Governance and Assessment Insights in Information Technology: the Val IT Model

Rosa Lombardi[1] · **Manlio Del Giudice**[1] ·
Andrea Caputo[2] · **Federica Evangelista**[3] ·
Giuseppe Russo[3]

Abstract The purpose of this paper is the investigation of the relationship between information technology and value creation. In doing so, the paper presents a conceptual framework based on the Val IT model. This framework can assist companies in the selection, implementation and optimisation of IT investments to create long-term value. The paper is based on a qualitative approach with the inclusion of a single-method approach. Research is developed according to the study of national and international literature. Following an initial analysis of existing literature on the evaluation of company investments, research has been conducted through the Val IT method to assess these intangible assets. The sources of research are secondary in nature (documents, reports, newspaper articles, papers and scientific books). This methodology emphasises the connection between the modern services created in the knowledge economy and the application of new technologies, especially in the field of Information Technology. Val IT is a governance framework for creating business value from IT investments. It allows companies to increase the possibility of selecting investments

✉ Rosa Lombardi
 r.lombardi@unilink.it

 Manlio Del Giudice
 m.delgiudice@unilink.it

 Andrea Caputo
 dr.andreacaputo@gmail.com

 Federica Evangelista
 f.evangelista@unicas.it

 Giuseppe Russo
 giuseppe.russo@unicas.it

[1] Link Campus University, Rome, Italy

[2] University of Lincoln, Lincoln, Lincolnshire, UK

[3] University of Cassino and Southern Lazio, Cassino, Italy

with a high potential of value creation, as well as with a greater possibility of success in executing, creating, strengthening and using these services.

Introduction

Modern business environments are characterised by high volatility and uncertainty. This is mainly due to competitive circumstances, knowledge management and technological developments. In this context, creating a competitive advantage for sustainable value creation has become increasingly complex. In the knowledge economy (Sveiby 1997), technology has a pivotal role in enhancing the value of organisations (Soto-Acosta et al. 2015) and, among the others, stimulates the following question: *how do contemporary companies create value through investments in Information Technology (IT)?*

The use of IT technologies (Aral and Weill 2007; McAfee and Brynjolfsson 2008) in company information processes is a relevant tool for business development and cost optimisation. However, this is not enough: Adequate organisational structures with clear roles and responsibilities are required. It is therefore important to adopt frameworks and models to suit company needs and the optimisation process by investing in expertise, professionalism and training.

The purpose and aim of this paper is to answer to this question, by investigating the relationship between information technology and value creation (Işık 2013) and presenting a conceptual framework. To do so, we propose the study of the Val IT model to understand the real value which companies create via IT investments to achieve their goals (ITGI 2008a, b). This framework, developed by IT Governance Institute (ITGI), is an applicable business process model that could help enterprises support business/IT alignment and increase the realisation of business value from IT business investments. Indeed, companies invest a large amount of capital in IT structure and services, sometimes without the certainty that these investments will have success or create value for the company as a whole.

Over the years, several models of IT investment governance have been developed; however, they have not been able to ensure or, at least, increase the IT investment possibility of success or their capability to create value for the company. In order to sustain the achieving of IT benefits, we present a conceptualisation to introduce the Val IT framework as the IT investment governance model. Our speculation on the Val IT is useful for both decision makers (Lombardi et al. 2014), to whom we provide suitable instruments for the governance of IT investments, recognised as structural capital, and stakeholders, to whom we present information about the company's capability of creating value through the management of IT investment.

Through a qualitative research approach, we have analysed extensive literature on this subject and have identified the Val IT framework as the applicable structure for managing investments in IT and IT-enabled services. We used a single-method approach to describe how management can align business with IT to support long-term value creation (Venkatraman and Henderson 1993). The data collection, coming from

sites, databases, articles and documents, enabled us to describe the main framework and set of processes as key management practices to support the decisions of executive management and boards of company directors.

This paper is structured in several sections. Following this introduction, the "IT as the Company's Structural Capital" section provides a literature review. The "Methodology" section describes the research approach adopted. The section four "Literature Review" introduces the management of IT Systems, defines IT governance and the Models that companies could adopt, paying particular attention to the Val IT Model. The "Findings and Discussion" section illustrates the findings of the research. Finally, the "Conclusions" section presents the concluding remarks and limitations of the study.

IT as the Company's Structural Capital

Information (Ho-Chang et al. 2014; Tallon et al. 2013) and the control of information-derived flows are strategic for all companies. Information services are quickly becoming an economic activity, as many industries and institutions are involved in the collection, production, transmission and distribution of information.

IT is considered part of the structural capital (Stewart 1997), as it is classified as an intangible and strategic resource for company management and for the achievement of differential results compared with those achieved by competitors. These resources have been included in many studies over the last few decades. According to Stewart (1997), intangible resources such as intellectual capital can be divided into three dimensions: human capital, relational capital and structural capital.

The human capital represents the whole of individual knowledge, skills, expertise and experience acquired by individuals staff that allow the effective and efficient performance of the business activities (Ployhart and Moliterno 2011; Ranft and Lord 2000).

The relational capital (Adler and Kwon 2002; Arregle et al. 2007) express the value of a company's relationship with the ecosystem of its contacts, enabling it to achieve a certain image, reputation and trust of key business stakeholders (Cragg 2002) .

Finally, the structural capital represents coded and non-coded company knowledge (Del Giudice et al. 2013), specifically technology, inventions, publications, formal and informal organisational procedures, best practices, patents, databases, intranet networks and company values (Trequattrini et al. 2012a). Intellectual assets included industrial projects and intellectual property rights (such as patents, copyrights, brands and trade secrets), methodologies, programmes, inventions, processes, databases and IT systems, for which the company can claim property rights (Sullivan 2000). As a result, we may include the methods and technologies which support systems of information transmission, reception and processing among the assets of structural capital.

IT allows for near-immediate access to and adoption of important internal and external knowledge for the organisation (Huysmanm and Wulf 2004). However, for more than 50 years, IT has focussed on the technological processes of collecting, storing and presenting data. In essence, most attention was focussed on the "T" of the acronym "IT." If we ask ourselves the meaning and objective of information, we recognise the need to move our attention from technology alone to a more holistic information technology. This adjusted perspective allows us to identify the value which can be generated within an organisation by information management and by creating investments in IT and IT-enabled services.

Methodology

The adopted research approach reflects a qualitative perspective (Maylor and Blackmon 2005; Myers 2013), focusing on literature analysis of the relationship between IT and the creation of long-term value.

This research examines IT governance by exploring the management of a variety of information systems. These systems are designed to assist managers and administrators in the selection, acquisition, development, implementation and realisation of generated benefits. As a result, our research pays particular attention to the following aspects:

- The importance of IT and IT investments in the knowledge-based economy
- The elusive character of the value resulting from these investments
- The management procedures for business information systems

Data acquisition was conducted through a single-method approach (Yin 1994) via secondary research sources. These sources included

- Ten sites, including resources from the Information Systems Audit and Control Association (ISACA)
- Two databases, particularly EBSCO and Google Scholar (providing 16 articles and 15 articles, respectively)
- Existing literature on systems of management information systems
- Documents published by ISACA
- News articles to interpret the framework's implementation rules and the results obtained from the companies that have adopted it.

In the next section, the findings of the study are presented and discussed.

Literature Review

The Management of IT Systems

Information technology has become pervasive in current dynamic business environment. Most managers generally recognise the advantages and the increasingly strategic necessity of applying IT in supporting of organisational activities (Peterson 2003).

Nevertheless, despite that this asset is used in many organisations (Maggioni and Del Giudice 2011), the extent to which it is applied creatively and to critical tasks varies considerably. Many organisations have not indeed used IT to enhance organisational performance, or if they use IT in the hope of reaching significant goals in effectiveness and efficiency, sometimes the results are different from those expected. Therefore, the research attention started to focus on the nature of IT capabilities and organisation designs that will allow firms to take advantage of the business potential of IT (Weill et al. 2002).

The rise of an influential IT function brought also the organisations to attempt to integrate companies' core business functions with information technology. The need of some IT management approach (Daim 2014) has grown. There are three distinct

spheres of IT activities that underlie IT-based services: IT infrastructure management, IT use management and IT project management.

The IT infrastructure management (Sirkemaa 2002) is defined by the decision that determine the nature of hardware and software platforms, enhancement of these platforms, the nature of network and corporate standards for implementation of IT assets. The IT use management consists of decisions that aim to planning, budgeting and the day-to-day delivery of IT operation and service (Lynne 2004). Finally, the IT project management (De Bakker et al. 2010) combines the knowledge of IT infrastructure capabilities and capacities with knowledge linked for conceptualisation, acquisition and advancement of information system applications. These three IT activities are directed, monitored and coordinated through the management of IT systems.

The organisation initially managed the IT systems as a managerial activity. The IT management is the process which includes many of the basic functions of management, such as staffing, organising, budgeting and control, but it also has functions that are unique to IT, such as software development, change management, network planning and tech support. All of the resources related to information technology (networking hardware, computers and people, as well as intangible resources like software and data) are managed according to an organisation's priorities and needs.

However, the importance and the complexity level assumed, in the last decade, from IT for the business and the implementation of corporate strategies have meant that this asset was handled not through a management activity but through a governance activity (Burn and Szeto 2000; Trequattrini et al. 2012b; Weill 2004). In this way, enterprises could take full advantage of IT activities.

In fact, IT governance enables the organisation to manage IT systems and create investments by the companies in order to achieve several main objectives: reducing implementation costs of the IT system, guaranteeing adequate services for company business and aligning IT with specific company characteristics (Maryska and Novotny 2013; Van Grembergen 2004).

The difference between IT management (Bosworth and Webster 2006) and IT governance is substantial—the first focuses on the present effective and efficient supply of IT services and products, and the management of IT operations, and the second one relates to the definition of processes and activities related to information technology, the distribution of powers and responsibilities and the definition of performance measurement systems in the future perspective of the more active participation of IT to the process of value creation (Van Grembergen et al. 2003). Ensuring the correct balance of the above objectives is a hard task for company decision makers. This is the main challenge encountered by IT governance.

Through the governance of IT systems, business organisations are able to use information technology (IT) effectively to achieve business objectives (Trequattrini et al. 2012c). This concept is called "business–IT alignment" (Van Grembergen and De Haes 2009) and typically refers to the improvement of outcomes, in order to produce long-term business value (Woodruff 1997; Palacios-Marqués et al. 2015; Palese and Crane 2002), or means linked to the harmony between IT and business decision makers within the organisations.

Defining IT Governance

In the knowledge economy, technology plays an important role in improving an organisation's general chain of value (Stoel and Muhanna 2009; Subramani 2004).

However, the real increase in value demands that business and technology management collaborate as a creative and synergic team.

Until several years ago, IT operated in important managerial activities (Frenzel and Frenzel 2003; Schwalbe 2010) and was implemented to create company strategies. Nowadays, it is handled as a governance-related activity (Schwartz and Hirschheim 2003).

IT governance, or the management of information systems, is a component of corporate governance dealing with the management of corporate information systems (Selig 2008; Weill and Ross 2004). Its attention is focused on the management of IT risks and the alignment of IT systems to support business objectives, to guarantee value generation from IT investments and to allow for the management and mitigation of associated risks. The current perspective of IT as a governance-related activity is articulated by Van Grembergen and De Haes (2009), who defined IT as "an integral part of corporate governance [which] addresses the definition and implementation of processes, structures and relational mechanisms in the organisation that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT enabled investments" (Van Grembergen and De Haes 2009, p. 3). Additionally, the Information Systems Audit and Control Association (ISACA 2009) defines IT governance as the leadership, organisation, structures and process which ensure the sustainment of enterprise IT and the extension of company strategies and objectives.

Organisations strive to implement an IT governance model with several levels of impact, taking advantage of the potential synergies between companies and the company system they belong to (Schwartz 2002). Within complex systems and company networks, IT governance seeks to define new IT governance models that are capable of harmonising network IT with each member of the network itself. IT governance also focuses on identifying the skills and contributions provided by IT in the creation of value, both for the company/network system and for each operative unit (Weill and Ross 2004; Brown and Grant 2005; Trequattrini et al. 2012c). It is within these complex systems that problems can arise regarding the coordination of IT with those of its constituent individuals and the application of adequate assessment instruments to highlight its value creation contributions. IT governance is based on five main areas (Van Grembergen et al. 2003). The following table summarises the areas and their main aim (Table 1).

Creating an effective IT governance model for company systems is a complex topic. It is important to define the correct cost–benefit balance for costs incurred in the creation of IT systems and the benefits, which derive from it. Many companies rely on an IT management model in which IT decisions are not structured. As a result, its management is divorced from corporate strategies. Two primary models of IT governance are useful to highlight (Sambamurthy and Zmud 1999). The first is a centralised model: IT governance is centrally created by the government boards. The second is a decentralised or federalised model: IT governance is distributed at the central level and the peripheral level of a company. In the latter model, the stakeholders of each business unit also take part in the governance of IT systems.

According to research indications highlighted by IT and market research company Forrester Research (2008), the centralised model is more prevalent in contemporary companies. This prevalence is attributed to the merger and acquisition operations,

Table 1   The IT governance areas

IT governance areas	Purpose
1. Strategic alignment	The achieving of enterprise strategies through executing activities via structure governance
2. Value delivery	The value creation, the maintenance of existing IT investment value and the elimination of IT investments that are not creating value
3. Management	The controlling of IT risks
4. Resource management	The ensuring of appropriate resources to execute the strategic plan
5. Performance management	The ensuring of the attainment of enterprise's IT-related services

Source: our elaboration

which are generally involved in large companies. A centralised IT management model is preferred for the typical cost-driven orientation of IT management (Daniels 1993; Henry 1997). To that effect, IT is regarded as an undifferentiated function whose cost is reduced as much as possible according to the information service. However, cost control cannot guarantee an alignment between business and IT. Consequently, it also cannot support long-term value creation (Venkatraman and Henderson 1993).

Studies conducted by Forrester Research demonstrate that 70 % of all IT decision making power is attributed to the managers of company information systems, while the remaining 30 % of decisions are made by business managers. This is probably a consequence of the greater modern complexity of IT due to its rapid increase in the knowledge economy (Lundvall 2004). Since the main objectives of IT system governance are to guarantee value generation from IT investments (Weill 2004) and allow for easier management and mitigation of associated risks, the achievement of these objectives is accomplished via the creation of the company's organisational structure (Cohen and Prusak 2001; Brown and Dacin 1997). This requires clear roles and responsibilities of IT systems: Requirements include safety procedures, effective company processes, risk analysis and applications.

The IT Governance Models

As previously argued, the governance of IT services is a complex topic. The decision making function could use this tool to manage IT systems and investments in order to reduce implementation costs of the IT system, guarantee adequate services for company business and align IT with specific company characteristics (Van Grembergen 2004). Over the time, several conceptual frameworks have been developed. Some of these are included in this non-exhaustive list:

- The IT Infrastructure Library (ITIL)
- ISO 20000
- The Capability Maturity Model Integration (CMMI)
- The Project Management Body of Knowledge (PMBOK)
- The Val IT
- The Control Objectives for IT (COBIT)

The (ITIL) is a set of guidelines developed by the UK Office of Government Commerce in partnership with the IT Service Management Forum and inspired by the practice in the management of IT services. It consists of a series of publications that follow an approach based on the life cycle of the service and provides indications on the provision of quality IT services and processes and means necessary to support them. One of the main benefits declared by management that supports ITIL within the IT community is the provision of a common vocabulary, consisting of a glossary of concepts strictly defined and widely agreed upon.

Instead, ISO 20000 is an international standard developed by the International Organization for Standardization (ISO); it is a set of standards dedicated to the evaluation of the organisations that provide IT services. These standards recognise the importance of IT services; they identify the specificity and the need to establish an appropriate response to problems that involve information technology in the setup and operation of a service management system. By providing a common international base for IT service management, these rules are applicable to organisations of all sizes by the provider of IT services to demonstrate effective control and continuous improvement of the whole complex performance.

Capability Maturity Model Integration (CMMI) is a process improvement approach whose goal is to help an organisation to improve its performance. The model helps to integrate organisational functions that were traditionally separate, define objectives and priorities for process improvement, provide guidance for quality processes and provide a point of reference for the evaluation of current processes. Therefore, it can be used to guide process improvement within a project, division or organisation as a whole.

The Project Management Body of Knowledge (PMBOK) is a guide, published by the Project Management Institute (PMI), which aims to document and standardise generally accepted project management practices applicable to different types of projects: construction, software development processes and automated industrial processes. The guide defines for that purpose five macro-processes (Initiating, Planning, Executing, Controlling, Closing) and nine knowledge areas (Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resource Management, Project Communications Management, Project Risk Management, Project Procurement Management, Project Integration Management).

The COBIT is a framework, also developed by the IT Governance Institute (ITGI), for the management and availability of IT services and provides best practices to contribute, by appropriate means, to the process of value creation in the company. The framework aims to assess whether it is in place effective governance of the IT function or to provide a guide to establish it by giving managers, auditors and users of IT systems a reference grid composed of (a) a process structure of the IT function, with respect to which it has developed the consensus of experts in the field, and (b) a series of theoretical and practical tools related to the processes.

The "Val IT" 2.0 is a governance framework based on COBIT and developed by the ITGI. It adds the best practices to measure, monitor and maximise the return on IT investment. Val IT is a COBIT complement from the point of view of the business, in a financial perspective, and is help for those interested in analyzing the "value delivery" which comes from IT.

Among these frameworks, we analysed the Val IT model as a governance framework of IT systems. All the above mentioned models refer mainly to the management activity of IT services and projects, or service and projects in general.

We chose the Val IT model because this governance framework combines all the main aspect of the quoted models (Fig. 1).

IT Governance Framework: the Val IT

In essence, the Val IT framework is a governance model created by the ITGI to assist companies in optimising value creation from IT investments. This model includes a range of principles, processes and best practices in a set of key management strategies to support executive management and the company's board of directors. The consolidated processes and practices described in the Val IT, which have been implemented successfully for years by leading organisations, represent a single picture of integrated governance that provides activities and IT decisions via a global, concrete, measurable, ongoing and coherent approach with the creation of value.

The Val IT framework is connected with the COBIT model (De Haes et al. 2013; Kerr and Murthy 2013). While the COBIT defines best practices as a means of value creation, the Val IT defines the best practices for objectives, providing companies with the necessary structure to measure, monitor and optimise the creation of company value from IT investments. As a result, the Val IT both integrates with and completes the COBIT. For companies and IT managers, the two models outline a global picture of value creation from the supply of high-quality, IT-based services, while for stakeholders, the framework adoption means the company's possibility and capability of create long-term value.

The Val IT relies on a company governance perspective, helping executives to focus on two of the four vital questions related to IT governance. These questions are as

Fig. 1 The Val IT Framework: the emerging characteristics

follows: (a) the strategic question "*Are we doing the right things*?" and (b) the value question "*Are we getting the benefits?*"

COBIT, on the other hand, relies on an IT-based perspective, supporting company executives in the execution of investments. As a result, the remaining questions to be answered are as follows: (a) the architectural question "*Are we doing things the right way?*" and (b) the delivery question "*Are we getting them done well?*"

As showed also in Fig. 2, these four key questions compose the enterprise governance of IT (ITGI 2008a, b).

In the Val IT framework, the value is defined as the total benefit lifecycle relative to costs, adapted to risk and according to monetary value (ISACA 2009). Value is rarely calculated in quantitative measurements because it is considered a complex, dynamic and context-dependent variable that is subject to the type of company and researcher carrying out the estimate (Anderson et al. 2006).

Furthermore, a necessary condition for implementing the Val IT model is an extended acceptance of the terms used within the company; this enables efficient communication. To this end, the Val IT framework defines these vital terms:

- The project: A structured range of activities related to the company's creation of a defined capacity for an identified programme and budget
- The programme: A structured group of interdependent projects that are necessary and sufficient to achieve business results and create value
- The portfolio: A range of programmes, projects, services or selected goods that are monitored to optimise company results (McAfee and Brynjolfsson 2008; Anderson et al. 2006)

Building on these terms, the Val IT model is based on various principles in three domains to create value management processes. The seven principles can be listed as follows:

1. IT and IT-enabled investments should be handled as a portfolio of investments.
2. IT and IT-enabled investments should include the entire range of activities to achieve value.
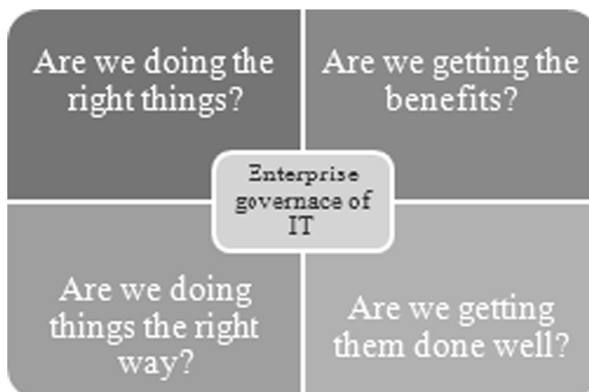
Fig. 2 The enterprise governance of IT

3. IT and IT-enabled investments should be handled throughout the economic lifecycle.
4. Value delivery procedures should consider several investment categories for assessment to be handled in a different manner.
5. Value delivery procedures will define the key metrics, submit them to controls and react quickly to every change or deviation.
6. Value delivery procedures will involve all stakeholders (Mitchell et al. 1997) and will allocate the relative responsibilities for execution of the skills and creation of company value.
7. Value delivery procedures will be constantly monitored, assessed and improved.

These principles operate in three domains: Value Governance, Portfolio Management and Investment Management.

The domain of Value Governance seeks to ensure good organisation governance procedures to create the best possible value from IT and IT-enabled investments for the duration of their economic lifecycle. Next, the domain of Portfolio Management seeks to guarantee the company's efficient handling of the general portfolio of IT and IT-enabled investments, promoting the best value. To this end, investment programmes are implemented as part of the investment portfolio and are monitored throughout their economic lifecycle. This structure allows the most advantageous allocation of resources in investments, enables appropriate risk management and promotes the identification of any possible problems. Finally, the domain of Investment Management seeks to guarantee that each investment programme contributes to value creation.

This third domain contains three components: the business case, programme management and benefit achievement. First, the business case is important for the selection and management of correct investment programmes. It is developed with a strategic view of the desired business results. Second, programme management is an operative and dynamic instrument that must be updated periodically to maintain programme feasibility. And third, benefit achievement is enabled by effective implementation of the business case and resulting programme management.

This investment management programme and the IT implementation may contribute to the creation of value when investments have been defined, handled and monitored as a programme in which IT plays a necessary but not autonomous role by operating in combination with the business and its processes, organisational structures, personnel and their skills (Soto-Acosta et al. 2010).

Additionally, a maturity model has been defined for each domain. This model utilises a measurement scale based on five levels (0, non-existent; 1, initial; 2, repeatable; 3, defined; 4, managed; and 5, optimised). At one end of the scale, level 0 indicates the management practice is not implemented. In contrast, level 5 indicates the organisation can quantify the value created through IT investments and may use this experience to further improve value creation.

Findings and Discussion

The value of IT can often seem elusive. As a result, it is sometimes not implemented. Investigations conducted by the Cranfield School of Management (Peppard and Ward

2003) suggested that, in the UK, between 20 and 30 % of large investments in IT (McAfee and Brynjolfsson 2008) and in modifications to IT-enabled services are contested or do not generate return for the company. In fact, few companies handle value created by IT. To understand the relationship between IT and value creation, several aspects must be analysed.

First, the board of directors and company executives should understand that IT enables the achievement of business results (Stoel and Muhanna 2009). In essence, company leaders must especially pay attention to the "I" of the acronym "IT." Second, greater attention should be given to the organisation's IT governance. Most companies adhere to an IT management model, rather than an IT governance model. Companies that choose a governance model for IT services generally implement a centralised model. The objective of IT governance is to implement and modify IT services. As a result, IT governance is insufficient on its own but is still useful for service management.

According to findings by Forrester Research (2008) in North America and European Enterprise IT Management and Governance, 20 % of the firm's IT infrastructure is highly standardised. Over 50 % reported they are either highly standardised or more standardised than not. The level of standardisation differs based on industry and company size. Higher levels of IT infrastructure standardisation occur in large companies (63 %), while lower levels are reported by small business (56 %). In utilities and telecommunication sectors, 66 % of executives reported a high level of IT infrastructure standardisation; only 47 % of retail sectors claimed similarly high levels. In addition, 77 % of the firms surveyed have an IT-centralised infrastructure, while nearly 10 % are decentralised and 13 % are federated.

Based on this analysis, we may deduce that the centralised governance of IT, focusing on economic and technical efficiency, creates a rationalisation of resources and structures, as well as a standardisation of infrastructures and applications. Consequently, the objectives of each business unit and the optimisation of investments become less important. The IT services generated are efficient but excessively independent from the characteristics of the units' business. Furthermore, the focus on cost-driven aspects may result in an imbalance between investments in technologies and infrastructures instead of in processes and applications.

What has been missing for many years is a structured, global and tested approach based on a well-organised and systematised governance framework. This governance framework provides a practical guide for the board of directors and executive groups for decisions related to investments in and management of IT (O'Brien 1999). In this context, the Val IT is proposed as a model that optimises value creation from an IT investment, complete with an acceptable cost and an acceptable level of risk. Our analysis further suggests that the application of Val IT as reference framework for IT governance should be accompanied by the adoption of a decentralized governance model, one that also considers the needs of various business units in addition to the cost. The definition of general terms (project, program and portfolio) by the framework is needed for efficient communication through business units.

Instead of increasing conformance to the IT infrastructure, cost reductions often possess great weight in decision making (Cecere et al. 2008). In addition to the six principles applied in the Val IT, this model also asserts that because there are different categories of IT investments, each must be assessed and managed autonomously.

The enterprise governance of IT should be regarded as the key alignment factor for business and IT as well as the chief means of business value creation from IT investment. An established set of questions (the strategic question, the value question, the delivery question and the architecture question) provide a comprehensive framework which can reduce losses of value related to IT investments if the company is equipped with an adequate IT infrastructure management and a decentralised structure of IT governance to balance the needs of all business units.

Analysing Val IT implementation status per continent (Asia, Europe and North America), organisation size and industry segment, another survey (De Haes et al. 2009) confirms that the implementation status of Val IT framework is higher for mature enterprise, historically active with IT services and systems, such as larger enterprises, enterprises from financial, manufacturing and retail sectors, and European and North American enterprises.

The survey highlight, also, that there is a strong correlation between the implementation of Val IT and the achievement of IT goals, and between the achievement of IT goals and business goals. However, the enterprises are aware of the importance of some IT goals, for example, to align the IT strategy to the business strategy or create agility in responding to changing business requirements, but they do not manage to reach them appropriately.

Perceptions of IT have improved over the years, but there is still extensive progress to be made. Important steps include improving the consistency and quality of IT processes, communicating IT value and success more effectively and enabling IT managers to measure and monitor IT quality and associated costs. Companies should monitor and assess the value delivery procedures of the IT investment portfolio and rapidly react to any change or deviations. In this way, it will be possible to select IT investments and manage them through the economic lifecycle, sustaining or increasing their value for the organisation.

Conclusions

In summary, IT serves as a strategic business resource for long-term value creation. This paper sought to define IT as an integral part of the structural capital of modern entrepreneurial entities, describe the current governance models and analyse the Val IT model to support company leaders in choosing and implementing the best investments.

When discussing strategies involving IT, is it essential for directors and those in executive management to understand that IT is a means of creating business results through the management of information. Another strategic factor involves defining and implementing a complete IT governance protocol. In addition, ensuring that value is supported or increased by IT and by IT-enabled investments (Boynton and Zmud 1997) is a vital component of company governance. Effective IT governance involves selecting investments wisely and handling them throughout their economic lifecycle; investments include the initial investment, the consequent services and any additional IT resources.

Based on these principles, we propose management should regard IT services as governance activities. Along with this recommendation, the Val IT allows companies to apply principles, processes and procedures included and to adopt a decentralised model of governance. In doing so, companies may achieve a range of strategic advantages and create higher levels of company value.

In essence, this framework helps decision makers to increase their understanding of the nature of value and how it is created. Consequently, costs, risks and benefits derived from investments are defined in a clearer manner, allowing company management to make more informed decisions that consider the needs of various business units in addition to considering their costs. IT may therefore be considered to be a proactive source for business improvement and innovation.

Our model enables a reduction in costs and value losses from IT investment failure. This is accomplished by ensuring that decision makers can perform rapid corrective actions on any investments which fail to produce appropriate value according to their expected results. Furthermore, the reduction in costs associated with IT increases the value of business (Meroño-Cerdan and Soto-Acosta 2005), reduces useless costs and increases the general level of trust in the field of IT from the board of directors, management, leaders of the organisation and stakeholders. At the same time, the reduction in failure risks is registered.

In conclusion, the Val IT framework combined with a decentralised model of IT governance allows companies to increase the possibility of selecting investments with not only a high value creation potential but also a greater possibility of success in execution when services are created and utilised.

The limitations of this paper should be noted. These limitations include the following:

1. Its theoretical form
2. Its literature-based analysis
3. The viable existence of other forms of IT infrastructure in multiple industries

Ultimately, each company should adopt and adapt a model of IT governance to meet its specific needs and goals. Future research should seek to systematise the current literature on the Val IT framework to provide a more quantitative analysis.

References

Adler, P. S., & Kwon, S. W. (2002). Social capital: prospects for a new concept. *Academy of Management Review, 27*(1), 17–40.

Anderson, M. C., Banker, R. D., & Ravindran, S. (2006). Value implications of investments in information technology. *Management Science, 52*(9), 1359–1376.

Aral, S., & Weill, P. (2007). IT assets, organizational capabilities, and firm performance: how resource allocations and organizational differences explain performance variation. *Organization Science, 18*(5), 763–780.

Arregle, J., Hitt, M. A., Sirmon, D. G., & Very, P. (2007). The development of organizational social capital: attributes of family firms. *Journal of Management Studies, 44*(1), 73–95.

Bosworth, D., & Webster, E. (2006). *The Management of Intellectual Property.* Cheltenham: Edward Elgar Publishing Limited.

Boynton, A. C., & Zmud, R. V. (1997). Information Technology Planning in the 1990s. *MIS Quarterly, 11*(1), 59–71.

Brown, T. J., & Dacin, P. A. (1997). The company and the product: corporate associations and consumer product responses. *Journal of Marketing, 61*(1), 68–84.

Brown, A. E., & Grant, G. G. (2005). Framing the frameworks: a review of it governance research. *Communications of the Association for Information Systems, 15*, 696–712.

Burn, J. M., & Szeto, C. (2000). A comparison of the views of business and IT management on success factors for strategic alignment. *Information & Management, 37*(4), 197–216.

Cecere, M., Peters, A., Bartels, A., De Gennaro, T. (2008). The state of IT Governance in North American and European Enterprises, Forrester Research. http://c.ymcdn.com/sites/www.simnet.org/resource/collection accessed December 2014.

Cohen, D., & Prusak, L. (2001). *In good company: how social capital makes organizations work.* Boston: Harvard Business School Press.

Cragg, W. (2002). Business ethics and stakeholder theory. *Business Ethics Quarterly, 12*(2), 113–142.

Daim, T. U. (2014). Systems of Technological Innovation. *Journal of the Knowledge Economy, 5*(4), 669–669.

Daniels, N. C. (1993). *Information technology: the management challenge.* Wokingham: Addison-Wesley.

De Bakker, K., Boonstra, A., & Wortmann, H. (2010). Does risk management contribute to IT project success? A meta-analysis of empirical evidence. *International Journal of Project Management, 28*(5), 493–503.

De Haes, S., Van Gremberger, W., & Van Brempt, W. (2009). Demonstrating the Value of COBIT and Val IT. IT Governance Practice. *ISACA Journal, 5,* 29–34.

De Haes, S., Van Grembergen, W., & Debreceny, R. S. (2013). COBIT 5 and enterprise governance of information technology: building blocks and research opportunities. *Journal of Information Systems, 27*(1), 307–324.

Del Giudice, M., Della Peruta, M. R., & Maggioni, V. (2013). Collective Knowledge and Organizational Routines within Academic Communities of Practice: an Empirical Research on Science–Entrepreneurs. *Journal of the Knowledge Economy, 4*(3), 260–27.

Frenzel, C. W., & Frenzel, J. C. (2003). *Management of information technology* (4th ed.). Boston: Course Technology Inc.

Henry, C. L. (1997). *Information technology for management.* New York: The McGraw Hill.

Ho-Chang, C., Chang, E. K., & Prybutok, V. R. (2014). Information technology capability and firm performance: contradictory findings and their possible causes. *MIS Quarterly, 38*(1), 305–341.

Huysmanm, M., & Wulf, V. (2004). *Social capital and information technology.* Cambridge: The MIT Press.

ISACA (2009). The Val IT Mapping. Mapping of Val IT™ 2.0 to MSP™, PRINCE™ and ITIL, USA, (10–14). https://www.isaca.org . Accessed December 2014.

Işık, C. (2013). The importance of creating a competitive advantage and investing in information technology for modern economies: an ARDL test approach from Turkey. *Journal of the Knowledge Economy, 4*(4), 387–405.

ITGI (2008). Enterprise Value: Governance of IT investments – The Business case, USA,, (5–28). https://www.isaca.org. Accessed May 2015.

ITGI (2008). Enterprise value: Governance of IT investments, The Val IT Framework 2.0, USA. https://www.isaca.org/Knowledge-Center/Val-IT-IT-Value-Delivery-/Documents/Val-IT-Framework-2.0-Extract-Jul-2008.pdf . Accessed May 2015.

Kerr, D. S., & Murthy, U. S. (2013). The importance of the CobiT framework IT processes for effective internal control over financial reporting in organizations: an international survey. *Information & Management, 50*(7), 590–597.

Lombardi, R., Trequattrini, R., & Battista, M. (2014). Systematic errors in decision making processes: the case of the Italian Serie A football championship. *International Journal of Applied Decision Sciences, 7*(3), 239–254.

Lundvall, B. A. (2004). The economics of knowledge and learning. In J. L. Christensen & B. A. Lundvall (Eds.), *Product Innovation, Interactive Learning and Economic Performance* (pp. 21–42). Bingley: Emerald Group Publishing Limited.

Lynne, M. M. (2004). Technochange management: using IT to drive organizational change. *Journal of Information Technology, 19*(1), 4–20.

Maggioni, V., & Del Giudice, M. (2011). Relazioni sistemiche tra imprenditorialità interna e gemmazione d'impresa: una ricerca empirica sulla natura cognitiva delle nuove imprese. *Sinergie, 71,* 171–197.

Maryska, M., & Novotny, O. (2013). The reference model for managing business informatics economics based on the corporate performance management – proposal and implementation. *Technology Analysis & Strategic Management, 25*(2), 129–146.

Maylor, H., & Blackmon, K. (2005). *Researching business and management.* New York: Palgrave Macmillan.

McAfee, A., & Brynjolfsson, E. (2008). Investing in the IT that makes a competitive difference. *Harvard Business Review, 86*(7–8), 98–107.

Meroño-Cerdan, A. L., & Soto-Acosta, P. (2005). Examining e-business impact on firm performance through website analysis. *International Journal of Electronic Business, 3*(6), 583–598.

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Towards a theory of stakeholder identification and salience: defining the principle of who and what really counts. *Academy of Management Review, 22*(4), 853–886.

Myers, M. D. (2013). *Qualitative Research in Business & Management*. London: Sage.

O'Brien, J. A. (1999). *Management information systems: managing information technology in the internetworked enterprise*. Boston: McGraw-Hill.

Palacios-Marqués, D., Soto-Acosta, P., & Merigó, J. M. (2015). Analyzing the effects of technological, organizational and competition factors on Web knowledge exchange in SMEs. *Telematics and Informatics, 32*(1), 23–32.

Palese, M., & Crane, T. Y. (2002). Building an integrated issue management process as a source of a sustainable competitive advantage. *Journal of Public Affairs, 2*(4), 284–292.

Peppard, J., & Ward, J. (2003). Unlocking Sustained Business Value From IT Investments. *Cranfield School of Management, 49*(3), 273–289.

Peterson, R. R. (2003). Information strategies and tactics for Information Technology governance. In W. Van Grembergen (Ed.), *Strategies for Information Technology Governance* (pp. 37–80). Hershey: Idea Group Publishing.

Ployhart, R., & Moliterno, T. (2011). Emergence of the human capital resource: a multilevel model. *Academy of Management Review, 36*(1), 127–150.

Ranft, A., & Lord, M. (2000). Acquiring new knowledge: the role of retaining human capital in acquisitions of high-tech firms. *Journal of High Technology Management Research, 11*(2), 295–319.

Sambamurthy, V., & Zmud, R. W. (1999). Arrangements for information technology governance: a theory of multiple contingencies. *MIS Quarterly, 23*(2), 261–290.

Schwalbe, K. (2010). *Managing information technology projects*. Canada: Cengage Learning.

Schwartz, G. (2002). Organizational hierarchy adaption and information technology. *Information and Organization, 12*(3), 135–211.

Schwartz, A., & Hirschheim, R. (2003). An extended platform logic perspective of IT governance: managing perceptions and activities of IT. *The Journal of Strategic Information and Organization, 12*(2), 129–166.

Selig, G. J. (2008). *Implementing IT governance: a practical guide to global best practices, IT management*. Zaltbommel: Van Haren publishing.

Sirkemaa, S. (2002). IT infrastructure management and standards. Paper presented at Information Technology: Coding and Computing International Conference, 8–10 April 2002, pp. 201–206.

Soto-Acosta, P., Casado-Lumbreras, C., & Cabezas-Isla, F. (2010). Shaping human capital in software development teams: the case of mentoring enabled by semantics. *IET Software, 4*(6), 445–452.

Soto-Acosta, P., Popa, S., & Palacios-Marqués, D. (2015). E-business, organizational innovation and firm performance in manufacturing SMEs: An empirical study in Spain. Technological and Economic Development of Economy, http://dx.doi.org/10.3846/20294913.2015.1074126. Accessed May 2015.

Stewart, T. A. (1997). *Intellectual capital: The New Wealth of Organizations*. London: Nicholas Brealey Publishing Ltd.

Stoel, M. D., & Muhanna, W. A. (2009). IT capabilities and firm performance: a contingency analysis of the role of industry and IT capability type. *Information & Management, 46*(3), 181–189.

Subramani, M. (2004). How do suppliers benefit from information technology use in supply chain relationships? *MIS Quarterly, 28*(1), 45–73.

Sullivan Jr P., (2000). Valuing intangibles companies – An intellectual capital approach. *Journal of Intellectual Capital, 1*(4), 328–340

Sveiby, K. (1997). *The New Organizational Wealth*. San Francisco: Berrett-Koehler.

Tallon, P. P., Ramirez, R. V., & Short, J. E. (2013). The information artifact in IT governance: toward a theory of information governance. *Journal of Management Information Systems, 30*(3), 141–178.

Trequattrini, R., Russo, G., & Lombardi, R. (2012a). Defining Business Network. *International Journal of Business Research and Management, 3*(1), 29–34.

Trequattrini, R., Russo, G., & Lombardi, R. (2012b). Network Governance: organisational and legal profiles. *Corporate Ownership and Control, 9*(4), 346–350.

Trequattrini, R., Russo, G., & Lombardi, R. (2012c). The Crisis of Company Networks and Tools for its Prediction. *International Business Research, 5*(10), 46–55.

Van Grembergen, W. (2004). *Strategies for Information Technology Governance*. Hershey: Idea Group Publishing.

Van Grembergen, W., & De Haes, S. (2009). *Enterprise governance of IT: achieving strategic alignment and value*. New York: Springer.

Van Grembergen, W., De Haes, S., & Guldentops, E. (2003). Structures, Processes and Relational Mechanisms for IT Governance. In W. Van Grembergen (Ed.), *Strategies for Information Technology Governance* (pp. 1–35). Hershey: Idea Group Publishing.

Venkatraman, N., & Henderson, J. (1993). Aligning business and IT strategies. In J. Luftman (Ed.), *Competing in the information age: practical applications of the strategic alignment model* (pp. 21–42). New York: Oxford University Press.

Weill, P. (2004). Don't just lead govern: how top-performing firm govern IT. *MIS Quarterly Executive, 3*(1), 1–17.

Weill, P., & Ross, J. W. (2004). *IT governance: how top performers manage IT decision rights for superior results*. Boston: Harvard Business School Press.

Weill, P., Subramani, M., & Broadbent, M. (2002). Building IT infrastructure for strategic agility. *MIT Sloan Management Review, 44*(1), 57–65.

Woodruff, R. B. (1997). Customer value: the next source for competitive advantage. *Journal of the Academy of Marketing Science, 25*(2), 139–153.

Yin, R. K. (1994). *Casestudy Research*. Thousand Oaks: Sage.