essential requirement for organizations to achieve sustainable competitive advantage.

As mentioned above, intellectual capital is the foundational pillar of a knowledge-based economy. It is the unseen value of organizations. It is closely associated with the latest and relevant information and organizational resources and focuses on employees' competency (Popescu, 2019). Thomas Stewart, an editorial board member of Fortune Magazine, explained and analyzed the concept of "intellectual capital" in 1991. According to the initial definition, "it is the dynamic system created

from intangible resources and activities that are used to support the competitive advantage."

Nevertheless, experts considered this definition less supportive in terms of theory and practicality. In 1999, Charles Despres and Daniele Chauvel came with the idea that the concept of intellectual capital should be analyzed thoroughly. IC is considered an intangible asset and serves as a growth engine for the companies (Despres & Chauvel, 1999). Similarly, it is also considered a primary factor that generates value and ensures high performance and profitability (Bontis et al., 1999).

To understand the organizational value, one should know the classification of capital. The above-exhibited figure (Fig. 1) explains an organization's importance based on capital. Organizational capital consists of financial capital and intellectual capital, which is known as intangible capital. There are four types of intellectual capital—**human, structural, relationship, and business model**. However, most researchers and practitioners have extensively studied human, structural, and relationship capital; a few have paid attention to its business model applicability.

In the current era, intellectual capital is the economic reality. The most significant contributors to intellectual capital are the intelligence and knowledge level of employees. These contributors enable companies to achieve financial benefits (Stewart, 2007). The intellectual capital of every organization is not useful; some characteristics make it worthy enough. Lönnqvist and Mettänen (2002) stated a few attributes of intellectual capital:

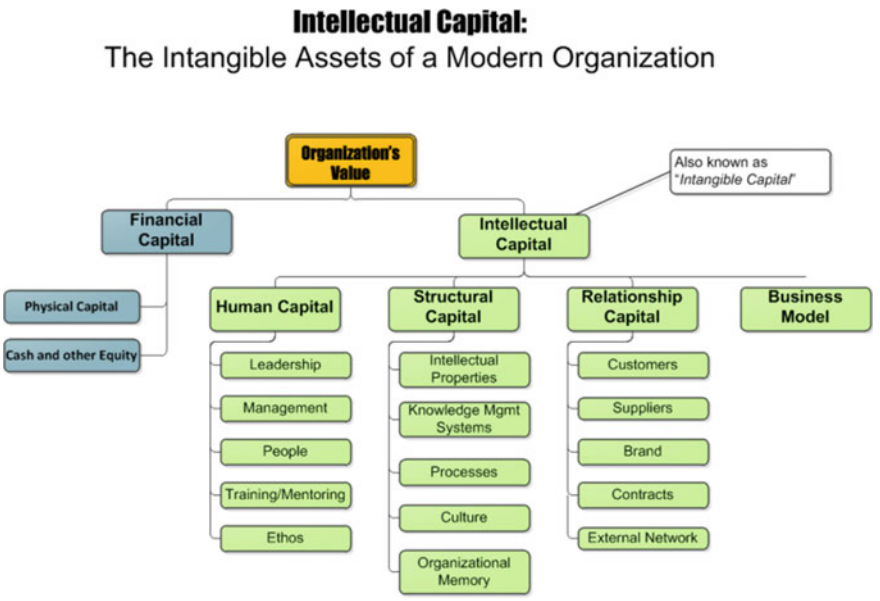

Fig. 1 Classification of organizational capital. Adapted from "The wealth of knowledge: Intellectual capital and the twenty-first-century organization." *Source* Stewart (2007)

1. It offers better chances for organizations to achieve success in the future.
2. It is intangible
3. It is closely related to the intellect, knowledge, and experiences of the respective company's workforce, customers, and technologies.

Some research-based findings and arguments support that intellectual capital can play a positive role in improving organizational performance. In the very next heading, we will discuss it.

3 Intellectual Capital and Organizational Performance

Intellectual capital is intangible, so it is difficult to assess its accurate value. However, it is used for value creation and developing competitive advantage (Obeidat et al., 2017). Previously, it was understood that an organization's success depends on finance; the more you finance you have, the more successful you are. However, with time this thought has changed, practitioners and researchers have assumed that intellectual capital is significant for organizational performance and success. Among many authors, Gogan et al. (2016) have suggested that managers should consider their intellectual capital for making effective decisions because it affects organizational performance. It is used to improve the overall performance of organizations. Based on this perception, different authors have conceptualized IC in different ways. For example, most recently, Popescu (2019) explained, "Intellectual capital in the organization includes skills, expertise and practical experience of employees, latest technologies, important information, customer relationships, intellectual property (like patents and trademark)." These all are important factors for the success of the digital age.

Some researchers and practitioners extend the concept of intellectual capital to green intellectual capital (GIC). The next section of the chapter explains this emerged phenomenon with references to different research studies.

4 Green Intellectual Capital (GIC)

In 1987, the Brundtland Report encouraged organizations to behave socially responsibly. This focus was because of the pressure of a competitive global economy. Thus, organizations started environmentally friendly practices to become competitive in the market and labeled green (practicing green management). Besides, the rising environmental concerns among stakeholders have also given rise to the awareness and development of green intellectual capital (GIC) (Chang & Chen, 2012). Therefore, in earlier decades, organizations are recommended to increase environmental awareness to develop green environment capital (Yong et al., 2019).

Chen (2008) describes green intellectual capital as the extension of intellectual capital accompanied by environmental concern, which is applicable not just on the organizational but also at individual levels. Like IC, the GIC is also intangible, interacting with employees' environment, knowledge base, and competencies. A clear explanation of green intellectual capital (GIC) was given by López-Gamero et al. (2011). They stated it is conducting effective environmental management that can be done by any organization with the help of accumulated knowledge to gain a sustainable competitive advantage. Yusoff et al. (2019) investigated the relationship of different dimensions of green intellectual capital with business sustainability. The results depict that green human capital has a negative relationship with business sustainability. However, green relational capital and green structural capital have a positive association with business sustainability. Another study explains that green intellectual capital multiplies the value of an organization (Allameh Sayyed, 2018).

Organizations use their capitals and resources not only to improve their financial performance but also for sustainable growth. Later heading covers the role of sustainable development in business and its connection with corporate social responsibility.

5 Sustainable Development and Corporate Social Responsibility (CSR)

According to Colbert and Kurucz (2007), if an organization wants to have sustainable growth, it should concentrate on its business performance. They also suggested paying closer attention to three dimensions: economic/financial, social, and environmental performance, which may help attain sustainable development. This approach, comprising the three dimensions, is known as the *triple bottom line* accounting approach. Where the company is accountable for all three above mentioned dimensions. Few authors also relate sustainability and corporate social responsibility (CSR) as close cousins. In contrast, others consider CSR an antecedent to sustainability. For example, CSR improves corporate governance, organizational reputation, and action towards society (Blaga, 2013). Though this concept does not match with sustainability, yet he claims CSR leads towards sustainability.

Given the differentiation between CSR and sustainability, Carroll (2008) identified four vital responsibilities of organizations under the head of CSR. However, sustainability uses a triple bottom line approach, but both serve the same purpose. These responsibilities include economic, legal, ethical, and social/philanthropy. In this perspective, Blaga (2013) also mentioned that for sustainable growth and development, organizations are using CSR as a business strategy, and this will help in two ways. Firstly, it helps improve the organizational reputation among stakeholders, and secondly, it remains helpful in community development. Besides, Wales (2013) has discussed CSR according to marketing theory. He mentioned that CSR is associated with brand image, risk management, cost reduction, community work, customer

attraction—a few to mention. These factors collectively lead to organizational success for the long term. In the modern era, success is not about achieving the bottom line but taking sustainable advantage over your rivals in the market ensures your long-term success.

6 Sustainable Development and Competitive Advantage

Most recently, in November 2020, we have gone through different interviews of experts in their respective fields. They were intensely referring to sustainable development. They highlighted that it is necessary to secure a competitive place in the future market. For example, Mr. Kamran Kashif Khan stated in his video, "dialogue on sustainability in the textile industry," that it is necessary to dialogue on sustainability in organizations. He also emphasizes that organizational development practices are beneficial for sustainable development. He believes that sustainability leads organizations to reach a new level of green management, operational efficiency, and individual growth. The dialogue concluded that the corporate leader would place their position at risk if they ignore social, ethical, and environmental issues.

Similarly, in her article, Bansal (2001) wrote that businesses could achieve a competitive advantage by being socially responsible and proactive. Also, she discussed ensuring that corporate sustainable development organizations/corporations must focus on their policies, processes, and products. Further, these should be aligned with their current and future needs. It can be achieved by having a sense of pro-sustainable development, creating a competitive advantage, gaining loyalty from their stakeholders, and managing the risk at different times.

The utilization of an efficient approach towards sustainable development commitment in manufacturing/service is the organization's ultimate goal. For example, producing the same output within less input (resources) will significantly impact environmental and economic forces. It will help the organization in two ways. Firstly, it will help minimize resource usage and, secondly, lessen the rate of wastage. For example, Bansal (2001) referred to the case of 3M, where he defined the pollution prevention program. The company has started around four thousand and seven hundred projects since 1975 to reduce pollution and energy consumption. This program led to cost minimization, which became significant for every business strategy (competitive advantage) and increased organizational performance. Organizational performance is always crucial for employers.

Similarly, at the microeconomic level, the economic advancement of ventures (business sustainability) can play a significant role in executing objectives and bringing reasonable improvements at the country level. As mentioned earlier, sustainable development comprises monetary activities, social activities, and natural point of view. **Monetary activities** are associated with the management of budgets and improvement in financial outcomes. **Social activities** are related to feasible endeavors to accomplish business objectives viable with moral guidelines. A **natural point of view** refers to a functioning usage of environmental angles in the business system.

Hence, each of the three spheres of an organization's monetary, social, and natural objectives affects one another.

Likewise, considering sustainability in Small and Medium Enterprises (SMEs), even SMEs produce waste and utilize cleaning specialists, power, water, and petroleum gas. Therefore, the monetary, social, and natural objectives are equally crucial for SMEs. Putting Higher Education Institutions (HEIs) into perspective, the literature provides implications for practitioners and academicians. Studies show that the sustainable advancement idea is also related to HEIs'. It also extends supportability to monetary, natural, and social objectives (Aleixo et al., 2018). Using these objectives appropriately within given resources can achieve a competitive advantage for a long period.

Strategically, competitive advantage is highly needed for companies to gain sustainable growth and development. According to one well-known author, there are two approaches to achieving a competitive advantage in strategic management. First, industrial organization (I/O) view, and second is the resource-based view (RBV). According to the I/O view, external factors are relatively more important than internal factors for attaining and sustaining competitive advantage, including economic, cultural, technological, competitive, and legal. However, the resource-based view focuses on internal resources, including physical resources, organizational resources, and human resources (David & David, 2016). In correspondence with the discussed topic, the resource-based view supports the effective utilization of internal resources, including intellectual capital, for gaining a sustainable edge in the market. The next heading will discuss the integration of RBV to signify the intellectual capital of organizations.

7 Integration of Resource-Based View (RBV)

Advocates of RBV believe that internal resources are significant for organizations. This notion is also supported in the literature. For example, Mubarik and Naghavi (2020) mentioned that industries with a higher level of human capital integrated with tech-based innovation. These integrated industries could easily replace non-green energy with green energy consumption. Moreover, human capital is a very considerable intellectual capital component. It is also considered one of the major drivers of ensuring effective organizational performance (Bontis, 1998).

The resource-based view (RBV) theory of organizational analysis shows the importance of having effective human capital (a component of intellectual capital). It shows that human capital will positively affect the performance and productivity of an organization. It will contribute to sustaining competitive advantage (Barney, 2001). He also highlights the distinctive significance of green human capital by using the knowledge, experience, creativity, skills, and commitment of employees towards environmental protection. Similarly, Chang and Chen (2011) found that organizations now start investing in human capital to improve overall organizational performance. Likewise, Yong et al. (2019) discussed that the more organizations invest in human

capital, the more they will develop green organizations; because of their skills and knowledge about the environment. This theory also suggests that the company's resources (assets/capitals) must be valuable, rare, and inimitable within the market to gain a competitive advantage and seek opportunities (Barney, 1991).

Additionally, Chang and Chen (2012) mentioned that human capital is based on employees' knowledge, skills, and abilities. Therefore, when they quit the organization, that particular capital may also withdraw from there. Human capital is regarded as the most substantial intangible asset, resulting in increased employee satisfaction. Consequently, the company will grow and enable to improve its market reputation (Allameh Sayyed, 2018). Ahmed Syed et al. (2019) identified that human capital and organizational capital positively influence business performance.

Unlike human capital, structural capital is comprising non-human organizational assets. It includes corporate charts, databases, technology, departments, instruction processes, and strategies (Jardon & Martos, 2012). Its effective utilization improves organizational capabilities that will ultimately increase their sustainable organizational achievements.

On the other hand, green structural capital focuses on environmental protection and green innovation (Chen, 2008). The green structural capital is also an essential and valuable factor of success (Chen, 2008). It is noteworthy to mention here that environmental-related concerns have become vital for companies to work sustainably (Jardon & Dasilva, 2017). It requires organizational support to practice it efficiently.

Alternatively, Chen (2008) defines green relational capital as "intangible assets of any company based on the relationship amongst organizations and suppliers, consumers, green innovations, network members and stakeholders about corporate environment management to procure competitive advantages". Stakeholder theory (ST) is relevant to comprehend the concept of relational capital. It underlines the importance of having a strong relationship with stakeholders while managing their long-term expectations to optimum a firm's wealth. Given the stakeholder theory, organizations are suggested to create value for all stakeholders (Donaldson & Preston, 1995). Furthermore, relationships with the company's primary stakeholders play a significant role in developing a sustainable financial position. Stakeholder concerns could be redressed via green supply chain management (G-SCM). At the same time, other studies also confirmed this relationship between supply chains and the environmentalist perspective was a crucial tool for sustainability (Longoni & Cagliano, 2018). Hence, relationship strength between organizations and suppliers plays a critical part in green relational capital for a competitive advantage.

In short, all companies' resources can be helpful for the companies and consequently remain successful for the long term if resources are utilized effectively. The next section is useful to understand the effective utilization of intellectual capital that leads to sustainable organizational development.

8 Effective Utilization of Intellectual Capital Leads to Sustainability

In the era of a knowledge-based economy, intellectual capital—a mostly focused type of organizational capital — transforms the concept of competitive, innovative, and sustainable development (Mohamed et al., 2009; Oliveira et al., 2010; Alvino et al., 2020). In every organization, employees are considered the backbone and critical factor of growth because of one significant resource they possess: "Knowledge". According to David and David (2016), knowledge and skills make the difference to gain a competitive advantage. He explains that the combination of knowledge and skills with a degree of reliability brings profitability to the organization in the long term." Scholars have found that intellectual capital is an intangible value of a firm and is three times better than its tangible book value (Sunday, 2017).

IC is an intangible resource. Therefore it cannot be quantified in the financial documents. However, it plays a vital role in critical organizational decisions. It creates long-term corporate value (De Villiers & Sharma, 2020; Zhou & Fink, 2003) and is also useful for sustainability (Xu & Wang, 2018). Additionally, IC is imperative for improving organizational competitiveness, gaining stakeholders' confidence, attaining economic development, and accomplishing individual well-being (Caputo et al., 2016).

Studies related to organizational capital categorize IC as an essential resource for value creation (Kianto et al., 2014). However, in dynamic business situations, studies found that intellectual capital maximizes the advantage when integrated with knowledge management (Zhou & Fink, 2003). For sustainable development, knowledge management is also significant, along with intellectual capital. Likewise, sustainability focuses on the future performance of the organization rather than present circumstances. It also helps to cope up with the challenges through effective knowledge management because sustainability is the source of a competitive advantage which can be sought through different ways (López-Gamero et al., 2010).

Putting technology into perspective, agile companies seem interested to implement new technologies in their business model through strategic decisions to attain sustainability (Rossi et al., 2017). There are three significant benefits of implementing new technologies. First, providing timely knowledge/information. Second, exchanging information beyond organizations' or institutions' limitations. Last, keeping employees updated with all new trends (Natalicchio et al., 2019). Several scholars and practitioners (i.e., Singh et al., 2019) agreed that organizations could ensure better productivity in three different ways. First, by having effective intellectual capital management. Second, by improved organizational competitiveness. Last, by sustainability through technology. Thus, integrating new technology (structural capital) is considered an effective way of sustainable development.

Organizations are preserving resources and attaining sustainability by protecting their environment. They achieve it through the paperless environment, avoid emission, pollution-free surroundings—a few to mention. Based on the scholar's point of view (De Villiers & Sharma, 2020; Hahn et al., 2007), the companies' survival can be

gauged through their ability to meet the challenge of sustainability. For that reason, to attain sustainable development, companies need to work efficiently on every type of capital regardless of size and significance (Figge & Hahn, 2005). However, De Leaniz and Del Bosque (2013) suggested that the management of intellectual capital (IC) is the most crucial aspect of sustainable development. The subsequent paragraph explains the global practices of sustainable development and intellectual capital.

Xu and Wang (2018) found evidence of the relationship between intellectual capital and business sustainability. Similarly, Massaro et al. (2020) also found the relationship between intellectual capital and sustainability in Italy's service-based firms. The result shows that intellectual capital and sustainability impact each other. Likewise, a study in Poland focusing on the role of intellectual capital on the competitive advantage of the small, medium, and large-sized companies resulted in a positive impact of human capital on its competitiveness (Gross-Gołacka et al., 2020). Moreover, Tonial et al. (2019) showed how Intellectual Capital Management (ICM) improves Brazilian organizations' sustainable activities. Their study shows that those organizations implementing ICM practices increase their sustainability-oriented activities based on the Triple Bottom Line model. Besides, Gross-Gołacka et al. (2020) indicated that small companies' human capital has the most significant impact on sustainable development. They also found that human capital is an essential component of intellectual capital. However, they also argued that an enterprise's value is also created based on structural and relational capital.

An organization with a vigorous mindset regarding intellectual capital will gain a competitive advantage. It will maintain its position in the market for a more extended period because it believes that IC is inimitable (Tonial et al., 2019). Organizations need to utilize efficient knowledge and develop innovative ideas for the management of sustainability. Additionally, sustainability can be managed through economic, environmental, and social aspects (Mertins & Orth, 2012). It is worth noting that firms that do sustainable practices can achieve a competitive advantage.

Moreover, organizational sustainability can be increased by effectively managing intellectual capital (Tonial et al., 2019). Simultaneously, human capital can also improve green performance (Yusliza et al., 2020).

After analyzing the global perspective, the following parts will explain IC and sustainable development practices in Pakistan and recommendations based on findings and experts' opinions.

9 Utilization of Intellectual Capital and Pakistan

Considering under-developing nations, these kinds of nations have various other problems than taking care of sustainable development. Under-developing nations are going through different obstacles, including economic, social, and political—a few to mention. They are concerned with survival, not with the future aspects of the upcoming generations. The current market economy of developing nations is primarily based on direct financial income expression. However, non-tangible

resources are becoming more and more forceful, as it is also part of the subject's market value. Currently, in developing countries, the focus of the companies is more towards different issues, i.e., retaining talented employees, using their expertise in the best possible way, customer relationship management, and improve their brand image for profit maximization.

In addition to that, organizations in developing nations also keep an eye on current happening in the environment and invest in human capital management (Baron & Armstrong, 2007). But at the same time, the intellectual capital's performance in organizations becomes the critical success factor. In a knowledge-based economy of the world, most nations have encountered sustainability challenges relating to economic growth and remaining competitive in the international market. Therefore, Policymakers in developing nations are supposed to provide any vital tool to improve intellectual capital (Sandhu et al., 2011).

Pakistan is an underdeveloped country having a population of 219.0 million, according to the latest census held in 2019. The country came into being with the vision of a welfare state that will provide better opportunities for all and advance oneself to compete in the international market. However, the nation has deviated from its vision. Unfortunately, Pakistan is facing many obstacles in accomplishing its vision. For example, bad governance, brain drain, corruption, inflation, energy shortfall—a few to mention. These issues are creating policy imbalance (Sandhu et al., 2011). Given the context of developing nations, particularly Pakistan, academicians and practitioners have identified the following indicators (Fig. 2).

1. Financial capital indicators (FCI)
2. Market capital indicator (MCI)-customer focus
3. Process (focused) capital indicator (PCI)
4. Human capital indicator (HCI)
5. Renewal and development focus

The model mentioned above is based on a future-oriented business model. The model focuses on five areas to identify the organizational value by assessing hidden factors. These factors are related to finance, process, customers, human capital, and renewal and development. The model not only covers past and present situation but also anticipate the futuristic context. The *human focus (first element)* area identifies the workplace's human dimension, including leadership, working activities, and workforce diversity. The *financial capital indicator (second element)* reflects the organization's intangible assets, including net worth. *Customer focus (third element)* reflects organizational commitment towards their customers and how they are utilizing their resources for customer satisfaction. The *process area (fourth element)* focuses on processes of productivity and structural capital identification. However, the *renewal and development* focus (*fifth element*) represents the company's future approach based on an innovative solution. Specifically, it includes employee training, innovation, improvement in the knowledge base—a few to mention. This area emphasizes how well the organization is ready for future opportunities. By applying this model in countries like Pakistan, we can quickly gauge intellectual capital's overall performance and pertinent practices. Nowadays,

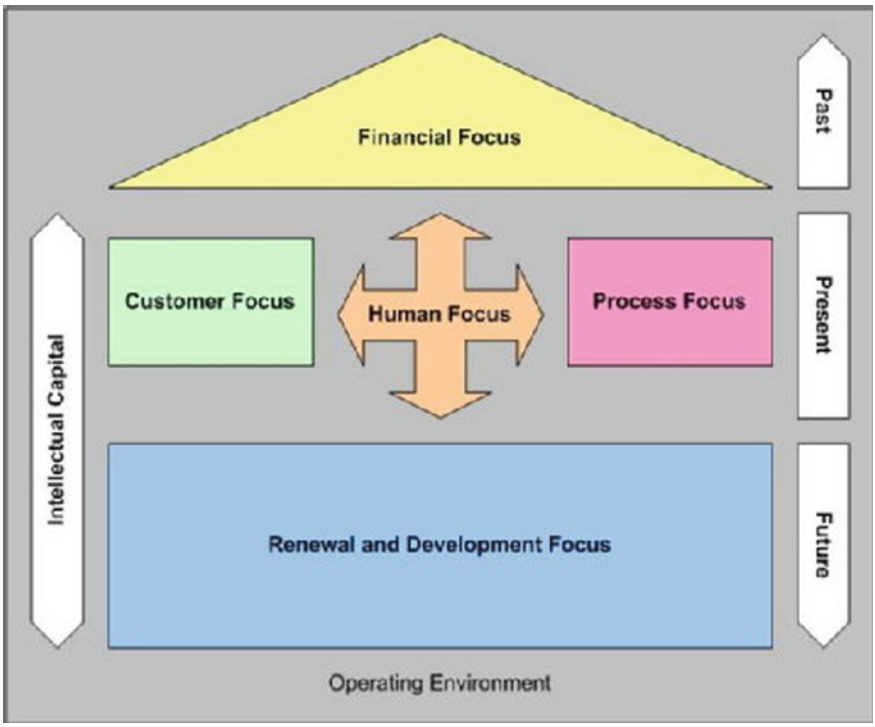

Fig. 2 Scandia navigator for intellectual capital. *Source* Edvinsson and Malone (1997)

organizations are investing continuously in sustainable development (sustainable progress). It indicates that respective organizations are very much concerned about their stakeholders. Besides, organizations are engaging themselves in environmental and societal goals that positively impact organizational performance (Golicic & Smith, 2013).

10 Efficient Utilization of IC in Pakistan

Different studies have shown that IC has a significant impact on the performance of the companies in Pakistan. For example, Haris et al. (2019) found that credibility and effective management of intellectual capital (IC) improve Pakistan's banking profitability. It has substantial relevance and an outstanding contribution to overall banking performance. Their study suggests that the banking sector should improve intellectual capital investment while managing IC components efficiently. Although Khalique et al. (2011) discuss that SMEs in Pakistan are working hard to run their businesses effectively, they are working hard to explore trained employees.

Moreover, Saeed et al. (2016) found that IC has a significant positive impact on Pakistan's telecom sector's business performance. It has also been observed that the IC and its sub-components have a remarkable effect on performance indicators of different sectors in Pakistan, specifically in the banking sector (Latif et al., 2012). Since human capital and structural capital are the crucial assets for efficiency, proper management of intellectual capital is mandatory in all sectors of Pakistan (Shehzad et al., 2014).

11 Comments and Implications

Based on the current dynamic situation of the global, economic, and business environment, it is strongly recommended that government and businesses align their policies to manage intellectual capital and lead Pakistan's growth to achieve sustainable development in all Pakistan's sectors. Keeping Pakistan's contemporary situation into perspective, we present some recommendations to Pakistan's businesses to utilize intellectual capital. The recommendations are as follows:

1. An organization should be aware of the intellectual capital concept and its sub-components. For managing anything efficiently, having complete knowledge is necessary.
2. Organizations should assess/evaluate what and how much intellectual capital they have to improve productivity and bring sustainable development.
3. Organizations should develop strong policies to make a conducive culture for sustainable development. For example, through the protection of intellectual property, effective process for knowledge management, creating and maintaining better relationships with concerned stakeholders, policies that support talent management—a few to mention.
4. Organizations must be clear about measuring intellectual capital because it is a crucial part of business success.
5. Employee empowerment can encourage effective management of intellectual capital. It is to note that providing updated training and empowering employees are critical success factors for gaining a competitive advantage.
6. It is necessary to keep in mind the external environment's ongoing trends while managing intellectual capital to remain competitive in the market. Organizations should remain updated with current market knowledge.
7. Organizations should invest in qualified and talented performers and develop their competency level.
8. Organizations should make a shared and strong vision that encourages sustainability. Having a shared vision will create a supportive work environment.
9. Open communication and less micromanaging will also enable employees to remain competitive. Consequently, it will create valuable competencies in our human resources.

10. Organizations should address their customers' specific requirements and keep their quality control process sound because satisfied customers will enhance intellectual capital value.
11. In the pandemic situation of COVID-19, organizations should allow their workers to remote working and encourage them to maximize their full potential. Your relation with all stakeholders will ensure sustainable development.

Efficient utilization of intellectual capital gives success for the present and secures the organization's future. It will also change the status of the organization from being ordinary to an industry leader.

12 Conclusion

In conclusion, the firms' performance is determined by how efficiently it produces goods and services that fulfill the needs while using its intellectual capital, economic, and social resources productively. It is to note that a firm aid sustainable development when it practices efficiently to utilize every form of capital it has obtained. Besides, increased social awareness has increased pressure over organizations to improve sustainable behaviors. These pressures have led firms to understand that they must face this challenge through the development of knowledge. It might help them establish a sustainable development approach and provide them with an opportunity to improve their ability to compete against other businesses. Though organizations can sustain pandemic using financial capital, yet they require a broader vision of IC.

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Enhancing Intellectual Capital and Organizational Performance Through Talent Management

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Abstract In a knowledge economy, organizations are hard-pressed to perpetuate the process of idea creation. Consequently, intellectual capital has replaced physical capital to be the main source of competitive edge. Intellectual capital is mainly determined by the employees of the organization. Therefore, firms in the twenty-first century need to be attractive to employees so they can hire, develop, and retain them. The chapter recognizes the significance of talent management for the intellectual capital of an organization. It attempts to explain the mechanism of how talent management practices have been assisting intellectual capital development and organizational performance in the current turbulent business environment. It also draws cases from the corporate world to facilitate readers' understanding. This chapter shows that the role of talent management is paramount to attract, develop, value, motivate, and retain human capital. The effective management of human capital improves organizational and relational capital. Subsequently, adding value and enhancing the performance of an organization.

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1 Introduction

At the beginning of 2019, Zoom was relatively an unknown entity, but till mid-2020, the video conferencing app had become a household name all over the globe. Currently, Zoom has almost 14 million users and its revenue sharply increased up to $623 million in the year 2020. The moot point is what made Zoom what it is today. Is it because the pandemic caused a panic that encouraged people to move to online platforms or something else? A naïve onlooker may consider COVID to be the reason, but the reality is different. As the saying goes: Opportunity knocks at the door of the most prepared. The pandemic brought misery to many and a few prepared ones were able to reap the fruit of the bad season. The thing that differentiated Zoom from the others is the talented individuals held by it.

The above-given description portrays the rising role of employees in the knowledge economy. The competitive edge of the firm is no longer in its capital assets meant for a stable economy, now, it is the employees of the organization that decide the fate of the organization through the selection of the set of relation, systems, and quality of the workforce. In this Schumpeterian era, the organizations engulfed by competitors, vie for their growth and survival using human-driven intellectual capital. The role of resources like human and intellectual capital have attained more significance than previously cherished physical resources. Therefore, every organization has been seeking the best people to take on threats and create new opportunities. The induction, retention, and compensation of talented people have been at the heart of the organizational strategy. The ever increasing significance of people has led organizations to the 'war of talent'. The heated war of talent then compelled the organizations to safeguard their talent much like the vantage point being protected by the knights in the medieval era.

Steven Hankin of a US-based management consultancy firm first coined talent in 1997. Talent Management was referred to as the recruitment, deployment, and retention of highly skilled employees. This concept was further popularised through the book 'The War for Talent' by Michael and colleagues in 2001. Since these publications, organizations began focusing more on the attraction, motivation, development, and retention of talented employees. Parallelly, the concept of intellectual capital was gaining prominence in the academic and business world alike. The business paradigm had been shifting from tangible assets to intangible assets. Stewart signified intellectual capital as the intangible assets that could be utilized to create wealth. Scholars further classified the intellectual capital concept into human, structural, and relational capital (Edvinsson, 1997; Mubarik et al., 2019; Roos & Roos, 1997). The concept of intellectual capital characterizes the combined embedded knowledge in the people, organizational routine, and relationship network of a firm.

Michael broadly defined Talent as the sum of Individual abilities (Skills, Knowledge, Character, drive, attitude, experience), and emotional maturity, the ability to motivate others, leadership skills, communication skills, entrepreneurial instincts, and the ability to deliver results. Intellectual capital was also co-opted in Michael's definition through human and relational capital notions (Michaels et al., 2001). With

the understanding of the concept, there is a need to know how talent management can affect intellectual capital.

The holistic view of the organization system could enable practitioners and scholars to understand the role of Intellectual capital better. It also demonstrates the connection between talent management and intellectual capital. Human capital provides an organization with the requisite competence to compete in business. Organizational capital i.e. organization culture, system, and routines galvanize organizational processes and productivity. The third dimension of intellectual capital- Relational capital has also gained significance in the current business circumstances, it is now believed that talent departure from the organization not only cost the human capital loss but also the loss of relationships maintained by the departing employee.

The number of studies on intangible assets particularly intellectual capital has sharply grown since its inception in the 1990s. Many scholars implicated intellectual capital with several concepts, mostly descending from the broader area of knowledge management. However, one of the areas that naturally connects to intellectual capital development is human resource management. According to Kong and Thomson (2009), HRM plays an integral role in managing employees who are the most valuable asset and source of knowledge for an organization. Although, some studies have examined the HRM-intellectual capital relationship (Kang & Snell, 2009; Kong & Thomson, 2009; Youndt, 2004), the concept of talent management has not been previously studied with intellectual capital. Thus, this chapter sheds light on the role of talent management to develop intellectual capital and organizational performance.

2 Intellectual Capital

The tangible assets of an organization used to play the most crucial part in business success till the last century. However, in this digital era, the significance of intangible assets like employees competences, copyright, patents, relationship with stakeholders has increased a great deal (Mahmood & Mubarik, 2020; Shujaat et al., 2019). Hence, intellectual capital attained prominence in the organizational strategy, and organizations began to view intellectual capital as the most valuable source for business success.

If intangible assets are the key drivers for organizational success. The management of intellectual capital should be the top priority of an organization. The role of top managers and strategists is important to understand the intellectual capital dynamics and design strategy which increases intellectual capital and creates value for the organization. The scholars (e.g. Ahmed et al., 2019; Mubarik et al.,2016a) have delineated intellectual capital into three primary components to create better understanding. It included human, structural, and relational capital.

2.1 Human Capital

Human capital could be simply defined as the knowledge, skills, abilities, and other characteristics held by a human, and which could be used to create value for an organization. In recent times, American economist and former president of the American economic association, Theodore Schultz introduced the human capital theory in his magnum opus, investment in human capital (Schultz, 1961). The theory holds that the worth of human capital is more than all the other assets combined. Additionally, another American economist, Gary Becker published a book entitled human capital in 1964. He reinforced Smith's notion of considering human capital as similar to physical forms of capital like land and machines. The organization could invest in human capital through training and provide other benefits like medical facilities. He emphasizes that human capital is a means of production, and investing in people gives higher yield (Becker, 1964).

Intellectual capital empirical studies from all around the world specify that human capital is the primary antecedent of relational and structural capital (Agostini & Nosella, 2017; Bontis, 1998; Wu et al., 2007). Moreover, scholars consider that human capital has both implicit and explicit aspects and creates invaluable value for an enterprise (Mubarik et al., 2018; Sharabati et al., 2010). Human capital can affect all the organization's assets and generate financial and non-financial value. According to Agostini and Nosella (2017), it is human capital that improves organizational structures and business processes. This results in creating better services and products, thus, improving the performance of an organization.

2.2 Structural Capital

Edvinsson and Malone (1997) simply described structural capital as what remains inside the company when employees have gone home. Khavandkar and colleagues clearly defined structural capital as the capacities, procedures, routines, culture, and methodologies embedded in an organization (Khavandkar et al., 2016). According to Ahmed et al. (2019) structural capital is a primary constituent of intellectual capital that plays an integral part to enhance business performance in the knowledge era.

It is interesting to note that an employee of the organization owns human capital but the organization owns structural capital in the form of all the processes which translate human capital to create and enhance value. Brusoni and colleagues identified a very distinct aspect of structural capital. They comment that people come to an organization from diverse cultural and socio-economic backgrounds. Structural capital is the shared reference point for all the employees in the shape of processes and procedures (Brusoni et al., 2001).

2.3 Relational Capital

Relational capital could be broadly referred to as the value embedded in the organizational relationships with its customers, suppliers, and shareholders. It also comprises the capacities, routines, and systems that are developed from the interaction with external stakeholders (Subramaniam & Youndt, 2005). Some scholars have identified relational capital as the dimension of broader social capital. According to them, Relational capital is an asset embedded in the relationship that results from historical interactions among the actors (Nahapiet & Ghoshal, 1998; Sun et al., 2012; Mubarik et al., 2016b; Khan et al., 2020).

Thus, in this information age, relationships have gained significance. From a relational capital perspective when an employee leaves an organization, he also departs with the relationships maintained by him. Subsequently, the organization also loses relational capital along with human capital. According to Lavie (2006), the relationships have attained more significance in comparison to resources as it enables organizations to acquire knowledge from internal and external sources.

2.4 Intellectual Capital and Organizational Performance

According to Sumedrea (2013), the rapidly changing business environment has been dictating organizations to find a business solution with the available resources efficiently and effectively. The repercussions of the economic and financial crisis of 2008–2011 drew organizations' attention to the relationship between intellectual capital and performance.

Inkinen (2015) states that intellectual capital has multiple classifications and definitions. However, the recognition of three components- human, structural, and relational provides a reference point for intellectual capital research. Many scholars have attempted to examine the intellectual capital operating mechanism inside an organization and explain its significance for organizational performance.

Sullivan (1999) argues that effective utilization of human capital drives organizational performance. He explains that human capital drives other components of intellectual capital which subsequently profits organizations. Besides, Jardon and Susana Martos (2012) explain that human capital development paves way for the structural capital improvement that subsequently enhances relational capital and organizational performance. Curado et al. (2018) also found that human capital is the major intellectual capital component contributing more than 50% among all.

3 Talent Management

Professor Cappelli of the University of Pennsylvania commented that talent management failure was a nightmare for the top executive of US companies. According to him, the talent management practices have been generally ineffective, particularly in the US, leading organizations to talent shortfall (Cappelli, 2008).

Talent management attempts to staff, develop, deploy, and retain people who are strategically valuable for an organization. Effective management of talent facilitates an organization to create a workplace where excellence is pursuit generating value for the stakeholders.

I love to follow the English premier football league. One of the author's favorite team Arsenal has been underperforming and sits in the middle of the table. Traditionally, this London team has always been in the top quarter of the table. Many football experts attribute the current failure of Arsenal football club to the lack of talent Management (Gamage, 2020; Glendenning, 2019; Laurence, 2019).

Although I am not a football guru, as an HR instructor, I do understand the significance of having people with the right capabilities in the team. Things get complicated when one closely examines how a team excels in performance. It is not just the case of buying the group of most expensive players and put them in the team. The team performs when players are carefully inducted, developed, and retained. This is the very basics of talent management.

It starts with effectively recognizing the skills of players, and deploy them in the position which is more suitable for the team performance. A reflection on successful team performance also indicates that the manager of some teams went against their favorite formation to adopt a need-based approach. They formulated a strategy taking account of the opponent teams' strengths and weaknesses and swap the players' positions, consequently, earning their team a win. There are key talent management lessons to drive from the above narration.

Organizations should strive to induct people with key skills that align well with job duties. They also need to put them in the right place in the organizational structure (Stokker & Hallam, 2009). Besides, anticipating business environment employees with high potential could be reassigned job duties. Moreover, the role of organizations to motivate and retain employees is paramount amidst this intense business environment. Because, no organization wants to lose its employees, particularly to its competitors.

3.1 Talent Management Concept

Talent management is multifaceted so its definition. Talent management has a plethora of definitions. However, the updated definition that has been developed combining the essence of past researches was given by the Chartered Institute of Professional Development (CIPD). They broadly defined Talent Management as

the systematic attraction, identification, development, engagement, retention, and deployment of those individuals who are of particular value to an organization. This may be through high potential or because they fulfill critical roles (CIPD, 2020).

Literature survey reveals that despite the emerging consensus, practically the idea of talent management still has operational vagueness thus it is interpreted differently by different people. As some practitioners, taking its literal meaning, considered the employees with extraordinary talent to be talented individuals, and the subsequent management of such employees was regarded as talent management. On the other hand, the other group of researchers and practitioners have taken a heuristic approach and included all the employees as talented individuals. Following their perspective, talent management turns out to be an augmented approach to traditional HRM.

3.2 Talent Management Advantages

The role of talent management is becoming more pressing with the continuous change in the working environment. With the increasing automation, firms find their employees to be redundant at their present jobs. In absence of talent management, it portends badly for the employees with minimal as their jobs will vanish. In contrast, the use of a talent management approach will readjust the employees to new roles. To illustrate the pain caused by the traditional HRM, I would share an example from my part-time job during my university days.

On the weekends, many of our colleagues worked at the food processing factory that was situated just a mile apart from our university. Mainly we worked as a substitute for many of the permanent workers. This was a large organization, a vendor of British Airways and Marks & Spencer with an annual turnover of £1.1 billion then. It was a giant factory with multiple units. The unit I worked on had 11 assembly lines. Each assembly line would employ 38–52 people depending upon the product. In the meanwhile, this organization installed two automated assembly lines. The newly installed each assembly line required only 6 people, thus, around 40 people end losing the job.

The above narration informs us that the workplace has been changing rapidly with the progress in the field of automation and robotics. The job that requires minimal skills would be lost with time. On the other hand, the job market would find it hard to find potential competent employees. In such circumstances, organizations could reap fortunes by taking a strategic route for talent management.

A tailored approach to talent management focuses on people and puts them high in the organization's strategic plan. Talent Management benefits the organization in many ways. It makes work meaningful and provides growth opportunities for employees. It also supports employee development through learning which creates learning and high-performance culture, resulting in better performance in business.

3.3 Talent Management and Strategic Planning

Good strategic planning is always crafted through the lens of the vision and mission of an organization. Similarly, thorough strategic planning always incorporates talent management and smartly aligns it with strategic objectives. However, when one looks around at the organizations, often the strategic planning is done in a vacuum, having no connection with the crucial organizational processes such as operation and talent management.

As a successful case study of talent management and strategic planning, a US consultancy firm witnessed phenomenal growth during the last decade. It grew from ninety offices to 300 offices in 35 countries with the annual revenue increasing from $40 million in annual revenues to approximately $500 million. According to the top manager of the company, strategic talent management contributed profoundly to organizational achievements.

It first started with the existence of synergy between strategic planning and talent management. As this firm progressed through many 3 year strategic plans, the organization also witnessed the development of its leadership teams. The strategic implementation of technology, new services, and geographic expansion contributed immensely to entire organizational performance. This strategic success was possible because of the inclusion of the right people in the right places. The employees who left this organization for a time, often re-joined, some of them were also assigned higher responsibilities. The remarkable success of this organization was down to its talent management strategy that identifies, attracts, selects, develops, values, rewards, and retains employees.

4 Talent Management to Develop High Potential Talent

Successful organizations attempt to estimate the current and potential capacity of an employee to contribute to an organization's value. The organization assists the employee by investing in training and development activities. Inappropriate planning and allocation of resources in talent development could force an organization to suffer employee turnover and performance issues.

Hence, human capital development is a very important element of the talent management strategy of a successful organization. The process starts with an employee performance appraisal that measures employee performance. This outlines the potential development areas for the employees according to the present and future business objectives. This process also specifies the set of skills needed to improve job performance. The management with employees' feedback develops programs to improve those skills.

According to Cappelli (2008), the practices of internal talent development in large organizations sharply declined in 1970, mainly due to the market uncertainties. There were only a handful of corporations like General Electric and Pepsi Co. that

continued internal talent development practice. In the 1990s, outside hiring developed as a norm. With the growth of the economy, the talent war begins as organizations attempted to hire fully developed talent from outside organizations, especially, from competitors. He also noted the organizations' effectiveness deteriorated due to the executives' inattentiveness to talent management.

5 Compensating Talent

For effective talent management, the compensation package of an organization must be aligned with the tasks, tools, and job duties that are related to employee performance and strategic organization's objectives. In order words, compensation must be perceived as rewarding for the services employee is rendering for the organization. Compensation is a broad set of rewards that includes cash, benefits, recognition, and development. In this manner, compensation influences people's performance at the organization, and in return, this performance becomes the primary factor for the success of an organization. Moreover, reward value differently to different people. Rewards must be considered meaningful by the employees.

6 Competence: A Talent Management Building Block

In contemporaneous time, most of the large organizations possess their set of competencies for each job role. These specify the unique knowledge, skills, ability, and desired behavior that is vital for successful employee and organizational performance.

Dalziel (2004) narrates that a new CFO (Chief Financial Officer) was hired at the successful US technology company. Graduated from the top business schools of the country, with rich experience at multiple Fortune 100 companies. He seemed an ideal candidate to fill the vacant job post. However, after eighteen months of relationship with the organization, he ended up quitting the job. According to the company CEO, he never had fit in the company.

The technology company missed a point here. The position of Chief financial officer does not only require technical skills, the leadership skills are equally important to succeed in the job role. The company C.E.O informed that his relationship skills were poor that resulted in the unsuccessful employee-employer match. Organizations burn time and effort in the staffing process. These failures show why an understanding of competency modeling is the sine qua non for talent management. Although, many of the large organizations these days have customized competency models. But, some organizations are still skeptical and consider it as an HR department esoteric tool. This is disappointing as the competency model provides an effective framework that articulates the key skills required to perform the job duties successfully.

Therefore, the competencies are the building block of the talent management strategy. It specifies the set of knowledge, skills, abilities, and characteristics that are needed to perform job duty. It streamlines the talent management processes because once the organization has jotted down a set of competence for a certain job. It will help an organization in the entire life cycle of talent management.

7 Role of Talent Management in Intellectual Capital Development and Organizational Performance

Talent management is the driving force that ensures intellectual capital acquisition and growth. Given the human aspect of intellectual capital, Talent management practices could help to develop the organization's intellectual capital. The effective identification, deployment, motivation, and retention of talent invariably contribute not only to intellectual development but also improves organizational performance.

Chinese state-owned steelmaker, Ansteel group president attaches significance to talent management. He comments that the business challenges in the digital age are drawing attention to the weak workforce strategy. To better compete internationally, developing and retaining talented employees is the most crucial test now for us (PWC, 2011). Besides, managing business, leadership, and innovation are the key skills required by the local Chinese as well as MNCs competing globally. With the dearth of these critical skills, organizations have been competing hard for their human capital stock replenishment. The following account would explain the mechanism of talent management assistance in intellectual capital development.

7.1 Talent Management and Human Capital

Legendary Scottish economist, Adam Smith discussed human capital and talent management in his eighteenth-century classic work of *An Inquiry into the Nature and Causes of the Wealth of Nations.* Though he did not introduce the term human capital, the idea of establishing members of the society and their capabilities as capital, invariably founded the base of human capital science. Adam writes that the trained and educated talents make the organization more profitable, subsequently adding to the prosperity of the society and nation.

The process of talent management ensures the proactive management of human capital. The process typically compromises planning, recruitment, selection, development, compensation, and retention of human capital. Organizations with effective talent management programs constantly overshadow their competitors in the industry. California based top streaming media company, Netflix utilizes talent management for human capital and revenues growth.

Netflix, working for a diverse market, wants greater input from the employees. With this end in mind, the practices meant for productive efficiency were not so useful. Netflix designed its talent management strategy to enhance human capital and profitability, which was pioneered by Netflix CEO, Reed Hastings, and Chief talent officer, Patty McCord. A simple set of five principles guide their talent management program. Firstly, Netflix attempts to staff and compensate only fully formed adults. In Netflix parlance, fully formed adults are the ones who use common sense and logic instead of sticking to the orthodox formal policies. Second, divorcing the formal review system to marry informal review, and also giving good severance pay to the employees no longer suits the strategic company plans. Third, Managers are responsible for making great teams. Fourth, the leader's job is to create the culture they wish to see. They have to model and motivate the team for the required behaviors. Fifth, Talent managers must act like innovators and business people first, and like HR people last, to boost human capital and revenues. In simpler terms, Netflix wants HR to understand the intricacies of business and high performance instead of traditional HR jobs.

Similarly, a giant like MS cannot have complacency in this Schumpeterian competitive era. Microsoft attaches colossal importance to potential human capital for the leadership roles. Microsoft's empirical study "Realizing the full potential of Rising Talent" encapsulates high potential talent with three key tenets of ability, commitment, and aspiration (Human Capital) to rise to critical leadership roles. Microsoft Talent Management Program aims to identify high potential human capital to create organizational value.

7.2 Talent Management and Structural Capital

Research shows that unsuccessful organizations often lack coherent tools and systems. On the other hand, successful firms had good information systems and processes. For example: In one of the US utility companies, Oracle's PeopleSoft application is used to streamline information on career development and succession planning. Firstly, this enables the company to draw together a list of succession for individual job posts, and it identifies and tracks potential employees. Secondly, this system also contained various courses for development and promotion. It shows that usage of the system is not limited to the top management but also supports the development of the common employees.

It is interesting to note that many successful business organizations do not utilize the same business systems or processes. As human capital plays a vital role in the productivity of organizations and every employee is different from one another. Similarly, customized systems and structural capital make it harder for competitors to imitate. In this case, talent management makes it easier for organizations to form and upgrade structural capital to provide a competitive edge.

The concept of organizational culture coalesces human capital along with structural capital. Many scholars have used organizational culture as one of the structural capital components. Often the question is asked where the organization culture originates from. The simple answer could be that it originates from human capital. Specifically, the leader or top management cultivates it through personality, policies, and practices. Former C.E.O Haruka Nishimatsu of Japan airlines, one of the top ten international airlines could be an inspiration for the generations of C.E.O. We don't see many C.E.Os commuting to the office by public bus and waiting in the queue for meals. This kind of routine and relationship with colleagues not only increases organizational capital but also influences the internal relational capital of an organization. In addition to Mr. Nishimatsu's personality, Japan Airline fine-tune Talent management strategy translated the human capital strength to value creation. Another remarkable example from the airline industry is Herbert Kelleher, legendary former C.E.O of Southwest airlines, who created a talent management strategy based on mutual respect and trust that laid the foundation for the most successful airline in the history of the United States. Southwest's unique organizational practices and talent management strategies were greatly influenced by Kelleher's human capital and relational capital that business schools around the world have been teaching as a case study to be emulated (Hitt & Duane, 2002). The above arguments and illustrations recognize that the talent management strategy works as intellectual capital dimensions amplifier. Besides, the human capital of a leader invariably affects organizational human capital growth, and subsequently, it positively influences structural and relational capital.

7.3 Talent Management and Relational Capital

Organizations are part of the business ecosystem. They need to interact with external stakeholders to thrive and survive. Talent management could help the firm to build relationships that offer present and future benefits to the organization's stakeholders. Relational capital acts as a catalyst for an organization by linking human and structural capital with outside stakeholders (Knight, 1999). The role of talent management is to maintain a higher level of human capital stock through staffing and performance management, which also boosts the relationships, and organizations with a strong concern for their employees building a genuine relationship.

Talent management has also been using social media, which has become a popular tool in the digital age. Organizations with higher relational capital are likely to reach potential human capital quickly. According to Iles et al. (2010), very few organizations have focused on social capital among competence development programs. Cognizance of relational capital with other organizational capabilities could add manifold value to the organizational book. Generally, the quality of products plays a significant role to determine a company's business fate. However, with time, the value of relationships with the customers, brand image, problem-solving response,

and customer need satisfaction has emerged as important attributes that provide a competitive advantage to the firm.

In the Chinese cultural context, the concept of guanxi could be related to talent management and relational capital. It is commonly translated as connections and relationships. Traditionally, guanxi stems its significance in the Confucian philosophy. It regards a person as a part of the hierarchy, which has relationships with family, friends, and community. Therefore, mutual trust and commitment is an important part of guanxi. Private Chinese organizations place significant meaning on talent identification through the guanxi practice. In the Chinese corporate world, guanxi refers to doing business through informal relationships. Staffing through the guanxi relationship network is highly regarded in Chinese corporations, and it is a prerequisite for talent management programs (Zhang & Bright, 2012).

8 Conclusion

In short, talent management strategies and practices not only affect the intellectual capital and its development but also facilitate managing it proactively. It enhances the human capital stock, and human capital interaction with other intellectual capital components, accordingly increasing organizational performance. As talent management identifies and invests in human capital, higher quality human capital conceives, constructs, and advances organizational structural capital. Capable human and structural capital develops better relational capital by maintaining a good relationship with the stakeholders and thus adding to the growth and value of an organization.

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Modelling Intellectual Capital with Financial Inclusion: The Mediating Role of Economic Growth

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Abstract Business sustainability within the economic system has been a great interest of policymakers. There are several dimensions to measure the economic performance of a nation. It is not easy to understand the growth process of countries without knowing new factors that emerged within the financial system. In today's dynamic environment, there is a need to identify new relationships that explain the sustainable performance of a country. Therefore, the chapter discusses the importance of intellectual capital and financial inclusion in the economic system. The argument is that the rapid change in technology and industrialization has redefined the performance of the global economies. The traditional methods of measuring economic growth have somehow failed to capture newly developed relationships such as financial inclusion and intellectual capital. In this chapter, we developed a conceptual framework that measures the relationship between intellectual capital and financial inclusion through the mediating role of economic growth. The chapter also proposed useful guidelines for empirical testing.

Keywords Intellectual capital · Economic growth · Financial inclusion

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1 Introduction

In this digital and knowledge world, sustainable advantages for the economic system have included intangible assets along with financial and material support. The intangible assets or intellectual capital have several dimensions such as research development, human capital, innovation, environment and quality (Ruiz, 2011). In many countries where social and economic growth is concerned, intellectual capital plays a significant role in supporting sustainable economic objectives. This signifies that intellectual capital is one of the essential economic determinants which should be measured to gain macro-economic benefits. The combination of GDP and intellectual capital estimates both material and non-material wealth of an economy (Ruiz et al., 2011). On the other side, GDP does not include intellectual capital directly while its presence in the economic system already exists. As a result, many institutions working on the hidden factors of GDP create an impact on the economic growth and the social well-being of the nations. The World Bank keeps monitoring the global economies to develop a standard indicator representing a comprehensive measure of GDP. Nowadays, it is hard to believe that a country with a higher level of natural resources will be listed among prosperous economies. This means that there still need to explore factors that contribute to economic growth and capture a nation's wealth. In a business environment, intangible assets or hidden assets consist of invisible, non-material, and uncontrollable, but able to generate future growth. From the macro-economic perspective, intangible assets can improve economic performance. In this way, the useful indicators of GDP may include intangible assets such as human capital, relational capital and structural capital.

Moreover, policymakers' concept of financial inclusion has attained significant attention around the globe. In recent times, the world has experienced positive changes due to financial inclusion. It has strengthened the social and economic benefits of economic systems (Eldomiaty et al., 2020). In a broader sense, financial inclusion is a process to ease of access to financial services and products among the society members (Sarma, 2008). The phenomenon of financial inclusion has gradually increased its impact on economic systems. Due to this, a clear and concise definition of financial inclusion stills a matter of debate among the researchers (Van Hove & Dubus, 2019). According to the World Bank, financial inclusion is consists of financial products and services such as loans, insurance, deposits, bank accounts, remittances, bank ATMs and deposits. These financial features should have access to small enterprises and households to gain actual benefits of financial inclusion. The Consultative Group to Assist the Poor (CGAP) statistics defines financial inclusion as a measure to provide access to the consumers' formal financial services. The readily available financial services include payment services, savings account, insurance, bank deposits and loans. On the other side, Cihak et al. (2016) believe that financial inclusion is not limited to the ease of access to financial products rather it is an ability to consume a wide range of financial services by the firms and individuals. However, researchers have somehow established a consensus over the terms related to financial inclusion such as "ease of access" and "formal financial services".

Financial inclusion proved its impact on the economic systems through higher economic performance, higher saving rates, reduced poverty level, and improved capital accumulation (Park & Mercado, 2018). The efficient flow of financial services within a country or across borders help economies to perform well in this world (Van Hove & Dubus, 2019). Financial services' inclusion also declines financial uncertainty, lifts people out of poverty, and promotes economic development and growth. Past evidence illustrated that the implementation of financial inclusion has significant positive changes to many economies (Sahay et al., 2015). Globally, the G20 summit in Toronto (2010) proposed guidelines to offer an innovative financial inclusion system. The new financial inclusion principles adopt up-to-date financial literacy and accountability of institutions where governments make coordination to promote new financial systems. Later, the United Nations (UN) General Assembly (2015) considered financial inclusion a policy matter of financial regulation and prioritized its legislation. Additionally, the UN declared financial inclusion an essential component in achieving sustainable development goals (SGDs) for 2030. Not only this, financial inclusions featured itself among the top 10 out of 17 goals in the UN plans. These developments in financial inclusion show its relevance and concern among the policymakers. The emergence of financial inclusion also required programs to promote financial inclusions that may improve people's welfare and economic growth (Law & Azman-Saini, 2012; Demetriades & Law, 2006; Sethi & Acharya, 2018; Eldomiaty et al., 2020).

Based on the above discussion, this study proposed a framework that discusses the potential linkage between intellectual capital and financial inclusion through the mediating role of economic growth. In past literature, it is somehow highlighted that intangible assets can predict economic growth. Similarly, financial inclusion also depends on economic growth. These arguments indicate that GDP can play its role to establish the relationship between intellectual capital and financial inclusion.

2 Literature Review

2.1 Intellectual Capital

Intellectual capital is the value of skills and knowledge of the organization's employees, which helps the company develop and sustain its competitive advantage. On the other hand, intellectual capital is an organization's intellectual property, processes, and other intangible assets that help the company attain its bottom line of generating higher profits. Researchers have defined intellectual capital in various ways. Stewart (1995) explained it as packaged valuable knowledge, while Andreissen (2004) explained intellectual capital as a subdivision of intangible assets, including competencies and intellectual accomplishments. Intellectual capital has also been defined as assets that positively impact the profitability of the company but are not included in its balance sheet (Brooking, 1996a, b; Kayacan & Alkan, 2005; Mondal

& Ghosh, 2012; Mubarik et al., 2016, 2018; Ahmed et al., 2019). Thus, intellectual capital is the main driving force behind an organization's competitive advantage (Jord-ao & de Almeida, 2017). Some of the other key definitions given by researchers are explained in Table 1.

Measuring intellectual capital is a subjective concept. It does not appear in the balance sheet under assets, but instead, it seems under the intellectual property, which includes intangibles and goodwill. Organizations employ considerable resources to develop the capacity of their employees. If appropriately utilized, these enhanced skills of employees increase the returns of the organization (Mondal & Ghosh, 2012). It isn't easy to measure the returns earned due to enhanced employee skills as it may not start contributing immediately and might bring in revenues for several years. The assessment of intellectual capital is an extension of human resource cost accounting,

Table 1 Intellectual capital definitions

Author	Year	Definition
Brooking	1996a, b	Intellectual capital is the sum of all assets including market, human, intellectual property and infrastructure
Nahapiet and Ghoshal	1998	Intellectual capital is the knowledge and learning aptitude of an organization
Sullivan	2000	Knowledge which can be transformed into profits is called intellectual capital
Viedma Marti	2001	Intellectual capital signifies organization's fundamental capabilities
Rastogi	2003	Intellectual capital can be regarded as universal competency of an organization to manage, synchronize and direct all accessible knowledge with the objective to generate future value
Mouritsen et al.	2003	Intellectual capital activates and utilizes managerial procedures, employees, customers, information system and knowledge
Roos et al.	2005	Intellectual Capital is the organization's intangible asset which is fully or partly governed by the organization to develop a value for the organization
Marr and Moustaghfir	2005	Intellectual Capital is the organisation's intangible asset through its learning and experience to earn future revenues
Choong	2008	Intellectual Capital creates the present and future value but does not have any monetary or physical presence
Lerro et al.	2014	Intellectual Capital is organization's knowledge assets which help in value creation and innovation
Lentjušenkova and Inga	2016	Intellectual capital is the organisation's asset, including the organization's human capital, business processes, communication technologies, human capital, and other intangible assets, which can help develop value for the organization

which became popular in the 1960s (Bontis, 2003; Morse, 1973). The literature on intellectual capital is unable to reach a consensus on its essential elements. Even though there is still a dispute on which factors contributes most to intellectual capital, most of the researchers agree that it is the "hidden value" embedded in the structure of the organization and not directly visible in financial statements of the organization (Edvinsson & Malone, 1997; Forte et al., 2017).

2.2 Measurements of Intellectual Capital

Intellectual capital is classified under human capital, structural capital and relational capital (Zadjabbari et al., 2010). Human capital is associated with individual's working for the organization and their physical and intellectual abilities. Financial revenues cannot be directly related to human capital (Bontis, 1998; Edvinsson & Malone, 1997; Namasivayam & Denizci, 2006), however efficient use to human capital results in enhanced productivity (Stovel & Bontis, 2002) and higher customer satisfaction (Cabrita et al., 2007; Namasivayam & Denizci, 2006). Structural capital is linked with nonhuman storerooms of knowledge including intellectual property, infrastructure (Kannan & Aulbur, 2004), processes (Janoševic et al., 2013; Mention & Bontis, 2013) and explicit knowledge (Edvinsson & Malone, 1997). Structural capital itself cannot enhance profitability (Stewart, 1997) but can become a competitive advantage by supplementing value creation (Collins & Smith, 2006). Relational capital is associated with external resources and relations of the organization including customer loyalty, the reputation of the organization and network capital (Mention & Bontis, 2013; Dupark, 2012).

The resource-based view defines intellectual capital as the sum of competencies, intangible assets and knowledge that can develop competitive advantage and value for the organization (Nazari & Herremans, 2007). The intangible nature of intellectual capital makes it difficult for the organization's competitors to imitate it and make it easier for the organization to safeguard the competitive advantage created through intellectual capital. This unique characteristic makes intellectual capital an essential element for an organization's efficiency and performance (Mondal & Ghosh, 2012).

The development and research on intellectual capital's theoretical construct are divided into four phases (Bejinaru, 2017). Work on IC could be divided into three stages (Ricceri, 2004). In first stage, work on IC was more focused on the measurement and consolidation of IC followed by a second, when researchers started exploring the impact of intellectual capital on the organisation's value and financial performance (Petty and Guthrie, 2000). It paved the way for the advancement of a theoretical construct, identifying its components and impact on the organization's value and competitive advantage. During the third stage, researchers focused their efforts on understanding managerial implications due to intellectual capital (Lopes and Serrasqueiro, 2017). In the fourth stage, the concept was expanded to include the environment, sustainability, and other new aspects (Bejinaru, 2017).

2.3 Financial Inclusion

In the early 1990s, the limited access to financial services was termed "financial exclusion" and highlighted the importance of financial sector liberalization (European Commission, 2008). Rahim et al. (2009) stated that the financial exclusion concept describes barriers to use formal financial channels at the service provider end (supply-side) and user end (demand side). The user end plays a significant role to promote financial services and products. The argument is that if a large portion of the population falls below the poverty line, then it is expected to have lower usage for financial services due to fewer savings and bank deposits (Anand & Chhikara, 2013). Financial exclusion consequences also result in lower development, less demand for bank credit, and poor investment activities in the economic system. Additionally, the propensity to reduce poverty and support the savings pattern is essentialto augment the demand for financial services, which can further lead to economic growth. Hence, the concept of financial inclusion can be derived from the discussion, as mentioned earlier, where the ease of access to formal financial services is available for businesses and households.

Financial inclusion's operational definition has been a great concern, particularly for countries with low income or below the poverty line. Many people lack access to mainstream financial services such as branch banking for remote areas, low-cost bank loans, bank accounts, ATM networks, and mobile banking (HM Treasure, 2004). In this regard, financial inclusion has secured its place among the social policy glossary of world economies (Zuleika, 2010). Consequently, the access to financial services is epitome of financial inclusion. Anand and Chhikara (2013) argued that financial inclusion still required time to get its universally acceptable definition. However, previous studies, scholars, institutions and policymakers have proposed some definition of financial inclusion. Table 2 represents the definition of financial inclusion from the various sources.

2.4 Dimensions of Financial Inclusion

Financial inclusion can be divided into three dimensions. The first dimension allows the transfer of cheques, money and receipts. It is also known as the services provided by commercial banks. The second dimension is categorized as protective services which provide short-term and long-term financial protection and security against income and expenditure fluctuation. This dimension includes pension plan provisions, life insurance, savings, credit and home insurance protective services. The third dimension indicates promotional services where an individual or enterprises promote loan services for new business ventures (Anand & Chhikara, 2013). Fisher et al. (1999) suggest that protective services are directly associated with people's financial well-being, while promotional services are irrelevant to those who do not use financial services. In sum, all three dimensions of financial inclusion offer positive changes in

Table 2 Definitions of financial inclusion

Source	Definition	Indicators
Asian Development Bank (2000)	The availability of a wide range of financial services such as payment services, life insurance, deposits, money transfers and bank loans to the households, low-income, poor and microenterprises	Loans, money transfers, payment services, insurance and bank deposits
Sinclair (2001)	The ability of a financial system to provide access to necessary financial services	Debt assistance, money transmission, insurance, credit, savings and financial literacy
Chant Link and Associates, Australia (2004)	Financial exclusion indicates the lack of access to formal financial services by the consumers from mainstream providers	House loans, property insurance, direct investment, deposit accounts, credit cards, personal loans
Treasury Committee, House of Commons, UK (2004)	The access to financial products and services by the individuals	Savings, credits and financial advice
Scottish Government (2005)	Financial inclusion provides access to financial services and products to the individuals. It requires knowledge, skills, understanding and capacity to make the efficient use of financial products	Access to financial products and services, knowledge, skills and understanding
United Nations (UN, 2006)	Financial sector that provide access to financial products such as bank credit, insurance, payments and savings services	Insurance, payment services, credit and savings
Report of the Committee on Financial Inclusion in India (Rangarajan, 2008)	To provide timely and adequate financial services to the vulnerable groups which include low-income and weaker sections at an affordable price	All financial services and timely credit to individuals
World Bank (2008)	It is difficult to define financial inclusion due to its broader aspects and multiple dimensions. However, access to all financial services despite price and non-price barriers in the financial system	Financial services include, bank deposits, insurance, credit, payments
State Bank of Pakistan (SBP)	The access to formal financial services by firms and households on a wide range of financial products such as insurance, payment channels, credit and savings to meet their financial needs	No. of banks, no. of branches, ATMs, point of sales, total no. of accounts

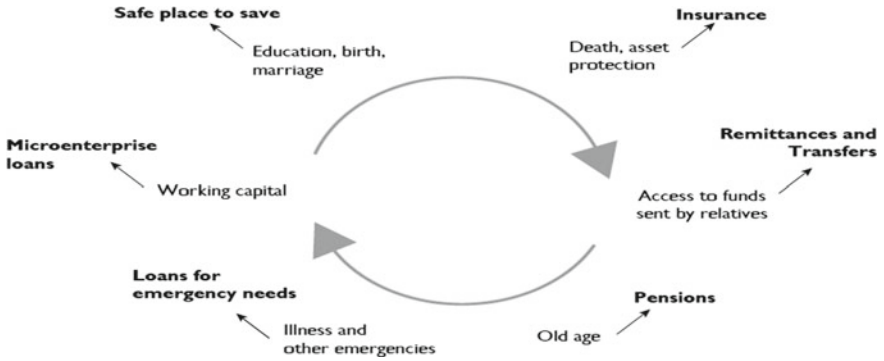

Fig. 1 Dimensions of financial inclusion. *Source* Helms (2006)

the economic system and improve individuals' living standards. However, the modern economic environment demands new and innovative methods to give businesses and individuals financial access, ultimately improving the savings, spending, and production patterns. Figure 1 illustrated all three dimensions of financial inclusion.

2.5 Measurement of Financial Inclusion

In past literature, financial inclusion has been analyzed using various indicators. The measurement of financial inclusion varies from country-to-country due to the availability of the data set. It has been observed that access to financial services has different indicators in some countries. However, a standard set of variables and datasets are available in multiple data banks. Among various sources, researchers mostly used World Bank database to analyze financial inclusion. The most common indicators of financial inclusion are as follows;

1. Automated teller machines per 100,000 adults
2. Bank branches per 100,000 adults
3. Commercial bank deposit accounts per 100,000 adults
4. Commercial bank borrowers per 100,000 adults
5. Number of bank branches per 100,000 adults
6. Depositors with commercial banks per 1000 adults
7. Life insurance premium.

The above-highlighted variables are the proxies of financial inclusion. Past literature also computed an index of financial inclusion to explain the concept better. Various statistical procedures can calculate the financial inclusion index. For this purpose, the principal component analysis (PCA) method has been widely applied to compute the index of financial inclusion.

2.6 Some Empirical Studies on Intellectual Capital and Growth

The rapid increase in demand for knowledge, information and intellectual capital has changed the business environment worldwide. Thus, several countries have transformed their economic environment from conventional to the knowledge-based system (Jednak et al., 2017). These countries invest in intellectual capital and knowledge to gain practical benefits of intangible assets. This process further increases the competitiveness and economic prosperity of the nations. Jednak et al. (2017) stated that intellectual capital has two dimensions: firm-level and national. The subcategory of intellectual capital (human, relational and structural capital) can predict both firm-level and economic level growth. On a firm level, the intangible values are associated with knowledge, skills, reputation and efficient processes. On the other side, the national level of intellectual capital is similar to firm-level intellectual capital. This implies that intellectual capital can produce multiple economic growth effects (Andriessen & Stam, 2005).

As an intangible asset, intellectual capital plays a vital role in various levels such as individual, industry, national, and organizational levels. De Pablo (2002) suggests that intellectual capital has the potential to contribute significantly to economic growth. Chen and Dahlman (2005) argued that the world's economies are now relying on the efficient use of knowledge to gain sustainable development. Drucker (1992) indicates that the traditional production factors, namely, land, labor, and capital, will become secondary and be replaced by the knowledge-based economic system. Ismail and Khalek (2018) found a significant positive relationship between intangible capital and economic growth. Herciu and Orgean (2015) show that intellectual capital can increase the level of economic output. Jednak et al. (2017) approved that intellectual capital differs from country-to-country due to national economic development change. Wensley and Evans (2020) highlight that intellectual capital is a significant predictor of economic growth in advanced countries while it is less dominant in developing countries. Kim et al. (2006) established a significant relationship between intellectual capital and economic development in Korea. De la Fuenta and Domenech (2006) examined the relationship between economic growth and human capital. Their results indicated that human capital and economic growth has a significant relationship. Wensley and Evans (2020) further stated that earlier studies have adequately analyzed the impact of intellectual capital on economic growth. They also suggest that researchers have mainly focused on the relationship between human capital and economic development, among other intellectual capital components. The argument is that human capital significantly increases the level of economic output.

2.7 Some Empirical Studies on Financial Inclusion and Growth

In past studies, the determinants of financial inclusion have been discussed widely. Most of the studies focused on the nexus between macroeconomic indicators and financial inclusion. Beck et al. (2007) used cross-country analysis and identified a combination of multiple bank-related variables for access to banking services. The study found a positive impact of banking usage and access indicators on economic development. Sarma (2008) study employed a comprehensive index of financial inclusion. The index mainly focused on three factors of financial inclusion, namely, usage of the banking system, banking penetration, and banking products' availability. Sarma and Pais (2011) study the influence of social and macroeconomic factors on financial inclusion. The study concluded a strong association between economic growth and financial inclusion. Arora (2012) analyzed the importance of financial inclusion in developing and developed countries by using a composite index of financial inclusion. The results highlighted that financial inclusion is equally essential for developing and developed countries' economic growth. Amidzic et al. (2014) assessed the relationship between financial inclusion and economic development of various countries. The study constructed a composite index of financial inclusion, namely, cost of usage, outreach and usage quality. Findings indicated that financial inclusion has a significant relationship with economic growth.

Moreover, Lenka and Barik (2018) found a unidirectional relationship between the internet and mobile services growth and financial inclusion. Other studies include Sharma (2016), Gosh (2013), Singh and Stakic (2020), Mehrotra et al. (2009) also established a significant relationship between economic growth and financial inclusion. Similarly, Kumar and Mohanty (2011) argued that financial inclusion is a precondition for economic development. The study further highlighted the barriers to financial inclusion, such as high-interest rates, lack of financial literacy and financial facilities. Thomas et al. employed the Generalized Method of Moments (GMM) technique to analyze the association between financial inclusion and economic growth in SAARC countries. Results suggested that an increase in access to finance leads to higher economic growth, particularly in middle-income and lower-income countries. Anwar et al. (2017) further supported their findings, which adopted a three-dimensional model of financial inclusion introduced by Sarma (2008). Likewise Lenka and Barik (2018) and Thomas et al., Singh and Stakic (2020) examined the association between growth and financial inclusion in SAARC countries. Results indicated that the strong relationship between economic growth and financial inclusion is beneficial for the overall economic system. The study also found a bi-directional causality between financial inclusion and economic development.

2.8 *Linking Intellectual Capital, Financial Inclusion and Growth as Mediating Factor*

In the knowledge-based economy, it is apparent that natural or gifted resources are insufficient to be responsible for high economic growth. Additional factors drive economic growth, such as invisible resources (Wadi & Alaali, 2020). Modern economies have successfully adopted the concept of technology and innovation (Boldov, 2010). Similarly, intelligence levels among the nations differentiated the per capita income and left a gap between rich and poor (Lynn & Vanhanen, 2005). This implies that the management of intangible capital (intellectual capital) on the macro level will positively change growth-related problems. Ahangar (2011) suggests that intellectual capital has various factors such as design approaches, general knowledge, inventions and technology-related components. In general, financial development and human capital together produce significant results to improve economic performance. Similarly, there are likely chances that intellectual capital (which includes human capital, relational capital and structural capital) can predict financial inclusion. The argument is that structural capital (organizational processes, infrastructure and databases), human capital (skills, education, experience, expertise and knowledge of employees) and relational capital (relationships with customer, vendors and other constituencies) may provide support to create opportunities for the availability of financial services. In this way, intellectual capital may offer an economic value to the firm, which leads to an increase in the level of productivity in providing more financial products and services. On the other side, the interaction between intellectual capital and financial inclusion is incomplete without economic performance. The favourable economic conditions provide more opportunities for both intellectual capital and financial inclusion. In sum, the intellectual capital offers economic value to the financial institution, and financial inclusion benefits from providing access to finance to its clients. In this process, economic growth plays a mediating role to strengthen the relationship between intellectual capital and financial inclusion. Based on the above discussion, Fig. 2 illustrated the conceptual model of his study.

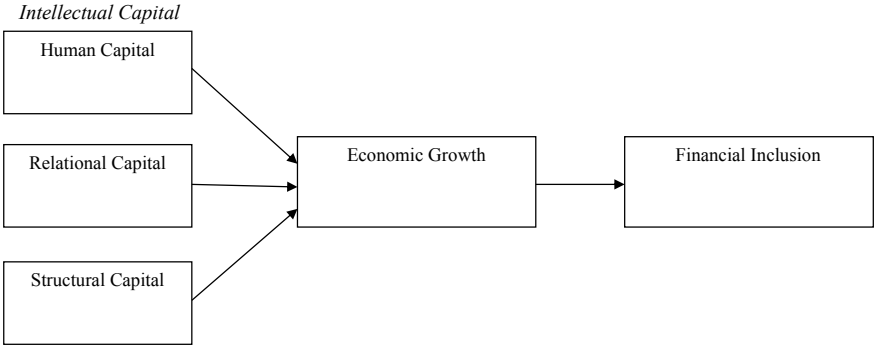

Fig. 2 Proposed model. *Source* Author's creation

3 Hypotheses

Based on the above discussion, this study proposed the following hypotheses;

H1 Intellectual capital will have a significant impact on financial inclusion.
H2 Economic growth will have a mediating role between intellectual capital and financial inclusion.

4 Conclusion

This study aims to present a conceptual linkage between intellectual capital and financial inclusion through the mediating role of economic growth. For this purpose, this study extracted the concept of intangible asset and access to finance from past studies and proposed a hypothesized model for future empirical testing. The theoretical underpinnings of this research are connected with previous empirical studies. To validate the conceptual framework, the potential association between intellectual capital and financial inclusion need empirical testing. We are confident that this study will provide a new dimension in the existing literature of intellectual capital and financial inclusion. Moreover, this study also offers useful policy guidelines for managers, policymakers and industry experts of financial institutions.

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Web Domain as a Proxy for Intangibles in Measuring the MNEs' Internationalization

Lukasz Bryl

Abstract One of the major shortcoming of the traditional multi-nationality metrics (e.g. TNI and INI) is taking into account mostly tangible and/or financial information, such as employment, assets and revenue. However, as numerous studies suggest the most important role in the firm performance (including the process of internationalization) is contemporarily played by the intangible assets. Hence, the aim of the paper is to propose a new approach of measuring the level of firm international activity by presenting the conceptual framework of the index including intangible assets. For the purposes of the study, the web domain was operationalized as a firm's intangible asset. Consequently, the paper empirically tests the proposed index on the sample of chosen digital MNEs. It was found that the multi-nationality of corporate web domains is high and geographically dependent. The greatest scores were identified in the group of North American MNEs whereas the lowest in the case of the Asian MNEs. Additionally, there was observed a strong positive impact of web domain internationalization level on the final score of foreign involvement of the studied MNEs. It further leads to the final conclusion stating that the introduction of intangible assets into the common metrics of multi-nationality increases the final score of the internationalization level of firms.

Keywords Intellectual capital · Intangible assets · Internationalization · Transnationality index · Internationality index · MNEs · Web domain

1 Introduction

The rapid growth of globalization along with the firms' foreign market expansion gained significant interest from scholars worldwide. As a result, various measures of firms' international activity were formed, such as, *inter alia*, transnationality index (TNI), or internationality index (INI). These traditional indices attempt to capture

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the extent of overseas corporate activity, are widely recognized by global organizations and often used in international business studies. Measurement of the level of internationalization is crucial since multi-nationality has been often employed and operationalized in the numerous empirical studies e.g. on the link between multi-nationality and performance (e.g. Eckert et al., 2016; Kim & Mathur, 2008; Lee et al., 2015; Oh & Contractor, 2014; Ral-Trebacz, 2016; Thomas & Eden, 2004). However, due to its uncomplicated construct are not free from simplifications and misleading conclusions. One of the major shortcomings is the fact of taking into account mostly tangible and/or financial information, such as employment, assets or revenue. Additionally, global firms, such as MNEs, very often internationalize their intangible assets in various organizational, legal and technological ways. As a result, some MNEs which are worldwide well-known, possess a global base of users and are present on many foreign markets, in fact may fall behind in traditional measures of internationalization. This phenomenon has been also observed by OECD in the recent report entitled: "Measuring MNEs using Big Data: The OECD Analytical Database on Individual Multinationals and their Affiliates (ADIMA)". One of the possible ways to address the current problem is the inclusion into the multi-nationality metrics the intangible assets. The importance of intangible assets in the contemporary business environment is increasing as it relates to the assets that contribute to sustaining and improving a firm's competitive position (Carlucci & Schiuma, 2007).

Intangible assets are rooted in many theoretical premises. One of the basic ones is the Resource-Based View (RBV) of the firm (Schulze, 1994) that provides two approaches. The first, named as the strong one, perceives intangibles as a bundle of assets, resources, and even liabilities possessed by the firm (Caddy, 2000). This approach is described as the static one. However, the second approach is based on the weak-form of the RBV (Prahalad & Hamel, 1990; Teece et al., 1997) and is described as a dynamic one. In the dynamic approach the focus is "not on intangible assets per se, but on the organizational capabilities to leverage, develop and change intangible assets for value creation" (Kianto, 2007). Spender (1996) links the term "dynamic" to intangible assets by describing it as "systems of knowing activity rather than systems of abstract knowledge assets". Since the objective of the chapter is to fulfill the research gap with respect to the dynamics of intellectual capital and intangibles (for the purposes of the paper the terms: intangible assets, intangibles and intellectual capital will be used interchangeably), this paper performs a dynamic approach into the nature of intangible assets and its quantification into the measurement process of multi-nationality. Since the spectrum of intangible assets is broad and may potentially encompass a plethora of various intangible assets items, in the paper web domain was operationalized as intangible assets and its internationalization as introduced into the multi-nationality metrics. Based on the theoretical premises there are two research questions of the paper:

Q1: How can intangibles be included in the process of measuring the level of firm internationalization?
Q2: How does including intangibles affect the final internationalization score?

The paper is a step along the way to recognize and include intangible assets in the studies on multi-nationality. The paper contributes twofold. First, attempts to revive and foster the discussion on the relevance of intangible assets in the process of measuring the level of internationalization. Second, it enables scholars to adopt a new measurement construct that recognizes intangible assets items. The pragmatic approach is performed since the paper proposes the new metric constructed on the basis of publicly available data.

The structure of the paper is as follows. Section 1 is an introduction, Sect. 2 provides a literature review on internationalization and intangible assets. Section 3 describes the methodological assumptions adopted in this paper. In Sect. 4 the main findings of the analysis are presented, whereas Sect. 5 depicts the conclusions, limitations, and suggestions for future lines of research.

2 Literature Review

2.1 Internationalization Theory

Internationalization is often described as a process and its various theoretical definitions are richly present in the international business literature. It can be described as a process of increasing international operations (Welch & Loustarinen, 1988), establishing and developing the positions in relation to counterparts in foreign networks through international extension, penetration, and international integration (Johanson & Mattson, 1988), increasing involvement in international operations (Melin, 1992) or adapting firms' operations (strategy, structure, resources, etc.) to the international environment (Calof & Beamish, 1995). Andersen (1997) perceives internationalization as a process of adapting exchange transaction modality to international markets whereas Coviello and McAuley (1999) describe it as a process by which firms increase their awareness of the impact of global activities on their future and establish and conduct transactions with companies from other nations. Finally, Eriksson et al. (1997) depict internationalization as a process of learning and knowledge accumulation.

Internationalization is conducted by firms of all sizes, however, the greater impact and scope of internationalization forms is performed by MNEs. A general theory of the MNE is internalization theory (Rugman, 1981) that was conceptualized by Buckley and Casson (1976) and further developed into the eclectic theory by Dunning (1980), known as OLI paradigm. The OLI paradigm explains the overseas expansion of MNEs in the form of FDI. Apart from OLI paradigm, other theories have emerged that explain why and how firms internationalize. These are product's cycle life theory (Vernon, 1966), Uppsala model (Johanson & Wiedersheim-Paul, 1975), network theory (Johanson & Mattson, 1988), born global and/or international new ventures (Knight & Cavusgil, 1996; Oviatt & McDougall, 1994). Together, the

eclectic paradigm and other internalization theories provide solid foundations for the contemporary theory of the multinational enterprise (MNE) (Verbeke, 2009).

2.2 Measuring the Level of Internationalization

The outcome of the corporate internationalization process is the level of multi-nationality that provides an important insight into the geographical spread of firm activity that can be measured in various ways. Thomas and Eden (2004) argue that there are two dimensions of the firm internationality:

- depth
- breadth.

Depth dimension relates to foreign market penetration and/or production, whereas the breadth dimension is perceived as the scope of foreign operations. The indices for depth and breadth have been adopted in numerous empirical research (e.g. Capar & Kotabe, 2003; Christophe & Lee, 2005; Denis et al., 2002; Lu & Beamish, 2004; Pantzalis, 2001; Zahra et al., 2000). Kirca (2008) studied the usage of various multi-nationality indices both in terms of depth and breadth in the empirical research and found that there are 20 indicators for depth and 11 indicators for breadth dimensions of multi-nationality. Under the most commonly used ones the following ones were identified (decreasing rank): the ratio of foreign assets to total assets, the ratio of foreign sales to total sales, no. of foreign countries in which the firm has subsidiaries, ratio of foreign revenues to total revenues and psychic dispersion of international operations. Nevertheless, there are two well-known measures of multi-nationality: the Transnationality Index (TNI) and the Internationality Index (INI). The first one was developed by the United Nations Conference on Trade and Development and is computed as the arithmetic average of the three ratios (Wall & Rees, 2004):

- the ratio of foreign assets to total assets
- the ratio of foreign sales to total sales
- the ratio of foreign employment to total employment.

In the recent World Investment Report (UNCTAD, 2020) the Authors observed that after the rapid growth in the 1990s and 2000s of the level of internationalization of MNEs subsequent years provided evidence that the pace has slowed down. As suggested in the report the mean Transnationality Index (TNI) of the top 100 MNEs has stagnated in the last decade around 65%. The Authors of the report argue that the stagnation is explained in part by the change in the composition of the list, as MNEs from developing countries entered the list starting out at lower levels of internationalization. Apparently then, the alleged slowdown of the internationalization derives from the sample modification. However, at the same time, a lot of MNEs in the top 100 have not broken through the "glass ceiling" of transnationality (65%). Back in the days Rugman and Verbeke (2004) and Rugman (2005) observed that most of the world's largest 500 companies are present in the home region of the triad of the EU,

North America and Asia Pacific failing to operate globally because of "inter-regional liability of foreignness".

The second common index, the Internationality Index is calculated as the number of foreign affiliates divided by the number of all affiliates. The ratio is a very basic metric depicting the level of foreign involvement. Nevertheless, it has been used broadly in international business studies. However, the problem is, as it counts each nation of equal size; so for any company, sales in a large market (e.g. US or Japan) will be much more significant than sales to a small country (e.g. Malta or Mauritius). It indicates further that possessing a large number of affiliates in small countries does not mean that the company is multinational (Rugman & Hoon, 2011).

2.3 Intangibles in the Popular Internationality Measurement Indices

The classic measures of firms' multi-nationality mostly include tangible assets and do not involve the intangible ones. However, as stated before, although the main lead of the MNEs' theories is the process of internationalization, the theories identify also directly or indirectly the role of intangible assets. For example, the resource-based view theory indicates that firms achieve sustained competitive advantage if they possess resources that are valuable, rare, and difficult to imitate or substitute (Barney, 1991; Dierickx & Cool, 1989). Such an approach suggests that intangible resources may be the ones that contribute to the better market position of the firm against competitors. Therefore, it seems undoubtful that companies in order to be profitable must own and leverage information-based intangible resources, including e.g. knowledge of local conditions and opportunities (Chetty & Blankenburg Holm, 2000) and business knowledge of resources, capabilities, and market behavior of suppliers, competitors, and customers (Blomstermo et al., 2004). Additionally, a recent paper by Bryl (2020) provides a literature review of the empirical studies in the last decade on the link between intangible assets and internationalization. The main conclusions are the following:

- there is a significant and positive link between the level of employee education and internationalization probability and extent;
- the effect of the wages on internationalization is stage-dependent;
- under certain assumptions, there is a positive and strong relationship between R&D intensity and internationalization.

Based on the theoretical premises the importance of intangible assets in MNEs is doubtless, hence its inclusion into the measurement of multi-nationality is strongly essential. However, if looking closely at the most common indices of the level of multi-nationality, such as Internationality and Transnationality Index the employment of intangible assets is barely present. Concerning the Internationality Index, its

basic construct takes into account only the quantity of affiliates with the geographical breakdown, hence its intangible content is not counted at all. A step ahead would be the inclusion of the type of affiliate (e. g. production, sales or R&D). This would provide some insight into the firms' intangible operations abroad. However, the problem may arise with gathering the appropriate and reliable data for the large sets of firms and years.

Intangible assets may be divided into the three main categories (Bjurstrom & Roberts, 2007; Bontis, 1998). The first one is relational capital that refers to an organization's external networks. The second one is structural (organizational) capital that relates the firm's procedures, systems and other forms of codified knowledge. The third one is human capital that encompasses knowledge, skills, experience and abilities of the employees. By adopting the three-dimensional division of intangible assets there can be identified some prevalence of intangibles in the TNI. First, is the amount of employment that may be widely referred to the human capital. However, there are some concerns arise. Stewart (1999) suggests that some employees by no doubt should be perceived as valuable assets, but others are only costs (often significantly high). Moreover, the TNI calculates the relative values, hence capturing the level of internationalization of employment provides valuable insight in the general internationalization, however, does not entail the intangibles. The second prevalence of intangibles in TNI is the intangible items embodied in the book values of fixed assets, namely under the position of goodwill and other intangibles in the balance sheet. These categories are strictly classified as the intangible ones, however they are often undervalued, since their valuation is conducted with the help of accounting tools and in most cases with no market approach. In order to better present the problem of undervaluation of intangibles calculated on the basis of book approach the analysis on selected digital MNEs was performed (Table 1).

Table 1 depicts the shares of intangibles in total assets among the global Top ICT performers. Since the ICT industry is considered as one of the leading ones in terms of knowledge content, innovation and technology (which are all based on intangibles) the obtained results should be expected to be high. In fact, some of the analyzed firms performed an outstanding score in the given years (e.g. SAP, Facebook and Twitter), however taking into account the entire sample the shares are low. Additionally, one of the oldest and most basic measures of the existence of intangible assets in firms is the Market to Book (MV/BV) value that shows how much greater are the firm's assets valued by the market than by the accounting tools. The value above one indicates some hidden, intangible assets that are somehow recognized and valued by the market. As theoretically stressed before, the book values of intangibles are lower than their real market value. In all analyzed years and firms (75 firm-year observations) the MV/BV metric indicated the presence of intangible assets. Hence, the presence and valuation of intangibles based on the scores in the balance sheets should be perceived as unsatisfactory. As a result, since intangibles are often undervalued, their role in the internationality indices is therefore underscored as well. Consequently, there is a strong need to introduce additional intangible items into the measurement of the MNEs' internationality.

Table 1 Top ICT MNEs' share of intangibles (goodwill and other intangibles) in total assets (IA/TA) and market/book value (MV/BV) index

	2013		2014		2015		2016		2017	
	IA/TA	MV/BV	IA/TA	MV/BV	IA/TA	MV/BV	IA/TA	MV/BV	IA/TA	MV/BV
Alphabet	0.16	4.32	0.16	3.48	0.13	4.44	0.12	3.88	0.10	4.78
Microsoft	0.12	3.64	0.16	3.83	0.12	4.43	0.24	5.51	0.19	7.98
Oracle	0.40	3.52	0.37	4.00	0.36	3.88	0.40	2.93	0.37	4.22
Facebook	0.10	9.00	0.55	6.05	0.44	6.73	0.32	5.60	0.24	6.90
Tencent Holdings	0.04	9.72	0.05	8.59	0.06	8.66	0.10	9.22	0.08	12.54
International Business Machines	0.28	8.68	0.29	13.39	0.31	9.32	0.35	8.65	0.33	8.07
SAP SE	0.84	4.49	0.86	3.91	0.66	3.86	0.64	3.86	0.54	4.50
Tata Consultancy Services	0.04	8.60	0.03	10.15	0.02	7.32	0.02	5.16	0.02	6.20
Salesforce.com	0.48	12.15	0.43	9.24	0.37	9.13	0.53	6.36	0.41	7.12
Infosys Ltd	0.30	4.46	0.09	4.35	0.07	4.35	0.06	3.20	0.03	3.56
Cognizant	0.05	5.00	0.04	4.15	0.26	3.94	0.25	3.17	0.24	3.93
Adobe Systems	0.07	4.19	0.29	5.41	0.45	6.55	0.40	6.89	0.36	10.21
Twitter	0.52	12.30	0.48	6.35	0.20	3.68	0.19	2.53	0.18	3.53
Intuit	0.13	9.82	0.13	10.21	0.28	38.81	0.27	21.73	0.34	17.14
Cerner	0.25	4.67	0.28	4.91	0.36	3.68	0.35	4.09	0.34	4.68
Mean	0.25	6.97	0.28	6.53	0.27	7.92	0.28	6.19	0.25	7.02
Median	0.16	5.00	0.28	5.41	0.28	4.44	0.27	5.16	0.24	6.20

Source Own calculations based on firms' financial statements

3 Web Domain as an Intangible Asset

There are multiple ways to identify, measure and evaluate the intangibles, however, none of them is perfect. In fact, measuring the intangibles is the holy grail of accounting (Kaplan & Norton, 2004) and is an on-going challenge for accountants. However, according to Andriessen (2004) there are over 30 methods for identifying, measuring and valuing intangible assets. The most well-known and at the same time basic classification of measurement methods of IC is the division proposed by Sveiby (2015) consisting of four groups:

- Direct IC Methods, focusing on the study of certain intangible assets. This group includes such methods as The Value Explorer, Intangible Assets Valuation, Accounting for the Future, Inclusive Valuation Methodology, Total Value Creation, and Technology Broker.
- Market Capitalization Methods, which show the difference between the market value and the book value, representing the value of IC. These methods include ratio of market value to book (MV / BV), Tobin's Q ratio, Investor Assigned Market Value
- Return on Assets Methods, which examine the profitability of individual assets involved in the company during the period. These methods include Value Added Intellectual Coefficient (VAIC), Calculated Intangible Value (CIV), Human Resources Costing, Knowledge Capital Earnings (KCE), Economic Value Added (EVA).
- Scorecard Methods, that, like the direct measurement methods focus on the determination of individual components of IC with such difference that they rarely allow an investigation of their monetary value. Among these methods there are distinguished: Balanced Scorecard, Intangible Assets Monitor, IC-Rating, Skandia Navigator, Holistic Approach Value.

In order to capture and include the intangible assets in the internationalization measurement schemes, the main focus was put on the quantification of intangible assets. As a result, the following criteria were set for finding the proper proxy for intangible assets:

1. The proxy should be able to be identified on the micro-level.
2. The proxy should be able to be distinguished into the domestic and foreign ones.
3. The proxy should be able to be easily obtained, operationalized and verified.
4. The proxy should be recognized as a valid intangible asset.

Based on the above-mentioned criteria the web domain was selected as the proxy for intangible assets and utilized in the study. Web domain serves as the "pedigree" of a website (Tan et al., 2001). Firms possess web domain for various reasons, e. g. to show their presence, present their offer and/or sell products/services. With regard to the created scope of requirements, the web domain appears to meet all set criteria. First, in the digital era most firms, not to mention MNEs, possess at least one web domain. Identifying further is easy assuming they have the same name. Second, by

adopting the country code extension it is possible to determine its national link. Third, thanks to global search engines, web domains are easy to find, verify and include in the studies. However, as many MNEs are complex organizations, operating globally and consisting of various affiliates, subsidiaries and firms. As a result, each dependent entity may have a different name and consequently a distinct web domain. For instance, Volkswagen Group is the owner of such other automotive brands, as *inter alia* Seat, Skoda and Audi. Each of them has its own domain. Therefore, in order to capture all domains belonging to MNEs, well-known market research on the studied firm should be performed. Fourth, according to the International Financial Reporting Standards 3 (IFRS 3, 2008) Internet domain names belong to the marketing-related intangible assets that be identified and monetized (among trademarks, trade names, service marks, collective marks and certification marks, trade dress, newspaper mastheads, Internet domain names, non-competition agreements). This is important since according to the international standards of accounting, only these components of intangible assets can be reported in the financial statements by firms (Nimtrakoon, 2015). Therefore, the web domain is perceived as an important carrier of a firm's intangible assets and can be operationalized in the process of measuring the firm level of internationalization as it provides a plethora of information on the company's global presence enabling to identify numerous geographical locations.

4 Methodology

4.1 Web Domain Internationalization

The analysis of the corporate websites is a complex issue due to the complexity of company web sites themselves since firms' websites have a complicated content structure (because of data architecture and their interaction). Additionally, multiple web domains are held by firms that indirectly reflects the real structure of these firms. The complexity strengthened by the existence of multiple web domains that are technically independent of the official corporate website is intended to provide specific information on the firm (Orduña-Malea et al., 2015). In this sense, web domains and websites serve as an official, mostly one-way communication channel with the company stakeholders. Nevertheless, the web domain was chosen as an object in this study. In order to determine the level of firm web domains' internationalization, first, its geographical classification should be conducted. This can be performed with the help of the three following approaches (OECD, 2018):

- text analytics;
- page rank;
- link analysis.

Text analytics approach analyses the geographical content of the webpage. By utilizing the advanced text analytics country mentions on the webpage are counted and subsequently, a table consisting of these mentions is formed and used later to disaggregate segment sales.

Page rank approach assumes the firm's segmentation into the location-specific websites by using country code. Each site corresponding to a given location is used later to disaggregate the reported sales segment with the help of Page Rank which measures the popularity.

Link analysis approach takes into account the outward links from the website in order to determine the distribution of sales by country. This method is most suitable for the businesses performing marketing standardization and operating (selling products or services) mostly online.

In this paper to measure the internationality of the web domain, the derivative of Page Rank approach was employed. The paper was however primarily focused on the web domain country code in order to capture the "clear geographical origin" of the website (not biased by the popularity ranks).

The study encompassed two steps. The first one was based on calculating the internationalization level of MNEs web domain (WINI). In this study the level of web domain internationalization was measured with the adoption of the following formula:

$$\text{WINI} = \frac{d_f}{d_t}$$

where:

d_f no. of foreign-registered domains
d_t total no. of domains.

For the classification of the web domain, the OECD (2018) scheme for determining the geographic location of the website was adopted. The domains and its divisions into the foreign and domestic ones were identified with the help of the country code extension which consists of two letters specified for each country and globally regulated (e.g. the country-code extension for the United States is.*us*, for China it is.*cn,* etc.). However, some of the domains are not country specified, as their extension is either.*com* or.*co.* These domains are the global ones and were included both in the numerator and denominator of the proposed formula.

The second step encompassed the inclusion of the WINI into the two common internationalization indices, namely INI and TNI. The inclusion of WINI into the INI was based on the following formula (parameters description same as in previous formula) and resulted in the creation of a new index (INI_{WINI}):

$$\text{INI}_{\text{WINI}} = 0,5x\left(\frac{a_f}{a_t} + \text{WINI}\right)$$

where:

a_f no. of foreign affiliates.
a_t total no. of affiliates.

To adjust the final score of INI_{WINI} the arithmetic average of the original INI and WINI was taken. For the purposes of the study, the unweighted average was employed, however, future studies may introduce different variations of the INI_{WINI}.

However, with regard to the TNI its basic formula, due to the lack of data was deprived of the share of foreign employment in total employment, but, similarly, as INI_{WINI}, was enriched with the WINI creating the formula below:

$$TNI_{WINI} = \frac{\frac{r_f}{r_t} + \frac{a_f}{a_t} + WINI}{3}$$

where:

r_f foreign revenue.
r_t total revenue.
a_f foreign assets.
a_t total assets.

Similar to the INI_{WINI} the unweighted mean was employed, however, future studies may introduce different weights of the parameters in the TNI_{WINI}.

4.2 Sample and Sources of Data

The initial sample consisted of the 200 largest digital MNEs, however, due to the lack of data final sample was reduced to 56. The data on total/foreign sales/assets derived from the UNCTAD database, whereas data on web domains from the OECD database. All data refer to 2018. Since, it is common for MNEs to possess various brands, specific products or services, information web sites for investors, a corporate blog, affiliates or branches in different countries with their own products and services (Orduña-Malea et al., 2015) in this study all web domains belonging to the MNE and its affiliates from various industries and with different (than the parent company) names were studied. The detailed list of MNEs incorporated into the study is included in the Annex of the paper.

5 Results

The studied MNEs were identified as digital ones according to the UNCTAD classification. Under such division, there were 12 sub-industries distinguished. These are search engines, social networks, electronic payments, Internet retailers, games, digital media, IT devices and components, IT software and services, telecoms, other platforms, other digital solutions, and other e-commerce. Table 2 presents the descriptive statistics of the analyzed MNEs.

The studied sample was geographically diversified, however, most MNEs derived from the developed nations. Developing countries' MNEs accounted for less than 9%. The combined quantity of the web domains amounted to almost 10 k what clearly shows that each MNE holds numerous web domains. In fact, each MNE possessed on average almost 168 web domains. In the next step, the level of web domain internationalization was determined with the help of WINI (Table 3).

Table 2 Descriptive statistics of the studied sample (2018)

Category	Value
No. of MNEs	56
Countries of origin	US (27), Japan (4), South Korea (2), Taiwan (2), Germany (2), UK (2), Spain (2), France (2), Netherlands (2), China (1), Mexico (1), UAE (1), Sweden (1), Norway (1), Canada (1), Switzerland (1), Finland (1), Ireland (1), India (1), Saudi Arabia (1)
Total sales	2,196,799 mln USD
Mean sales	3,922,855 mln USD
Total assets	3,831,146 mln USD
Mean assets	6,841,332 mln USD
Total no. of domains	9,370
Mean no. of domains	167.32

Source Own elaboration

Table 3 Web domains and WINI—descriptive scores (overall)

	No. of global domains	No. of domestic domains	Total no. of domains	WINI
Min	2	0	3	0.31
Max	539.00	271.00	692.00	1.00
Mean	147.98	19.69	167.32	0.86
1st quartile	46.25	0.00	47.75	0.89
Median	92.00	2.00	119.00	0.99
3rd quartile	201.25	19.50	230.50	1.00

Source Own calculations

The average score of the level of web domain internationalization was very high and amounted to 0.86 what means that out of 100 web domains on average 86 are either foreign (with country-specific code) or global (.com or .co). Additionally half of the studied MNEs performed an average score of more than 0.99 what implies further an extremely high level of web domain multi-nationality. A significant impact on the score was a substantial share of global domains in the total number of domains. Table 4 shows the results with the geographical breakdown.

The degree of web domain internationalization differed with regard to the geographic location of the parent company. The highest score was observed in terms of North American (mostly US) and European MNEs. However, the European scores were smaller than the North American ones. Surprisingly, an outstanding average

Table 4 Web domains and WINI—descriptive scores with geographical breakdown

	North America, n = 29			
	No. of global domains	No. of domestic domains	Total no. of domains	WINI
Min	8	0	8	0.88
Max	539.00	20.00	542.00	1.00
Mean	151.83	2.21	153.97	0.99
1st quartile	57.00	0.00	57.00	0.99
Median	83.00	0.00	83.00	1.00
3rd quartile	192.00	2.00	193.00	1.00
	Europe, n = 15			
	No. of global domains	No. of domestic domains	Total no. of domains	WINI
Min	5	0	5	0.31
Max	286.00	157.00	308.00	1.00
Mean	124.53	27.67	152.20	0.86
1st quartile	51.00	1.50	65.50	0.80
Median	98.00	11.00	140.00	0.91
3rd quartile	189.00	28.50	228.50	0.97
	Asia, n = 12			
	No. of global domains	No. of domestic domains	Total no. of domains	WINI
Min	2	1	3	0.41
Max	442.00	271.00	692.00	0.92
Mean	168.00	50.50	218.50	0.72
1st quartile	14.25	6.00	19.75	0.57
Median	87.00	28.00	126.50	0.70
3rd quartile	368.50	51.75	406.50	0.90

Source Own calculations

Table 5 TNI_{wini} index—the impact of intangibles inclusion (2018)

	TNI*	TNI_{WINI}	Variation
Min	0.045	0.217	+0.172
Max	0.975	0.983	+0.008
Mean	0.513	0.627	+0.114
1st quartile	0.34	0.542	+0.202
Median	0.518	0.627	+0.109
3rd quartile	0.625	0.735	+0.110

*TNI—Original Transnationality Index formula without data on employment
Source own calculations

Table 6 INI_{WINI} index—the impact of intangibles inclusion (2018)

	INI	INI_{WINI}	Variation
Min	0.2542	0.283	+0.029
Max	0.9616	0.981	+0.019
Mean	0.691	0.793	+0.102
1st quartile	0.5814	0.735	+0.154
Median	0.713	0.831	+0.118
3rd quartile	0.8554	0.884	+0.029

Source own calculations

level of web domain internationalization was observed in the group of Asian MNEs. The score was lower by 77 pp. then in the case of North American MNEs. Nevertheless, the achieved scores lead to the conclusion that the web domain internationalization level is much greater than the standard metrics of multi-nationality. Hence, with no doubt, such high scores of web domain multi-nationality will have a strong, positive effect on the TNI and INI scores. Tables 5 and 6 presents the results.

The inclusion of WINI in the TNI resulted in a relatively significant increase of the level of internationality of the studied MNEs. On average MNEs scored higher by 11.4 pp. in comparison to the taken TNI. The impact of web domain inclusion on the INI is shown in Table 6.

Similarly, to the TNI index the introduction of web domain internationalization level resulted in the increase of the INI by 10.2 pp respectively. However, in comparison to the impact on TNI, the influence on INI is slightly smaller. The achieved results indicate that intangible assets are feasible to be included in the process of computing the MNEs multi-nationality degree. Moreover, inclusion leads to an increase of the level of firm internationality.

6 Conclusions

The study performed a quantitative analysis of the level of internationalization with the help of the newly introduced metric (WINI) that takes into account intangible assets. For the purposes of the study, the intangible assets were operationalized as web domains. The studied sample consisted of the largest digital MNEs from various countries. It was found that the multi-nationality of corporate web domains is high and geographically dependent. The greatest scores were observed in the group of North American MNEs whereas the lowest in the case of the Asian MNEs. Additionally, there was observed a strong positive impact of the WINI index on the final score of foreign involvement of the studied MNEs. It leads to the final conclusion stating that introduction of intangible assets into the common metric of multi-nationality increases the final score of the internationalization level of firms. This has significant scientific implications, as it enables researchers to better capture the more adequate level of multi-nationality, and thus better understand various links between the internationalization level and e.g. financial and non-financial performance.

The paper performs practical contributions. First, it presents the possible operationalization of intangible assets and their inclusion into the internationalization level. This may serve as practical guidelines for business practitioners and for academics who operationalize multi-nationality and its link with various performance indicators in international business studies. Second, the results may also foster the discussion among the scientists on the inclusion of further intangible assets in the multi-nationality metrics.

The study has its limitations, such as a relatively small sample with data referring to the one year only. Future studies could be enriched by the intra-industry comparisons and by various WINI index weights.

Annex

Name	Classification	Total sales (mln, USD)	Total assets (mln, USD)	No. of affiliates	No. of domains
Alphabet	Search engines	74,989	147,461	58	542
Facebook	Social networks	17,928	49,407	42	64
Ebay	Other platforms	8,592	17,755	59	289
Red Hat	Other platforms	2,052	4,155	72	57
PayPal	Electronic payments	9,248	28,881	39	193
Salesforce	Other digital solutions	6,667	12,763	145	60
Equinix	Other digital solutions	2,726	10,357	150	49

(continued)

(continued)

Name	Classification	Total sales (mln, USD)	Total assets (mln, USD)	No. of affiliates	No. of domains
Servicenow	Other digital solutions	1,005	1,807	36	20
Amazon	Internet retailers	107,006	65,444	77	170
Amadeus IT Group	Other e-commerce	4,260	7,625	160	97
Tencent Holdings	Games	15,846	47,265	67	155
Thomson Reuters	Info & data	12,209	29,095	141	382
Netflix	Digital media	6,780	10,203	7	35
S&P Global	Info & data	5,313	8,183	134	88
Activision Blizzard	Games	4,664	15,246	26	65
Moody's	Info & data	3,485	5,103	215	55
Apple	IT devices	215,639	321,686	34	71
Samsung Electronics	IT devices	171,126	206,550	480	483
Hon Hai Precision Industry	Components	135,996	70,038	60	22
International Business Machines	IT devices	81,741	110,495	287	235
Sony	IT devices	71,968	148,037	149	505
Intel	IT devices	55,355	101,459	74	127
Dell Technologies	IT devices	50,911	45,122	591	342
HP	IT devices	48,238	29,010	246	149
Telefonak- tiebolaget Lm Ericsson	IT devices	29,253	33,689	109	34
Taiwan Semiconductor Manufacturing Company	Components	25,593	50,292	22	3
SK Hynix	Components	16,032	25,312	61	98
Nokia	IT devices	14,778	22,782	92	23
Texas Instruments	Components	13,000	16,230	92	8
Micron Technology	Components	12,399	27,540	27	32
Murata Manufacturing	Components	10,751	13,476	67	10
Asml Holding	Components	6,845	15,802	56	5
Nxp Semicon-ductors	Components	6,101	26,354	93	18
Nvidia	Components	5,010	7,370	48	83
Microsoft	IT software & services	85,320	193,694	80	172

(continued)

(continued)

Name	Classification	Total sales (mln, USD)	Total assets (mln, USD)	No. of affiliates	No. of domains
Oracle	IT software & services	37,047	112,180	179	333
Accenture	IT software & services	34,798	20,609	547	140
Qualcomm	IT software & services	23,554	52,359	24	38
SAP	IT software & services	22,637	45,061	358	293
Tata Consultancy Services	IT software & services	16,379	13,475	310	381
Cognizant Technology Solutions	IT software & services	12,416	13,061	186	62
Adobe Systems	IT software & services	5,854	12,707	101	62
AT&T	Telecom	146,801	402,672	255	510
Nippon Telegraph and Telephone	Telecom	102,468	186,770	243	692
Softbank Group	Telecom	81,271	183,851	411	216
Deutsche Telekom	Telecom	75,368	156,686	183	308
Vodafone Group	Telecom	59,013	192,587	433	206
America Movil	Telecom	51,970	75,349	71	172
Telefonica	Telecom	51,407	133,882	224	271
Orange	Telecom	43,805	99,540	510	229
BT Group	Telecom	27,426	61,345	348	122
Telenor	Telecom	14,549	23,259	149	116
Emirates Telecommunication Group	Telecom	14,215	34,926	34	44
Saudi Telecom Company	Telecom	13,507	25,776	19	13
Swisscom	Telecom	11,771	21,317	59	228
Vivendi	Telecom	11,717	38,046	81	193

Source own elaboration based on: UNCTAD (2020)

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Managing Intellectual Capital Through Strategic Leadership: A Complementary Approach

Imran Shafique, Nosheen Rafi, and Masood Nawaz Kalyar

Abstract Since organizations are facing a turbulent, dynamic and competitive business environment, a novel kind of leadership style i.e. strategic leadership is needed. In the twenty-first century, the required leadership for organizations is concerned with establishing organizations' capabilities and resources with a focus on intellectual capital. Intellectual capital is defined as the organization's intangible assets (employees' expertise and organization's processes) which play significant role to enhance the organization's performance. Intellectual capital is a major contributor to achieve a competitive benefit for any organization. Leaders should 'strategically' manage these vital assets for organizations such that these augment and expedite the organization's efforts to achieve overall strategic-fit and sustained competitive advantage. The strategic development and management of these assets include assessing available assets and bringing shifts like acquiring/building and removing intellectual assets that expedite firm strategy implementation and obtain strategic advantages. To establish value, the assets should be designed to build aptitudes that are perhaps leveraged for competitive benefits. Keeping this backdrop in view, the element of strategic leadership which will be defined in this chapter is novel. This novel kind of approach to leadership has vital implications for management practitioners and researchers. Moreover, this chapter also sheds light on current advancements in the subject domain and proposes a strategic management-intellectual capital grid to discuss the complementary role of leadership on how strategic leaders exploit intellectual capital to maximize value.Please check and confirm if the author names and initials are correct.Names and initials are OK.

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1 Introduction

Strategic leadership plays a key role in setting organizational goals, formulating and implementing strategies to achieve long-term success (Davies & Davies, 2004). Strategic leadership represents the extent to which a leader (at strategic-/top-level of an organization) deliberately anticipates to bring changes and drive the firm in new ways (Ireland & Hitt, 1999; Mubarik et al., 2016). Contemporary firms are constantly facing competitive pressures and environmental uncertainty towards business practices, hence need quick changes to acquire new plans and novel ways of doing businesses (Rowe, 2001). One way firms can achieve success and become more productive, is tapping on various resources existing in the form of intellectual capital (Thomas et al., 2004). Intellectual capital is the capacity to make, hold, and offer knowledge assets of the firm for sustainability (Mubarik, 2015; Subramaniam & Youndt, 2005). Intellectual capital is pivotal for sustained competitive edge and long-term business achievements (Stewart, 2010). Firms that invest into new information creation perform better than their counterparts (Brennan & Connell, 2000).Please confirm if the section headings identified are correct.Heading are correct.

Intellectual capital consists in the form of human, relational, and structural capital where this portfolio of capital provides firms a diversified pool of resources and facilitates them in devising and implementing strategic objectives. That's why, strategic leadership also considers employees as an important asset because their knowledge, skills, abilities, and expertise play a vital role in building and sustaining competitive advantages (Hitt et al., 2010; Mubarik et al., 2016). Strategic leaders are key in identifying intra- and inter-firm relational networks and exploiting them in creating value. Likewise, firm design and organizational structure either facilitate or hinder the efficiency of business processes. Thus, strategic leadership seems to bring about all the above systems, structures and utilize the workforce in a way that yields strategic-fit between resources and desired objectives (Guillot, 2003). Subsequently, it concludes that strategic leadership is the most significant as well as a fundamental tool in capturing intellectual capital and bringing a greater breadth of benefits and advantages to various stakeholders (Gerras et al., 2010; Kianto et al., 2017; Mubarik et al., 2018). Ample studies confirm the significant role of intellectual capital in determining various firm-level outcomes including innovation, sustainability, competitive advantage, and business performance.Reference Gerras et al. (2010) is cited in the text but not provided in the reference list. Please provide the respective references in the list or delete this citations.Gerras, S.J., M. Clark, C. Allen, T. Keegan, R. Meinhart, L. Wong, and G. Reed. 2010. Strategic leadership primer. Carlisle, PA: Army War College, Carlisle Barracks.

The objective of this study is to investigate the practices of strategic leadership in the development of intellectual capital. Since strategic leadership leads the business esteem converging upon the development and transferring the outcomes to its stakeholders, whereas intellectual capital deals with information distribution inside the firm and giving results concerning how to make a business valuable. Subsequent to this relation between strategic leadership and intellectual capital, the question to what degree both concepts share similar importance and boost the productivity of each other remains unaddressed. The high potential in strategic leadership and intellectual capital can be distinguished in this relationship if there is the presence of cross-functional groups. The high caliber of top management is viewed as a significant resource for the organization who want to see their successful execution in the business.

2 Literature Review

As indicated by the past observations and comprehensions (Bolívar & Chrispeels, 2011; Bontis & Nikitopoulos, 2001), researchers proposed that deciding the future with certainty is an overstatement. For firms, it is useful to recognize and prepare for situations that have occurred recently. According to recent studies (Gupta et al., 2021; Shafiee et al., 2021), the future forecast has grown problematic to measure achievement or disappointment, so the previous instances conclude with respect to how one ought to prepare for a future whose state has been improved. Therefore, strategic leadership based on this methodology helps us to contribute to corporate accomplishment all through the twenty-first century. In particular, the worldwide economy has made an incredible impact on strategic leadership as of now, as it offers criticism about practices that should be utilized in the future as globalization is irreversible. It is fundamental to recognize, research, and implement the best leadership strategies which are practiced by visionary leaders to gauge how an organization can develop and have more prominent efficiency in the upcoming deeds (Shrivastava & Nachman, 1989). It is imperative to look into these visionary organizations as strategic leadership is the one of key elements that address major issues in an organization. That is when performing internationally, the presence of strategic planning helps organizations to achieve success and more noteworthy profitability. Essentially, leadership is an individual's capacity to anticipate, to picture, to look after adaptability, to think strategically, and to bring creative changes that produce a reasonable opportunity for the firm (Covin & Slevin, 2017). The organization picks up an exceptional selling point if the competitors neglect to comprehend and reproduce a company's strategic administration. As it is significant for all organizations to secure their competitive edge, it empowers them to actualize strategic leadership in an advanced mode permitting the firm's struggles to produce better results. One clear similarity between leadership and intellectual capital can certainly be recognized which focuses on the business value (Hitt & Duane, 2002; Mubarik et al. 2019a).

Inefficient leadership leads towards lowering the assets of a firm, low certainty level, higher rates of absenteeism and employee turnover, poor methods of managing customers and markets, as well as increased uncertainty of activities and outcomes (Schoemaker et al., 2013). Strategic leadership is a basic part of a firm as it makes a solid impact and influence on other actions, such as decision making. Primarily, strategic leadership holds human resources undertakings (Gerras et al., 2010). It is perceived as a technique to upgrade leadership; it turns into a component of intellectual capital. So, it leads one's attention regarding the cooperation of individuals, their behaviors, and capital. It shows a positive connection between strategic leadership and intellectual capital where strategic leadership improves the intellectual capital of a firm, bringing benefit by securing the competitive edge over the rivals on the marketplace. Intellectual capital is the mindfulness and aptitude of a firm's employees, the capacity of structures, and relational networks (Covin & Slevin, 2017; Mubarik et al., 2019b).

Several researchers (e.g. Kianto et al., 2017; Subramaniam & Youndt, 2005) have attempted to comprehend why some businesses are more successful than others. Rowe (2001) argued that industry benefits emerge from the collaboration of five competitive forces and proposed that the productivity of a business unit relies upon the effect of these five forces. Yet, for what reason do organizations within similar industries vary in the benefit? Crossan et al. (2008) have discussed solutions to this concern, who think that the response to this unpredictable review lies in the complementary three aspects. The paradigm of competitive forces, as indicated by this angle, endorses that business productivity comes from intellectual capital. This capital has an enormous effect when businesses tap on strategic decisions. This is particularly clear in associations that depend on intellectual capital, for example, colleges, universities emergency clinics, etc. (Ahmed et al., 2019; Allameh, 2018; Mubarik et al., 2021).

Strategic leadership is defined as the capacity to impact others to voluntarily settle on everyday choices and decisions that improve the long-lasting sustainability of the organization while keeping up its short-term financial dependability (Davies & Davies, 2006). This definition is not different from Ireland and Hitt (1999), as it expressly incorporates the idea of voluntary dynamics and emphasizes the present just as what has to come. Directors and representatives of firms—such as owners and managers—make their decisions consistently as they interface with one another and their external partners, particularly clients, suppliers, and the other networks in the environment in which they operate (Davies & Davies, 2012). Are these choices as per the strategic bearing of the association? Will they enhance the future practicality of the organization? Depending on directors and managers' capacity to make decisions that advantage the organization implies that senior administration needs to emphasize checking and controlling employees, and will have greater ability to inspect what the organization needs to do in both the short and long terms (Elenkov et al., 2005). Then again, if supervisors and representatives are not well aware of the essential processes of the organization, they may make decisions that might harm the organization. Retrospectively, they may deliberately make decisions that harm the business. This requires an extraordinary struggle at monitoring and controlling and less struggle

on what should be accomplished for short and long-term sustainability (Samimi et al., 2020), hence affecting workers to purposefully make decisions that upgrade the organization is the main factor of strategic leadership. Boal and Hooijberg (2000) explained that "when you can't control, direct or monitor, the only thing you can do is trust. That means leaders must be certain that the individuals they are trusting have values that will inspire the choices and activities that they need." The meaning of strategic leadership is assumed as a capacity to impact subordinates, companions, and bosses (Hitt & Duane, 2002). It additionally assumed that the leaders understand the eminent strategies procedures that a few authors considered more significant than the proposed measure for organizational performance.

In learning and evolutionary organizations, intellectual capital (IC) has great importance (Ginesti et al., 2018), although it's a new term in the field of management and has many components that make it applicable in the management system (Sardo et al., 2018). IC can be utilized for the knowledge, acquiring unique assets, innovation, and experience along with the increase in value creation of an organization. IC is making extended place in human resource and procedural networking so that the innovation can create tacit knowledge and its collaboration among employees. Bontis (1998) stated that intangible assets are equally useful for the value creation of a firm like tangible assets and IC is a source to determine the missing links for intangible assets in the organization; which create the value for the organization. After reviewing the research on IC, it's clear that IC not only gives attention to the shareholder but also a wide range of stakeholders (Cricelli et al., 2018). Research Scholars (Allameh, 2018; Chen et al., 2004; Subramaniam & Youndt, 2005) argued that intellectual capital reveals the value creation system through knowledge and let it free from the traditional accounting parameters. As knowledge sharing is key understandings of individual and collective dynamics that become the foundations of IC concepts, employees in any organization are highly skilled and competency-based knowledge workers (Pedro et al., 2019). Since human resource management is a strategic choice to manage the workforce in an effective way for good performance (Pulic, 2004), the basic aim of leadership (for example responsibilities carried by human resource department) is to create an accessible, adaptable and compassionate administration style to motivate, develop, and train the staff so that the employees could perform at best-level and give their utmost support to the firm's missions. Leadership theories and practices are contributory and helping to achieve organizational goals and improve efficiency (Bukh et al., 2001). Extant theories signify that dynamic leadership harmonizes decision-making and corporate strategy. Hence strategic management, in this regard, guides the practices to develop and utilize intellectual capital (Guthrie, 2001).Kindly note that reference Bontis (2001) has been changed to Bontis (1998) so that this citations matches the list.OK.

Strategic leadership is the source to develop the skills of the workforce. This happens through extensive training courses, practices of skill development, and motivational programs (Davies & Davies, 2012). Strategic leadership helps in developing uninterrupted structures to support the administration in the execution of continued performance evaluations. Human resource practices also construct new avenues for employees to explore the opportunities. In this way, strategic leadership symbolizes

the directions set through HR exchanges (Elenkov et al., 2005). The actions willfully made by leaders and workers during day-to-day activities eventually figure out what novel and useful techniques evolve. Strategic leaders comprehend and utilize this cycle to guarantee the future sustainability of their organizations (Quong & Walker, 2010). Strategic leadership assumes a shared vision of what an organization is to be, so the everyday dynamic, or new strategy is predictable with(in) this vision. Strategic leadership allows organizations and leaders to work upon the opportunities that can be exploited, and the market turbulence can be assessed by the organization. Strategic leadership takes visionary concepts with respect to those with a willingness to take chances. It surmises strategic leadership with a reasonable perspective on the world (Jansen et al., 2009).

2.1 Relationship of Strategic Leadership and Intellectual Capital

Dynamic organizations must have to adopt new technologies for success and to compete in the global economies (Bolívar & Chrispeels, 2011). The improvements are dependent on systematic processes in product and service that is the application of intellectual capital. The information which has great importance today may turn into a worthless stock tomorrow. Therefore, there is a need to understand the effectiveness of intellectual capital today that is the resource of knowledge and can be stroked in every instance. The collective custom of suitable intellectual capital management and strategic leadership of organizations can motivate employees, build them and manage in a way that they can give their best to support the organization's missions and hence the organization's visions (Kalyar et al., 2019). The aim of knowledge-based resources (human capital, relational capital, structural capital) is to augment a firm's value, creation of competitive advantage not only for companies and institutions but also for nations and economic regions (Slack & Munz, 2016). The amalgamation of intellectual capital in strategic leadership fetches a developing and emerging viewpoint in knowledge-based dynamics because it deliberates a complete part of businesses, administrations, governments, and even for countries (Müller & Raich, 2005). Intellectual capital is anchored by three components.

2.1.1 Human Capital

Employees have the information, aptitudes, capacities, and number of experiences. For instance, employees' educational level, fulfillment, mentalities, values, leadership responsibility, inspiration, insight, innovativeness, collaboration, critical thinking and relational abilities, self-assurance, willingness to share information, business and initiative aptitudes, development, etc. (Leitch et al., 2013; McCallum & O'Connell, 2009). A major common perspective in human capital management

and strategic leadership is both determined to see how organizations pull in, create and lead their ability to make a continued competitive edge. Strategic leadership characterizes human capital by understanding and actualizing evidence-based prescribed procedures related to human resources counseling, change management, worker commitment and inspiration, culturally diverse administration, technical competencies, business law, compensation, employee dynamic, and systematic abilities (Hili et al., 2017). The enhanced strategic leadership plans for positions in counseling of human capital in both indigenous and worldwide business settings. The involvement of human capital in the business instills professionals learn to understand, produce and implement integrated ways of activities.

The human capital actually articulate organizations vision, mission, core values, drawing up HRM plan, carry manpower planning, performance management system (Zhu et al., 2005). So the well-equipped, talented, proficient and knowledge-based human capital would be able to create the value of the organization. The development can be focused through two basic steps: first, formulate practices to achieve the goals of the organization in well-organized, secure and certified ways; second, implement these practices and procedures over interconnected activities, perform improvements whenever necessary. The utilization of intellectual capital in organizational practices generate a natural flow to organization activities because this enables organizations to operate optimally in creating value and sustainable competitive advantage through employees sharing, collaboration, and creation of new knowledge to perform their tasks (Ratten, 2015). That is why, interdependency about "the dream of doing something" is created among individuals, which becomes a key source of their motivation of doing work, creating valuable efforts and satisfactory behaviors (Golmoradi & Ardabili, 2016).

2.1.2 Structural Capital

Organizations produce and deliver products and services by utilizing the resources such as competence, techniques, culture, mission, innovation frameworks, licenses, copyrights, brand name, information bases, R&D, advancement (Sarlak et al., 2012). Strategic leadership skills have the propensity to orchestrate intellectual capital in creating a pool of valuable assets. Strategic leadership encourages the reuse of intellectual capital, empower better dynamic, and make the conditions for the advancement of knowledge (Dwyer et al., 2019). Strategic leadership gives individuals opportunities to help information stream to the correct individuals at right time, so they can become more productive and innovative (Golmoradi & Ardabili, 2016). It fosters sharing, innovating, (re)using, collaborating, and learning beyond the boundaries of organizations. In every field, HR practices are important like the autonomy of work is an important contrivance motivator, through which individuals feel freedom and enjoy their work as well as put all efforts for superior performance outcomes. Especially in the era of digitization, they are highly motivated to improve individual performance through knowledge sharing as well as knowledge creation (Elkington et al., 2017). Likewise, the technology which has a key share of structural capital helps

to automate processes. It also assists in the reduction of workloads of employees, gives the opportunity to work on creative and innovative projects and assignments. For example, new technologies of palm computers, smartphone programs, software packages can help employees to collect and analyze data, useful information for their projects, such kind of information usually go unexploited or it takes enough time for employees to get desired inferences (Li, 2013). Different technologies help employees to access and operate routine operations with more ease. New skills and competencies can be expanded to improve working practices, procedures, processes which in turn enhance the efficiency of employees and organizations. All employees even special ones who are maybe a prime part of the labor force get the advantage commenced through technological advancements because new and emerging globalized economy the doors are open even for those workers who formerly might need the skill to do a specific job (Day, 2000; Ratten, 2015).

2.1.3 Relational Capital

The business makes added value for all stakeholders (clients, venders, financial invertors, providers, merchants, and government) and covers the relationships in order to maintain market position (Drewniak et al., 2020). For example, customer relations, customers' loyalty and satisfaction, distribution channels, firm goodwill, brand value, alliances, authorizing arrangements, etc., so it's important to manage this dynamic, intricate and unique feature of intellectual capital (Cegarra-Navarro & Dewhurst, 2006). The strategic leaders with partners can develop conditions for building, maintaining, and renovating intellectual resources, as firms can get to basic and harmonized assets through outside relations (Dewhurst & Navarro, 2004). In addition, relational advancements help to increase the efficiency of personnel those already working or got employed by joint ventures, alliances, and shared projects of organizations (Cousins et al., 2006; Welbourne & Pardo-del-Val, 2009). The ability to keep and use structural capital for the creation of comparative advantage needs the aptitude to recognize possible practices of every valuable resource. Acceptance of certain structural advances regarding technology shows cost-saving for different SMEs or multinational businesses (Chatterji & Kiran, 2017). Furthermore, organizations also evaluate the possibility and advantages of each new venture through the linked relationships. This evaluation gives way to all possible benefits which provide value to both employees and the organization (Cegarra-Sánchez et al., 2018).

3 Strategic Leadership Factors Procuring Intellectual Capital

Strategic leadership manages the significant motivations behind an organization's intellectual capital. It incorporates an elevated level of psychological capacity, several

contributions to working methods and practices, envisions to make a future, progressive reasoning, and long term sustainability. Strategic leaders utilize a wide range of cognitive capacities to maintain business procedures up to remarkable standards (Savolainen & Fresno, 2013). Strategies by the top management assist employees to adjust to the environmental stimuli by helping them so that they can turn out to be better ones through seeking information and developing a learning organization. Senior executives should support, lead and impact the labor force so they could contribute adequately towards the organizational goals.

The law of proximity states that humans perceive those factors that are close to each other by grouping them and identifying them as part of the same object (Kim et al., 2008). The principle of proximity enables organizations to group factors together into larger sets. In addition, this principle relieves us from processing so many small motivators. Thus, the law of proximity helps us to gain an understanding of the additional information much faster (Waldron, 2011). By using the proximity principle, numerous factors strategic leadership procured, which has further classified with the dimensions of intellectual capital (Exhibit -1).

3.1 Human Capital Factors

Inclusiveness: Strategic leadership concurs a comprehensive working environment which is significant to develop high rated intellectual capital. Yet it varies from one organization to another but its ultimate objective is to establish a workplace that absorbs diverse employees and utilizes it for long-term success (Bel, 2010). Management ought to sit with employees on a common platform to invite suggestions and feedbacks from them to increase their intellectual capital.

Supervision: Supervision is a crucial communication factor between senior management and team in organizations while developing the intellectual capital (Oke et al., 2009). It could be a significant, learning asset for organizational change. Supervisors and middle-managers are the interfaces between the senior administration and employees, can explicitly impact intellectual capital (Bono et al., 2007).

Innovation: Strategic leadership welcomes new ideas from their workforce. Employees must be encouraged to come out with new and innovative ideas that enhance the intellectual capital (Surie & Hazy, 2006).

Communication: Strategic leadership allows good communication between employees and top management which is necessary to build up a feeling of connection and reliability towards the organization. Executives should comprehend that their job isn't simply to sit in closed-lodges and impose decisions on others. They should discuss well with their subordinates so that firms' intellectual capital (human, structural, and relational) could flourish (Rosing et al., 2011). Workers should have a simple admittance to the senior administration. Communication from management to employees is essential for the employees to be aware of their goals and objectives and for them to know what is expected out of them (Hoch, 2013).

3.2 Structural Capital Factors

Strategic training: To keep the business running easily and ensuring its progress, strategic training and exercises are necessary for the labor force. At the staff level, the worker has higher spirit and participation, teams up more viably, and more ready with the aptitudes and skill to do assigned work (Emery et al., 2007).

Career development: Strategic leaders help employees to nurture their careers which decreases worker turnover by giving expansion in their expertise and improves workers' spirit and inspiration. It empowers organizations to determine opportunities, in this way decreasing the expense of administrative recruitment. Employees get aware of their growth plan in the organization (Stech, 2008).

Key responsibility areas: Strategic leadership allows the organization to recognize the key responsibility areas designed in line with workforce education, aptitudes, skill, experience, and region of interest (Boal & Schultz, 2007).

Evaluation: Strategic leadership supports evaluation and control in organizations which is a significant instrument for surveying how well your business has performed, comparative with its objectives (Jooste & Fourie, 2009). Evaluation and control is a way toward deciding the adequacy of a given technique in accomplishing the goals and making remedial moves wherever it is needed (Strand, 2014).

Knowledge osmosis: Strategic leadership accentuates organizational structure to disseminate knowledge across the boundaries of the organization, such as information (knowledge) transfer from employee to employee, unit to unit, and firm to firm. In this way, employees have easy access to all relevant information required to perform their duties (Shafique et al., 2019). Organizations establish various training programs (in-house or out-sourced training) to constantly upgrade the existing knowledge and skills of employees and acquaint them with new learnings.

Working conditions: Organizations have to develop good working conditions for their employees so that maximum output could be obtained. Employees frequently look for workplaces that oblige and incorporate a work-life balance (Gavetti, 2011). Nowadays, providing employees the adaptability to get to their regular day to day responsibility during work hours, benefits both business and worker. When organizations do so, employees realize that they are being trusted which fosters agreeableness and orientation towards job productivity.

Accountability: An appropriate accountability structure in organizations is a prerequisite to attain maximum output. At the point when employees are occupied with audits and accountability, that is the chance a leader can return to achievements contrasted with desires (Quong & Walker, 2010).

3.3 Relational Capital Factors

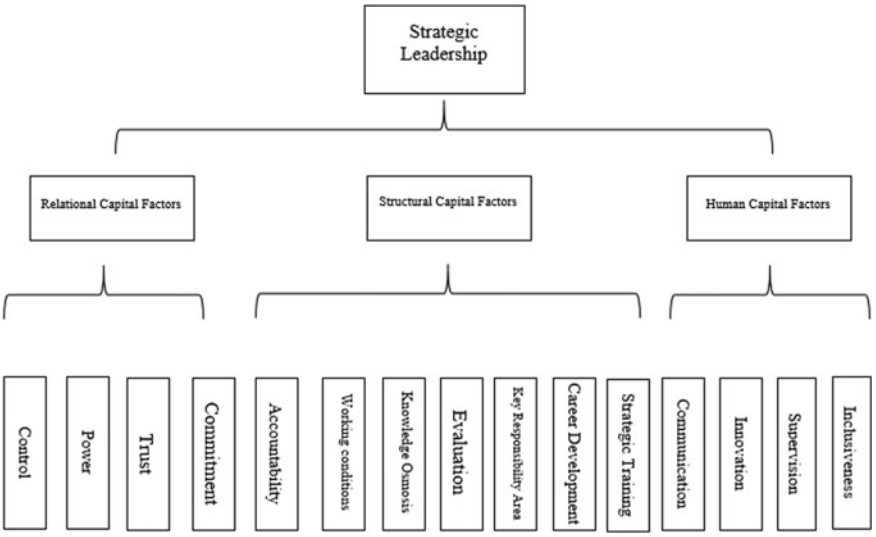
Commitment: Commitment is necessary to continue and maintain long-term relationships with the strategic partners and customers, for example backward and

forward integration (Vera & Crossan, 2004). Foregoing short term benefits can be a trade-off when organizations realize their long term benefits with partners and customers.

Trust: Organizations work towards building confidence and trust in the customer that they are accessible to help them with their requirements (needs or wants). They should feel they are in safe hands and their needs in the future will be satisfied (Hitt & Duane, 2002).

Power: The capacity to embrace any movement that other parties would not carry normally, proving that organization can handle and deliver any complexity during work (Dewhurst & Navarro, 2004).

Control: The hold of a firm over business activities that create value (either directly or indirectly). Somehow it could be the result of the power that the firm has in operations, resources, and market relative to its competitors (Drewniak et al., 2020).



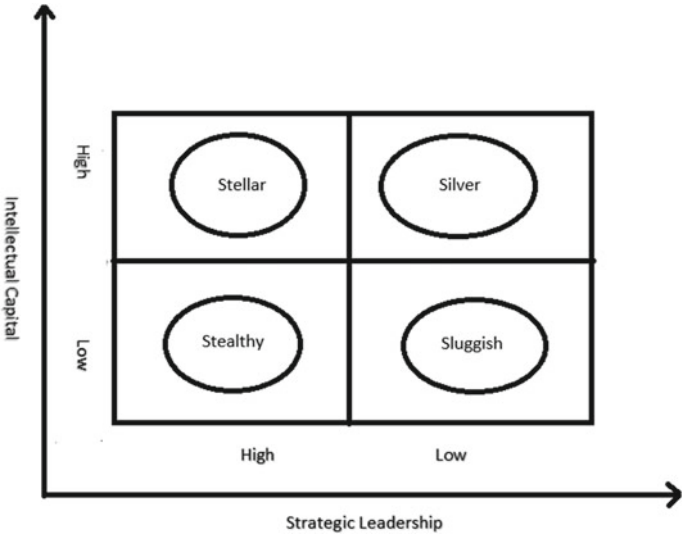
3.4 Strategic Leadership and Intellectual Capital Grid

Pulic (2004) advocated that organizations' intellectual capital and assets are meta-capacity of a firm. According to Hoch (2013), intellectual capital makes an incentive for firm's future endeavors and be capitalized through experience and learning and can be utilized to accomplish the essential purposes of a wide range of intangible resources and assets. Intellectual capital is needed to be generated, used, and renovated with effective leadership (Savolainen & Fresno, 2013). As designated by the conventional bookkeeping thoughts, intellectual capital and goodwill compare to

the idea of representing the distinction between the book value of the business with perceived market value (Petty & Guthrie, 2000). The strategic capacity to develop and exploit intellectual capital, organizations are classified into four categories, in this research, based on their strategic leadership and intellectual capital integration (Exhibit-2).

Stellar: The organizations that are able to utilize their strategic leadership abilities at the optimal level in order to maintain their intellectual capital to sense and manage market turbulence, to maintain long term competitive advantage and sustainability considered as stellar. Because such organizations could have more chances to maintain their status quo in the market for a long time.

Silver: The organizations that own a high level of intellectual capital (human, structural, and relational) but very low level of strategic leadership skills and abilities to align intellectual capacities with a strategy in order to achieve the competitive edge. Such organizations are proficient in reaping short term profitability but have low chances to handle market fluctuations and turbulences. Such organizations have chances to move in both directions, either coup strategic leadership to enhance the intellectual capital can achieve long term sustainability or can lose their current profitability by ignoring administrative and strategic policies and procedure and could move on the sluggish side.



Stealthy: Such organizations have high strategic leadership qualities but possess low intellectual capital, and could possibly standing with less current profitability (silent or stealthy). However, developing good strategic policies, decision making, and competitive strategies can upgrade their intellectual capital and move towards high market sustainability and long term benefits.

Sluggish: These organizations are characterized by low-levels of both strategic leadership and intellectual capital. They are at the ambiguous stage of the organization life cycle because of several possible reasons such as poor strategies, weak administrative skills, or unawareness about technological advancements.

4 Conclusion

Globalization and increased rivalry foster firms to use strategies along with substantial intellect in order to create value (Pulic, 2004). Intellectual capital provides resources and assets while strategic leadership provides orientation and ability to utilize these resources and assets to achieve strategic objectives of the organization. Organizations that acknowledge the outcomes of continuous learning have moved forward to embed intangible resources such as intellectual capital, to tap on physical resources for developing and sustaining competitive advantages (Rowe, 2001). Strategic decisions are viewed as an indispensable instrument, particularly in market uncertainty and environmental turbulence (Samimi et al., 2020; Worden, 2005). Undoubtedly, today's competitive advantages, material and monetary assets of business rely upon how strategic leaders direct their intellectual capital (Shin & Park, 2021). The future of a business move is to make benefits of intellectual capital in business practices, structures, and frameworks set up by the strategic leaders and customer network, which eventually are just conceivable with feasible strategic plans (Klein, Spieth, & Heidenreich). The future of large organizations especially depends upon the strategic decision of top management with respect to the administration of intellectual capital successfully.

This study focuses on the summative description of strategic leadership and its key role in developing and exploiting intellectual capital. Despite widespread literature on antecedents and consequences of both strategic leadership and intellectual capital on individual and firm-level outcomes, a detailed investigation is inevitable on how a strategic form of leadership can be useful in developing, sustaining, utilizing, and renovating intellectual capital capacities. Future research may explore how different dimensions of intellectual capital and strategic leadership get linked. More applications of study across the industries and can be carried that allows different to analyze different aspects to create new knowledge. Although strategical leadership has been a priority for organizations especially in decision-making, the demanding theory-based strategic leadership and intellectual capital management are comparatively new. Despite being new, strategic management can be a subject matter that has remarkable potential for academic, industrial and managerial researchers. The strategic management has created huge interest inside the subject matter. Organizations want to grasp the way to select, increase and preserve strategic leaders to achieve their human, structural and relational capital.

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Intellectual Capital and Supply Chain Mapping: A Proposed Framework

Mahmoood Ali, Muhammad Shujaat Mubarik, and Sajid Nazir

Abstract Owing to the staggering impacts of COVID 19 on supply chain performance, firms are increasingly looking toward supply chain mapping as the most suitable option to build a resilient and sustainable supply chain. Organizations' intellectual capital, in this regard, can play an instrumental role by making firms better prepared for risk and unforeseen events. Consequently, the learning organization could acquire the capability to observe the flow of products or services with real-time information gaining a competitive advantage over their competition and value creation. This chapter argues that by introducing IC in supply chain mapping, a firm can improve its supply chain performance. It can also uplift supply chain visibility, which further can identify the weak areas or individual's performance and allow firms to take action accordingly. We offer a testable framework by explaining how the various IC dimensions can contribute to the SC mapping of a firm, strengthening the firm's resilience. The chapter adopts a qualitative approach and builds the arguments based upon the available literature.

Keywords Intellectual capital · Supply chain mapping · Mapping · Supply chain risks

1 Introduction

The knowledge-based economy era has witnessed "*the predominance of intellectual capital as a key resource for obtaining sustained competitive advantage"* (Shou et al., 2018a, b, c). IC is observed as an essential tool in fostering knowledge-based collaborative strategies (Mubarik, 2015, 2016; O'Keeffe, 2001). Moreover, according to Celenza et al. (2015), organizations focus on the physical and financial assets of the company, while the efficiency of equity markets depends upon the efficiency of the

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intellectual capital employed (Celenza et al., 2015) and the capability of the organization to transfer and utilize knowledge (Curado & Bontis, 2006; Schoenherr & Swink, 2015; Shou et al., 2018a, b, c). At the firm level, intellectual capital—characterized as relational capital, human capital, and structural capital—can significantly improve various chords of organizational performance, including supply chain performance (Sendawula et al., 2018). It significantly determines an organization's capability to perform a task (Mubarik et al., 2016; Sultana et al., 2012). A number of studies (e.g. Bontis, 1996; Mubarik, 2015; Mubarik et al., 2019a, b, c) demonstrate IC as one of the major antecedents of firm performance. These studies consider IC as an indispensable component for attaining firm performance. However, the studies focusing upon the influence of IC on the supply chain are comparatively limited and narrow in scope. Especially, the impact of three dimensions of IC on the latest developments in the supply chain is yet to be known (Mubarik et al., 2021a). In such developments, supply chain mapping appears top of the list. Especially after the sheer supply chain disruption caused by COVID19, supply chain mapping is appearing as an essential supply chain strategy for attaining supply chain resilience. It is defined as "*the process of engaging across companies and suppliers to document the exact source of every material, every process and every shipment involved in bringing goods to market"* (Ivanov & Dolgui, 2020). As a matter of fact, the majority of the companies did not become aware of the supply chain entities in their value chain beyond their tier 1 supplier and customer. It created a state of sheer invisibility, leading to poor response to the market dynamics. According to Choi (2020), "*[if companies] have better visibility into the structure of their supply chains. Instead of scrambling at the last minute, they have a lot of information at their fingertips within minutes of potential disruption. They know exactly which suppliers, sites, parts, and products are at risk, which allows them to put themselves first in line to secure constrained inventory and capacity at alternate sites."*

Further, owing to the supply complexities, it has become even challenging to cope with the effects of disruptions resulting. Supply chain complexity is a network of suppliers, manufacturing processes at different stages in different facility locations, distributions of finished products around the globe, and balancing the interactions between them requires huge information to control its operations efficiently (Serdarasan, 2013). Therefore, organizations are losing visibility over their operations as supply chains continue to extend (Mubarik et al., 2021a; Wichmann et al., 2020). More specifically, its multifaceted supply chain network, such as tracking, visualizing, and managing, etc., is becoming more crucial (Canello & Pavone, 2016). While visualizing the process is not the only solution to enhance supply chain operations effectively, however, structuring the map among tiers of the supply chain in the way the knowledge is easily transferable and exchangeable as appropriate provide a strategy of effective integration and information sharing (Gardner & Cooper, 2003). A well-executed map can enhance the strategic planning process, ease the distribution of key information, facilitate supply chain redesign or modification, clarify channel dynamics, provide a common perspective, enhance communications, enable monitoring of supply chain strategy, and provide a basis for supply chain analysis (Gardner & Cooper, 2003). However, the mapping process requires a specific environment and

working skill. It demands the application of information sharing and collaboration as IC in a firm gives support for knowledge fascination and application (Shou et al., 2018a, b, c) closely linked with supply chain intelligence (Subramaniam & Youndt, 2005) because of its multidimensional nature. By incorporating IC with supply chain mapping and providing a framework within which to direct critical decision-making, effective business processes, i.e., knowledge development, material, and production planning, are crucial success factors.

Drawing upon dynamic capabilities theory, we argue that supply chain mapping can be considerably driven by effective intellectual capital management. This chapter is devoted to explain our proposed testable framework, explaining as to how IC can be linked with SC mapping, which further can uplift the supply chain performance. Linking IC and supply chain mapping is not only the a novelty of this work but also is well linked with the agenda of many organizations, which are looking for a solution to theyr SC disruptions. In short, this chapter aims to explore the adoption of IC and supply chain mapping and ways IC could contribute towards efficient mapping and enhanced supply chain operations.

This chapter is organized as follows: an overview of intellectual capital is presented in the next section, followed by a supply chain mapping review. A detailed review of the IC and supply chain mapping is presented in the following section, followed by a discussion on each element IC's role in effective supply chain mapping. Next, concluding thoughts are presented over IC's impact on improving supply chain visibility and process mapping.

2 Intellectual Capital

In the past, an organization's performance was evaluated based on their physical or tangible assets; however, now the intangible assets e.g. intellectual capital is the fundamental part of the company's evaluation process. Therefore, this change in the evaluation process leads to the reason behind the recognition of Intellectual Capital (Hejase, et al., 2018). The IC is considered as intangible assets that collect all information related to the company, employee's knowledge, and capabilities to create value for businesses such as information to drive profits, supplier development, customer development, product development, etc. Moreover, according to Huang & Liu (2005), IC is a critical force that contributes to economic growth, while according to Hejase et al. (2018), it contributes to the organizations' success as a powerful resource of any organization (Curado & Bontis, 2007; Cabrita & Bontis, 2008; O'Donnell et al., 2006; Seleim et al., 2004; Bontis, 2007; Nahapiet and Ghoshal, 2002; Alvarez & Busenitz, 2001) and also known as the most valuable assets of the organization (Curado & Bontis, 2007; Stewart, 1997).

The IC can be divided into three subcomponents, i.e., human capital, structural capital, and relational capital, which are broadly discussed in extant literature (Edvinsson & Sullivan, 1996; Hsu & Fang, 2009; Isaac et al., 2009; Martín-de-Castro et al., 2010; Mahmood et al., 2020; Shou et al., 2018, b, c). They represent

the organizations' capability to deploy knowledge (Shou et al., 2018a, b, c). There is an essential difference among these components, i.e., knowledge, accumulation, and distribution mechanisms (Shou et al., 2018a, b, c; Subramaniam & Youndt, 2005). Human capital relates to the knowledge, skills and capabilities possessed and utilized by the employees (Subramaniam & Youndt, 2005), whilst structural capital is a set of routines, procedures, and frameworks that generate and manage knowledge (Youndt et al., 2004). Lastly, relational capital is associated with interrelationships, trust, teamwork among the employees (Hejase et al., 2018; Khalique et al., 2011). The implementation of these components has a positive impact on the organization's performance (Kong and Ramírez, 2010). In this research, three essential components of the IC and their direct and indirect impact on supply chain mapping is discussed in the following sections.

3 Supply Chain Mapping

Gardner and Cooper (2003) define a supply chain map as "*a representation of the linkages and members of a supply chain along with information about the overall nature of the entire map.*" It allows a detailed graphical representation of the processes and flow of materials in a supply chain (Gardner & Cooper, 2003). The mapping process concentrates on a specific product's movement in a supply chain (Lambert, 2008) while understanding entities involved in the movement and their capabilities, and also, movement of material, information, and finance in either direction or within supply chain organizations (Schroeder, 2000). The maps facilitate effective decision-making by eliciting raw material, suppliers, various flows, and distribution channels until the receipt of customers' products.

A supply chain map plays a vital role in forming a business or supply chain strategy. By giving visibility to the supply chain's units and activities through highlighting the interconnectivity and flow, an informed strategy is formulated (Craighead et al., 2007). The effective adoption of supply chain mapping processes often leads to new untapped ways of collaboration between a firm's projects and transactions that may enhance supply chain efficiency (Miyake et al., 2010). It also enables managers to get a clear and in-depth understanding of supply chain members' capabilities, which are often hidden or overlooked. Thus, it helps understand the supply chain's complete dynamics, including enabling supply managers to design, align, and integrate the supply chain as required in real-time (Miyake et al., 2010).

Further benefit mapping offers include, as proposed by Gardner and Cooper (2003), (i) improved the strategic planning process, (ii) information sharing (iii) enabling supply chain redesign, (iv) improved process flows, (v) providing a common perspective, (vi) communications, (vii) continual review of supply chain strategy, and (viii) providing data for supply chain analysis.

4 Intellectual Capital and SC Mapping

The primary purpose of the mapping is to gain a comprehensive understanding of the supply chain. The supply chain mapping initiatives enhance intra- and inter-firm communication and enable information gathering and distribution among the supply chain members to support the supply chain's visibility and resilience. The traditional process mapping is typically internally focused, while supply chain mapping has a complete external orientation and strategic focus (Gardener & Coopers, 2003). It is achieved by collaboration, information, and knowledge sharing among supply chain partners. There could be two aspects of organizational knowledge; the sum of all knowledge and utilizing knowledge for competitive advantage (Youndt et al., 2004). The former indicates ensuring availability and later deals with applying knowledge in an organization for strategic purposes such as supply chain mapping. The knowledge creation and sharing significantly contribute to gaining a competitive advantage for an organization and its supply chain. The knowledge resources enable managers to better plan and coordinate their supply chain and prepare for unforeseen circumstances. One such source of knowledge is the intellectual capital (IC) of the organization, which promotes communication and learning within supply chain partners (Fig. 1) (Shou et al., 2018a, b, c) and contributes towards economic growth (Huang and Liu, 2005).

Literature review suggests a consensus among researchers that internal knowledge resources are essential towards gaining a competitive advantage for an organization (Inkinen, 2015; Su et al., 2013). The internal knowledge resources have continued to an important role in making the organization successful. However, over time with increased competition and reduced profits have forced organizations to seek alternate ways to grow and prosper. The organizations are becoming externally oriented by focusing on capturing the knowledge and incorporating it internally and externally through collaboration with their supply chain partners. The firms with access to the knowledge and ability to continually update through their intellectual capital (human resources, processes, infrastructure, and relationships) are in better opposition to

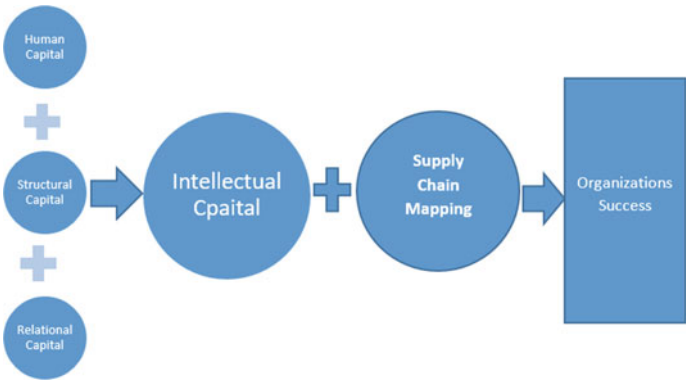

Fig. 1 Intellectual capital and supply chain mapping framework

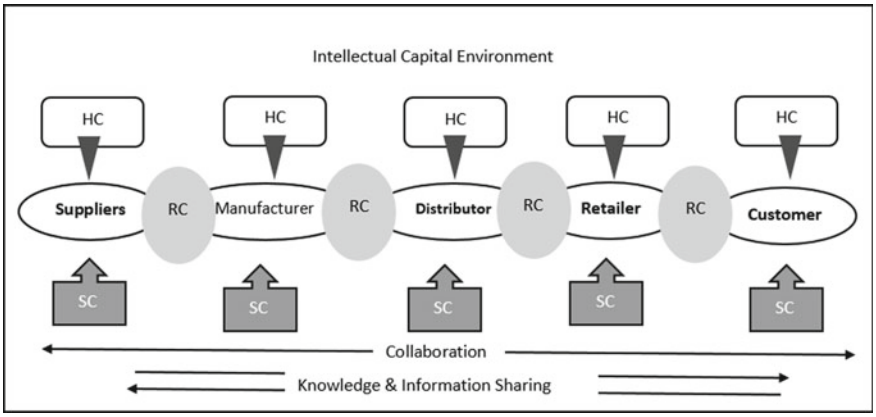

Fig. 2 Implementing intellectual capital in a supply chain

implement collaborative activities with their upstream and downstream partners. The ability of the firm to incorporate intellectual capital into their daily operations and supply chain plays a significant role in the development of innovation capability (Lee et al., 2005; Menor et al., 2007; Subramaniam & Youndt, 2005), and promotes innovation performance (Shou et al., 2018a, b, c; Hsu & Wang, 2012) (Fig. 2).

Zhang and Lv (2015) studied the effects of IC on supply chain processes and find that knowledge acquired through working with suppliers and customers has a positive impact on the increased collaboration and technological innovation. The prior studies agree that IC helps us enhance supply chain relationships, forming a core of efficient mapping (Youndt et al., 2004; Hult et al., 2006). In addition, an organization's IC integrates and reinforces supply chain partnership through an improved understanding of each member's role and potential. This enables fostering an environment of collaboration and commitment between members, effectively contributing towards an integrated and visible supply chain (Su et al., 2013).

Overall, the intellectual capital of a firm is a useful tool when it is derived from an internal knowledge base; however, it also encourages decision-makers to seeks knowledge from diverse external sources through promoting collaboration and information sharing with supply chain partners. This, in turn, benefits the overall supply chain mapping since the lack of IC could lead to collaborative relationship failure between supply chain members (Fawcett et al., 2012; Shou et al., 2018a, b, c).

4.1 Role of Human Capital

Human capital is identified as the core of intellectual capital (Bontis et al., 2005), contributing to organizational learning, knowledge creation, teamwork, problem-solving, skills, and decision-making abilities (Hsu & Wang, 2012). It is knowledge,

skills, and abilities residing with and utilized by individuals (Subramaniam & Youndt, 2005; Youndt & Snell, 2004). Human capital through interrelationships facilitates the exchange of knowledge between the employees across the organization effectively. The researchers have identified organizational structures, cultures, teaming structures, employee empowerment, senior-level managerial commitment (Fawcett et al., 2012; Shou et al., 2018a, b, c), human resource management practices (Huo et al., 2015), and human capital (Bontis et al., 2005; Huo et al., 2016) as a critical component of efficient human capital which promote collaboration inside the organization as well with external members of the supply chain.

The organization's human capital reflects talented and knowledgeable employees with diverse expertise in their roles and tasks (Roos et al., 1997; Lacroix and Zambon, 2002; Shou et al., 2018a, b, c). These employees are proficient in knowledge identification and absorption while communicating internally or with external members (Martín-de-Castro et al., 2011; Subramaniam & Youndt, 2005). High-quality employees display a unique set of characteristics involving tacit or explicit knowledge, leadership skills, professionalism (Subramaniam & Youndt., 2005), values, commitment, motivation, and employee loyalty (Fig. 3) (Bontis et al., 2005). According to Subramaniam and Youndt (2005), employees with such characteristics are more inclined to learn while acquiring and exchanging information from diverse sources, including external entities. The knowledge acquisition and sharing from the external environment lead to enhanced communication with supply chain partners impacting the mapping process. Besides communication, the knowledgeable employees also influence integration, forecasting, decision making, coordination, and risk planning, which are critical elements efficient supply chain. The qualified human capital enables encompassing the whole supply chain mapping by assisting and getting suppliers involved on the upstream side of a supply chain with their

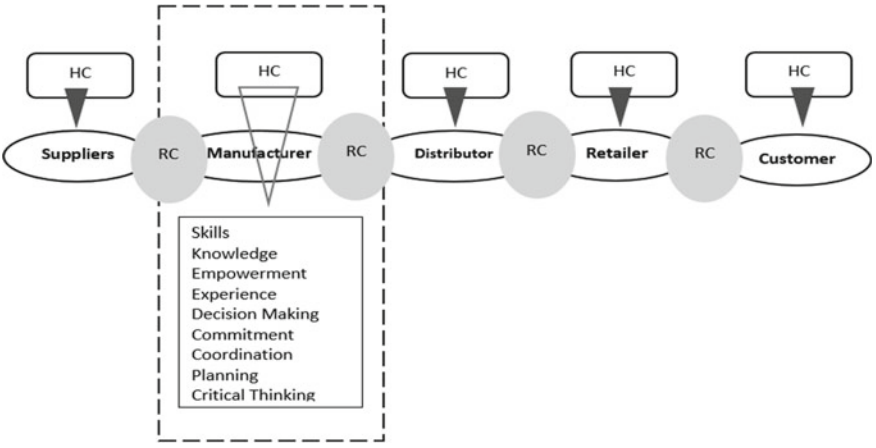

Fig. 3 Contribution of human capital in a supply chain

operations management and downstream side capturing distribution and customer service (Gowen & Tallen, 2003).

4.2 Role of Structural Capital

Structural capital represents a comprehensive set of functions and activities in an organization. The knowledge creation and management, data warehouse, procedures, manuals, organizational structure, intellectual property, and routines (Martín-de-Castro et al., 2011; Youndt et al., 2004) and also facilitating the storage and application of structural knowledge in diverse business environments (Menor et al., 2007; Wu et al., 2008) comes under the domain of structured capital (Fig. 4). According to Bontis et al. (2005), it emanates from the organizational values and strategies influenced by the current internal and external environment while focusing on renewal and future value development. It ensures the acquiring, storing, and access to the knowledge in an organized and structured way while offering the mechanism for knowledge acquisition and integration with the current process and members of the supply chain (Kang & Snell, 2009). Further, the knowledge gained from external partners to map activities can be systematically filtered and useful information stored in supportive infrastructures in a SC (Bontis, 1996) (Fig. 5).

A well-structured and reliable system facilitates the flow of information and communication in real-time, enabling effective mapping. As one kind of structural capital, information technology supports this flow by providing a framework for information and knowledge exchange (Devaraj et al., 2007), setting up a groundwork of mechanism for real-time connectivity of product flow and with suppliers

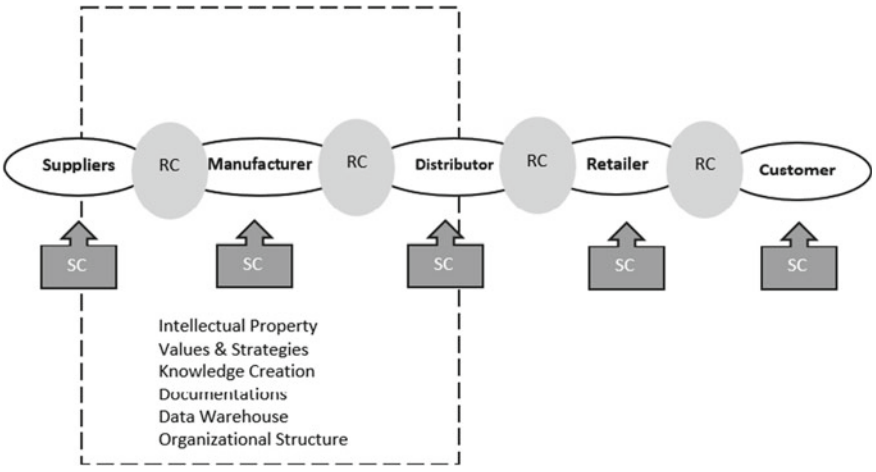

Fig. 4 Contribution of structural capital in a supply chain

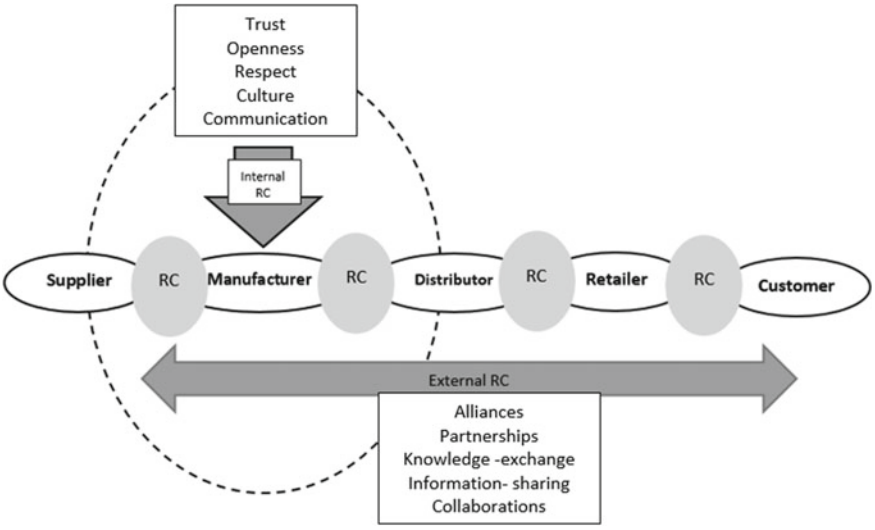

Fig. 5 Contribution of relational capital in a supply chain

and customers. This leads to a reliable mapping process supported by communication and knowledge sharing (Wang et al., 2015) and increased collaboration to overcome challenges (Paulraj et al., 2008).

According to Mart´ın-de-Castroetal (2011), structural capital provides a structured framework for interlinking organizational procedures and related activities in the supply chain. Organizations with standardized rules, policies, and routines can identify and absorb and integrate new knowledge (Kang and Snell, 2009). The organization that has developed its structured capital overtime is also better positioned to work with its supply chain partners to improve its capabilities and processes. This strategy establishes mutual understanding and shared values between the supply chain partner. An environment of trust and sharing is established, which is beneficial to everyone. Therefore, IC plays a critical role in knowledge management in the supply chain and facilitate communication between different entities.

4.3 Role of Relational Capital

The relational capital relates to the "knowledge embedded within, available through, and utilized by the interactions between individuals and their networks of interrelationships" (Subramaniam & Youndt, 2005), including relationships with external entities including suppliers, consumers, society, and other stakeholders (Roos et al., 1997). The high levels of relational capital are related to trust, teamwork, empathy and respect between employees (Nahapiet & Ghoshal, 1998). Lacroix and Zambon

(2002), focusing on external relationships, added formal alliances, licensing, and partner agreements under relational capital.

The relational capital emphasizes the knowledge present or gained through the relationship or interactions between employees or adopted processes. According to Cuevas Rodrıguez et al. (2014), internal relational capital is directly related to knowledge exchange and communication with external partners. The knowledge gained can be disseminated efficiently internally and within the supply chain members, ensuring that the organization communicates with all of its supply chain partners, thus forming a relational network of connected processes. The inter-connectivity of the processes and flow of information between the members enables agility in the supply chain. Moreover, it provides a continual source of learning throughout the supply chain when assets, ideas, and knowledge are shared as supply chain members continually in real time, contributing to an interconnected supply chain (Paulraj et al., 2008). On the contrary, the supply chain members with weak relational capital impact collaboration and knowledge sharing mediate the performance effect of an organization's competencies and business processes (Wang et al., 2015). In the context of SCM mapping, the inadequate relational network could impact diffusion and sharing of external information and knowledge into the supply chain efficiently (Zsidisin et al., 2015).

In an organization, a closed social network among the employees promotes a culture of knowledge exchange and communication, which establish a unique relational medium through which employees access and share the knowledge and information, and frequently share it with external partners. The knowledge sharing with supply chain partners reciprocate with gaining external partner confidence and valuable information that is often restricted to outsiders. This information could be useful in product design and development, improving operations, and risk planning leading to operational efficiency, productivity, flexibility, and visibility (Paulraj et al., 2008). Hence, forming an integrated supply chain and more effective mapping of its processes.

The supply chain visibility, which is the essence of the mapping process, is attained through a high level of relational capital, which allows the organization to share and monitor the process and movement of goods across the supply chain, thereby reducing errors and inefficiencies in the supply chain which is a reason for implementing process mapping (Ahmed et al., 2019; Khan et al., 2021; Mubarik et al., 2021a; Yan & Dooley, 2013). A Good relational capital derives from internal and external members in the supply chain to share new technological knowledge, best practices, market conditions (Hsu & Fang, 2009; Martín-de-Castro et al., 2011), and innovative ideas (Koufteros, et al., 2005). The relational capital helps to acquire the knowledge and translate this tacit knowledge into explicit forms (Robert et al., 2008). It facilitates operational alignment, visibility, and efficient mapping of the processes to overcome unforeseen challenges (Wagner et al., 2014).

The RC plays an essential role in making a strategic decision by providing critical knowledge and information about new technological developments and market opportunities to guide firms in making strategic decisions. Supply chain mapping benefits from the robust relational capital in several ways. Firstly, RC facilitates

access to novel external knowledge and integrates complementary internal/external knowledge to enhance competitive advantages (Adams et al., 2014). Secondly, a long-term partnership is built on information sharing, and mutual understanding for enhanced visibility, a primary tenant of the mapping process (Barratt, 2004). Thirdly, it reduces uncertainties and minimizes risks between supply chain partners due to collaboration and communication, when ineffective communication may cause misunderstanding and conflicts, and even lead to collaboration failure (Cao et al., 2010).

5 Conclusion

The extended supply chains accompanied with increased risks are the cause of concern for every supply chain manager. The diverse nature of these risks, probability of occurrence, and level of impact demand efficient risk planning. The organization implements various strategies to overcome unforeseen risks and challenges. Still, the challenge remains to make the supply chain more resilient and more visible and integrated. Supply chains are often the victims of poor planning and lack of coordination, which impacts the smooth flow of products in supply chain and frequently, loss, damages, and theft, thus affecting the organizations' baseline profits. The mapping process is one the tool that has become useful for the organization seeking to improve risk management and visibility in their supply chain. The mapping process enables the understanding of entities involved in the flow and their capabilities including how material, information and money flow in either direction in supply chain and within supply chain organizations (Schroeder, 2000). By mapping the current state, constructing a future state is possible in case of disruption, identifying supply chain resilience to disturbances. Despite the benefits of mapping, organizations struggle to incorporate process mapping in their supply chain. The efficient supply chain mapping requires collaboration, knowledge creation and sharing, efficient human resources, best-in-class organizational procedures, processes, and information flow between the supply chain partners.

The implementation of intellectual capital facilitates an organization with a set of intangible resources, i.e., technical and organizational knowledge, organizational structures, processes, procedures, and cultures (Nahapiet & Ghoshal, 1998; Subramaniam & Youndt, 2005). The three elements on IC, human capital, structural capital, and relational capital, facilitate the mapping in each unique way. Human capital ensures that an organization's employees are knowledgeable, informed, empowered, and brings in a unique characteristic that makes the organization innovative and efficient. These employees are able and willing to share knowledge within their organization and with external partners. Through reliable structural capital, an organization's supply chain is better prepared to create and manage data with standardized procedures and manual in place through an efficient organizational structure. The structural capital sets the foundation for a learning environment inside an organization in which new knowledge is created and shared internally and externally. The relational capital

enables knowledge sharing through interaction between individuals and their inter-relationships network with external parties such as customers, suppliers, and other entities.

By incorporating intellectual capital into their daily operations, supply chain managers are able to propagate an environment of collaboration, innovation, and information sharing. Each element of IC offers a unique advantage from which the supply chain could benefit. It is critical to understand that the three IC elements complement each other and less efficient when implemented in isolation. The supply chain managers should ensure that each IC element is implemented in its complete scope since it would contribute towards an efficient mapping process. In addition, decision-makers should work on increasing collaboration and visibility in their supply chain and invest in the development of IC for improved performance. This chapter establishes that by incorporating IC in an organization's supply chain, the acquired organizational knowledge source facilitates efficient supply chain mapping.

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