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Role of Knowledge Management in Enhancing the Entrepreneurial Ecosystems Through Corporate Entrepreneurship and Strategic Intent in High-tech Firms

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Abstract

The paper studies the role of knowledge management in enhancing the entrepreneurial ecosystem using knowledge management, co-governance, and co-management in high-tech firms. All these factors are important variables defining entrepreneurial ecosystem. The key drivers of knowledge management include intelligence generation and intelligence dissemination which are also critical variables of market intelligence for developing new products and creating new business creation as strategic business units in the entrepreneurial firm. The objective of the paper is to understand the dynamics of the components of sustainable entrepreneurial ecosystems, with an emphasis on the role of knowledge creation, diffusion, and application across the spectrum of high-tech organizations and their co-governance process and co-management processes.The methodology includes an empirical study based on data collected from all over India. More than 381 data were collected and analyzed using SPSS. Factor analysis and reliability analysis were used to find the reliability of questionnaire. Regression and correlation were used to analyze the influence of knowledge management processes on entrepreneurial ecosystem. Also, we analyzed the role of management support in facilitating culture for enabling corporate entrepreneurship. Response rate was 19.25%. The detailed case study of NASA and IBM was also undertaken to study the knowledge management system (Bixler & Stankosky, 2005). The paper undertakes the management approach to shed new light on the evolving role of knowledge on newbusiness creation and new product development. On the basis of analysis, it was found that entrepreneurial ecosystem includes the entrepreneurial proactiveness which is significantly influenced by lifecycle and strategic intent of high-tech firms. Moreover, leadership, knowledge management, and management support are the other components of entrepreneurial ecosystem that may influence the culture of innovation for facilitating entrepreneurship. The study also showed that culture is also influenced

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by the degree of involvement of the employees in pursuing the new ventures.The global implications of the paper include the advancement in the theory and body of knowledge in terms of development of correlation between the components of entrepreneurial ecosystem and knowledge management and strategic intent. The present study identifies the role of knowledge management in enhancing entrepreneurial culture, innovation, and new business creation within the firm to make it more competitive in the global arena. The concept of using intelligence generation and dissemination of knowledge through knowledge management systems has not been studied before with respect to entrepreneurial ecosystem and competitiveness, and there was a huge gap in the literature and managerial practice. Earlier studies have not identified the processes of knowledge management such as role of intelligence generation and dissemination and especially how the companies are implementing these processes. Interestingly, the study also covers the process of knowledge management implementation by describing such processes in NASA and IBM. For explaining these processes, the author has studied the case study of NASA and IBM which is the major contribution toward the managerial and research contributions through this study. The study balances practice with application and theory with the underlying concepts.

Keywords Innovation · Knowledge management · Entrepreneurial ecosystems · Corporate entrepreneurship · Market orientation · High-tech Firms

Introduction

Knowledge-driven ecosystems have certain drivers that encourage the transaction of knowledge between the participating entities. Creating sustainable entrepreneurial ecosystems are critical for the sustainability of new ventures. Sustainable entrepreneurial ecosystems are defined as the components of the formal and informal network and physical infrastructure, and culture within a community could contribute to a sustainable entrepreneurial ecosystem. One community, Victoria, British Columbia, is utilized to lay out the framework for the infrastructure necessary to create such a system. There is significant connection between cluster management, co-management and co-governance, and knowledge management within the participating partners in the knowledge clusters. In order to show how knowledge management is integrated in the cluster's organization, the authors chose to analyze some examples of co-management and co-governance structures applied in clusters of the North-West region of India. The authors tried to demonstrate that, at clusters level, in order to be effective, knowledge must be stored, organized, and disseminated among all cluster members so that later, it can be capitalized and put into practice. Co-governance and co-management are very critical aspects of knowledge management. Co-management is defined as the sharing of power and responsibility between the government and local resource users (Berkes 2009). The author further focused on a selection of these: knowledge generation, bridging organizations, social learning, and the emergence of adaptive co-management. Co-management is defined as knowledge partnership. Different levels of organization, from local to international, have comparative advantages in the generation and mobilization of knowledge acquired at different scales. Bridging organizations provide a forum for the interaction of these different kinds of knowledge, and the coordination of

other tasks that enable co-operation: accessing resources, bringing together different actors, building trust, resolving conflict, and networking. Social learning is one of these tasks, essential both for the co-operation of partners and an outcome of the co-operation of partners. It occurs most efficiently through joint problem-solving and reflection within learning networks. It is also interesting to observe that the social learning happening in the organization is also critical for the survival and competitiveness of the firm. Through successive rounds of learning and problem-solving, learning networks can incorporate new knowledge to deal with problems at increasingly larger scales, with the result that maturing co-management arrangements become adaptive co-management in time (Berkes 2009). Co-governance deals with the theory and practice of society's participation in strengthening government accountability in facilitating developmental clusters for creating wealth for the nation and employment opportunities. For example, developing policies for creation of special economic zones and express corridors may be facilitating knowledge transfers and creation of competitiveness for the organizations established in those clusters (Ackerman 2004).

This study could represent a reference on how clusters from the north to west region of emerging economies such as India are established (Stănculescu et al. 2013). These clusters are formed with the governmental policy to create special economic zones (SEZ) in northwest zones of India. This would include government policy to create fast corridors for connecting north with west region for facilitating trade and transportation of good and services. These regions in India are governed by different set of polices including the tax holiday for 5 years and other incentives given to the companies who set up their units in these zones. It is observed that the venture creating facilitating entrepreneurial ecosystems such as institutional framework is provided by the government of India to facilitate business creation in these regions. This kind of governmental co-management and co-governance policies is also the result of industrialization and urbanization objective of the government and also to create jobs in the rural parts so that these parts are also developed properly and people get livelihood nearby and they don't have to migrate to urban areas where there is unsustainable load toward cities. For instance, rural entrepreneurship also focuses on this objective. One such SEZ is Gurugram in Delhi/NCR region, and one such northwest SEZ includes Sanand, Gujarat, India. In these places the state taxes are also encouraging the investors to create new companies in these regions. Similarly, it is very interesting to find that the knowledge-based economy is primarily based on knowledge creation, diffusion, and application process across organizations, industries, suppliers, vendors, nations, and regions. Therefore, effective use of knowledge has been crucial to the organization's survival and competitiveness in global markets. Extensive use of knowledge management has a strong potential to problem-solving, decision-making, organizational performance enhancements, and innovation. Knowledge management defines a systematic, explicit, and deliberated building processes required to manage knowledge among participative firms including the suppliers and vendors learning process in co-developing the customized products and services. The purpose of which is to maximize an enterprise's knowledge-related effectiveness and create values based on market demands and needs of the customers (Bixler & Stankosky, 2005). This also helps to develop sustainable entrepreneurial ventures. S*ustainable entrepreneurship* is defined as the creation of viable, profitable and scalable firms. Such firms engender the formation of self-replicating and mutually enhancing innovation networks and

knowledge clusters (innovation ecosystems), leading toward robust competitiveness (Carayannis 2009).We understand *robust competitiveness* to be a state of economic being and becoming that avails systematic and defensible "unfair advantages" to the entities that are part of the economy. Such competitiveness is built on mutually complementary and reinforcing low-, medium-, and high-technology and public and private sector entities (government agencies, private firms, universities, and nongovernmental organizations) (Carayannis 2009).The concepts of *robust competitiveness* and *sustainable entrepreneurship* are pillars of a regime that we call "*democratic capitalism*" (as opposed to "popular or casino capitalism"), in which real opportunities for education and economic prosperity are available to all, especially—but not only—younger people. These are the direct derivative of a collection of top-down policies as well as bottom-up initiatives (including strong R&D policies and funding, but going beyond these to include the development of innovation networks and knowledge clusters across regions and sectors) (Carayannis and Kaloudis 2009).

The present study contributes by highlighting the global contribution toward sustainable entrepreneurial ecosystems in emerging economies such as India through enhancing innovation using knowledge management, co-management, and co-governance. It also contributes by studying how innovation can be leveraged to provide solutions to complex problems and issues, such as global crises in environmental sustainability and economic development for human development. The present framework of study and model generated shows the contribution by studying the role of technology-integrated platform for exploring the dynamics of knowledge, innovation, and development of products and services in high tech firms. It also adds to the body of knowledge by showing correlation between the concepts derived from *robust competitiveness*, *sustainable entrepreneurship* and *co-governance, knowledge management, and co-management leading to the theories of development related to sustainable entrepreneurial ecosystems for emerging economies and markets. Finally, the paper contributes by adding to the body of knowledge in sustainable entrepreneurship as* individuals, organizations, industries, regions, and nations are harnessing creativity and invention to achieve and sustain growth by achieving sustainable competitiveness through knowledge management.

It is important to study the knowledge management, co-creation (Prahalad 2010), co-governance and co-management processes facilitating the entrepreneurial ecosystem because studies show that firms are struggling to stay competitive and survive in the market. Corporate entrepreneurship has been found to be facilitator for creating innovative culture within the organization to become competitive (Bhardwaj 2006; Covin and Miles 1999; Cash and Moser 2000; Leydesdorff 2012).The firms are trying to find new ways of staying afloat in turbulent times especially in hostile market. Many researchers confirmed that doing business in hostile markets including emerging markets is not an easy task due to its higher degree of uncertainty and the crisis-rich nature (Herman 1963; Starbuck and Hedberg 1977; Turner 1976; Webb 1994; as cited in Mishra 1996). Entrepreneurial ecosystems may act as enabler for meeting such situations. Based on the literature review, the research gap was identified. The literature review shows that there is no study which shows the drivers of entrepreneurial culture such as role of strategic intent and leadership roles to create the knowledge

management process and innovative capability of the organization. The gap in the literature shows that not many studies were undertaken to understand the detailed processes of knowledge management, co-management, co-governance, and its implementation in creation of such entrepreneurial ecosystems (Bhardwaj 2016). Therefore, the aim of the paper is to analyze the processes of knowledge management and how organizations have implemented knowledge management to sustain in the market. The present study intends to build on this gap. The knowledge sharing between the entrepreneurs through sharing of information, networks, and knowledge about implementation of entrepreneurial ideas and availability of other resources facilitate the entrepreneurial ecosystem. For example, the sharing of knowledge between the seniors and juniors related to various processes of the organisation would facilitate the performance of the organisation (Figallo 2002). This knowledge management may include the sharing of intelligence generation related to people,process, technology, culture and resources (PPTCR Model) for facilitating entrepreneurship within the organisation (Huber 1990).The research purpose is to identify the components of knowledge management such as intelligence generation and dissemination in enhancing the entrepreneurial culture as these are the basis processes of knowledge management which facilitate innovation and new business creation through product development.

The research method includes the mixed method including empirical study and case study method. Empirical study helped to identify the correlation and hypotheses testing of the drivers of entrepreneurial culture, and case study helped to study the processes of knowledge management implementation by leading firms such as IBM and NASA for enhancing entrepreneurial ecosystem. The structure of the paper is discussed as follows. The introduction is followed by the literature review which helped to identify the variables influencing the entrepreneurial ecosystems. The research methodology has been explained (Folke et al. 2002; Frappaolo 2002). Thirdly, the data analysis is done and conclusion is given. The managerial and research implications are also mentioned in detail in the last section.

Literature Review

As the knowledge-based economy grows exponentially, the knowledge assets become invaluable to the organizations. Effective use of knowledge has been crucial to the organization's survival and competitiveness (Momaya 1998). Knowledge management defines a systematic, explicit, and deliberated building processes required to manage knowledge; the purpose of which is to maximize an enterprise's knowledge-related effectiveness and create values (Bixler & Stankosky, 2005). The process incorporated in knowledge management (KM) includes collecting, organizing, clarifying, disseminating, and reusing the information and knowledge throughout the organization and the suppliers. Knowledge has two types, explicit and tacit. Explicit knowledge can be articulated in formal language and transmitted among individuals; tacit knowledge involves more intangible factors and is personal knowledge embedded in individual experience (Frappaolo 2002).

Knowledge Management and Entrepreneurial Culture in Sustainable Entrepreneurial Ecosystem

Both explicit and tacit knowledge must create returns and solve today's problems within an organization (Amidon et al. (2004). The authors also highlighted how communities of practice can be used to create radical innovation. Xenia Stanford's guide to knowledge mapping and Lynne Schneider's enterprise-transformation methodology illustrate pragmatic approaches to harnessing and exploiting knowledge. Curley and Formica (2013) described the concepts of robust competitiveness, sustainable entrepreneurship, and democratic capitalism and the influence of knowledge management on these variables as a whole. Moreover, the study conducted by Lopes and Farinha (2017) proposed a "multiple helix ecosystem for sustainable competitiveness" for performance measurement in innovation and entrepreneurship networks, in order to contribute to the improvement of sustainable competitiveness of territories. Regarding the latter, co-management can lead to regulatory capture, as seen in a range of cases (Castro and Nielsen 2001; Nadasdy 2003). It can be used as a pretext to co-optcommunity-based management and extend the power of the state (Gelcich et al. 2006; Nayak and Berkes 2008; Armitage et al. 2007; Carlsson and Berkes 2005a, b). There is no single universally accepted definition of co-management (Armitage et al. 2007; Kruse et al. 1998). The term refers to a range of arrangements, with different degrees of power sharing, for joint decision-making by the state and communities (or user groups) about a set of resources or an area (Carlsson and Berkes 2005a, b; Kendrick 2003). Co-management shares many features with other kinds of partnerships and co-operative environmental governance arrangements involving multiple actors (Berkes 2003; Plummer and FitzGibbon 2004; Ayles et al. 2007; Castro and Nielsen 2001; Nadasdy 2003).

Entrepreneurial Culture, Strategic Intent, Work Discretion, and Co-management Support

Others have concentrated on identifying appropriate local institutions and building on their strengths, or crafting new institutions where the existing ones do not work or are not appropriate (Ostrom 2005). Creating a favourable policy environment assists the emergence of functional co-management arrangements. The general lesson from the international literature is that the interplay, or two-way feedback, between government policy and local institutions is necessary for the evolution of co-management (Armitage et al. 2007) and networking has a majorrole to play (Mahanty 2002). Trust appears to be a determinant of success in manycases of comanagement, as a prelude to building a working relationship (Hahn et al. 2006).

Successful sustainable entrepreneurial ecosystems require co-management and co-governance to develop a trust-based organizational culture to facilitate knowledge sharing. It also requires co-governance facilitators supported by an organization structure which can result in organizational and community learning and fits in the trust and open cultural environment. In most kinds of co-management, there are multiple government agencies and multiple local interests at play, rather than a unitary state and a homogeneous "community" (Amidon et al. 2004). Moreover, Feinstein (2017)

present a model of the creative development of a field and analysis of the model based on domain for human activity and engagement.

Entrepreneurial Culture, Ecosystem, Intelligence Generation, Dissemination, and Co-management

Instead of intending on the formal structure of co-management and its power sharing arrangements, one can regard power sharing as the result, rather than the starting point of co-management (Carlsson and Berkes 2005a, b). To do so, co-management can be examined as a problem-solving process (rather than a static arrangement) involving negotiation, deliberation, knowledge generation, and joint learning. Co-management will also depend on the strategic intent of the firm (Mahanty 2002).

Ecosystem comprises of all the stakeholders: internal as well as external. The concept of governance suggests that we look beyond government, toward public–private–civil society partnerships, as a way of dealing with the shortcomings of single agency, top-down management (Peters and Pierre 2000; Kooiman 2003). Knowledge generation and learning have become central issues in such adaptive co-management (Olsson et al., 2014; Armitage et al. 2007). Co-governance is particularly appropriate when user involvement leads to more legitimate management measures and to increasing compliance(Kooiman 2003; Capistrano et al. 2005; Holtskog 2017a, b).

Kruse et al. (1998) studied the relationship between user involvement and caribou management effectiveness in Alaska and northern Canada. Social capital is important, not only in indigenous co-management but also in all cases, because it is a prerequisite for collective action and social learning. The outcome is strongly influenced by the history of the case (Chuenpagdeea and Jentoft 2007). Adaptive management requires collaborative processes to establish consensus among the parties before feedback-based problem-solving can proceed. Collaborative problem-solving and co-management are task-oriented, concentrating on the function, rather than the formal structure, of the arrangement (Carlsson and Berkes 2005a, b).

However, a number of Millennium Ecosystem Assessment cases do in fact provide good examples of such bridging (Capistrano et al. 2005). But in general, bringing together science and local knowledge is not easy. First, many scientists and government managers do not trust local knowledge. Second, tacit, unwritten knowledge is often difficult to articulate, or at least difficult to make comprehendible to government managers and scientists (Reid et al. 2006). Third, especially when indigenous groups are involved, local knowledge often arises from a different worldview than does western science and has different starting points, assumptions, and rules (Berkes 2003). Both governments and indigenous parties seem to have developed a respect for one another's knowledge; Kendrick (2003) characterizes this relationship largely as a process of learning to respect differences. In many cases, the different actors need to work and think together and deliberate to generate new knowledge or make sense of knowledge from different sources. Such "co-production of knowledge" is described by Davidson-Hunt and O'Flaherty (2007:293): "Working from the premise that knowledge is a dynamicprocess – that knowledge is contingent upon being formed, validatedand adapted to changing circumstances – opens up thepossibility for researchers to establish relationships with indigenouspeoples as co-producers of locally relevant knowledge." Participatory research builds social capital, and power sharing

relationships between researchers and communities can help develop locally appropriate resource management strategies (Arnold and Fernandez-Gimenez 2007; Davidson-Hunt and O'Flaherty 2007; Feinstein 2017; Ivanova et al. 2017).

Knowledge Management, Entrepreneurial Culture, and Competitiveness

Sometimes, markets characterized by strong competition, new knowledge development are generally recognized as the key means for an enterprise to gain competitive advantage (Nguyen and Nguyen 2008). This knowledge-based competitive advantage is critical for all commercial ventures, but is especially so for high-expectation start-ups (technology-based ventures anticipating high-growth rates) (van der Borgh et al. 2012). Even though the organizational processes of a start-up are still under development, the success of new knowledge development is affected by three critical factors—the structure of the enterprise, the organizational technology, and the knowledge partners and promoters. An analysis of these factors suggests that the role of the knowledge promoter is the key determinant of knowledge development success in the case of early-stage high-expectation start-ups. Importance and the relevance of such a topic include the importance of knowledge management for enhancing the innovative culture of the organisation.It also includes the role of leadership in having strategic intent in developing innovative and sustainable ecosystems and culture for pursuing the innovation through new product development through sustainable systems management (Anantatmula 2005; Luttrell 2016; Carayannis 2016). Interestingly, Holtskog (2017a, b) argued the dualism of science, technology and innovation (STI) and doing, using and interacting (DUI) as ineffective modes of innovation. Rather the author proposed that in the process of embedding scientific knowledge into products, the companies apply interchangeably STI mode and DUI mode in a sophisticated pattern of knowledge creation (Carayannis and Chanaron 2007; Matricano 2010).

Why Knowledge Management and Why Now?

1. Companies are becoming knowledge intensive, and not capital intensive.
2. Unstable markets necessitate "organized abandonment."
3. Knowledge management lets you lead change so change does not lead you.
4. Only the knowledgeable survive.
5. Cross-country industry amalgamation is breeding completely.
6. Knowledge can drive decision support like no other.
7. Knowledge requires showing, IT barely supports sharing.
8. Tacit knowledge is mobile.
9. Your competitors are no longer on West Coast.

Carayannis (1999) tried to understand the role of knowledge management in fostering a synergistic symbiosis between information technology and managerial and organizational cognition. The author identified that both information technology and knowledge management can be perceived as strategic enablers of managerial and organizational cognition. He further synthesized classical cognition concepts and recent empirical experience with knowledge management applications to develop an organizational knowledge management model (the organizational cognition spiral or OCS) and tool

(the organizational knowledge network or OK net) for understanding and supporting managerial and organizational cognition. On the basis of the above literature review, the following conceptual model has been proposed which will be validated by the empirical study. Based on the above explanation and literature review, Fig. 1 has been given in the following page.

The conceptual model given above explains that the variables which influence the entrepreneurial ecosystems are critical for making the firm more innovative in high-tech firms. Bringing together science and local knowledge can be facilitated by bridging organizations that provide an arena for knowledge co-production, trust-building, sense-making, learning, vertical and horizontal collaboration, and conflict resolution (Sanchez 2005). Bridging organizations can respond to opportunities, serve as catalysts and facilitators between different levels of governance, and across resource and knowledge systems (Folke et al. 2002; Reid et al. 2006). Moreover, translation between science and policy spheres (Cash and Moser 2000) but are considered to have a broader scope than boundary organizations (Hahn et al. 2006).

Methodology

The research method adopted in this study is mixed method including quantitative and qualitative case study methods. This is because the quantitative study has helped to provide the analysis on the correlation factors. The case study in turn has helped to find the "how" to implement the strategic intent factors. Internal consistency describes the extent to which all the items in a test measure the same concept or construct, and hence it is necessary but not a sufficient condition for measuring homogeneity in a sample of test items. Reliability is the extent to which a list of scale items would produce a

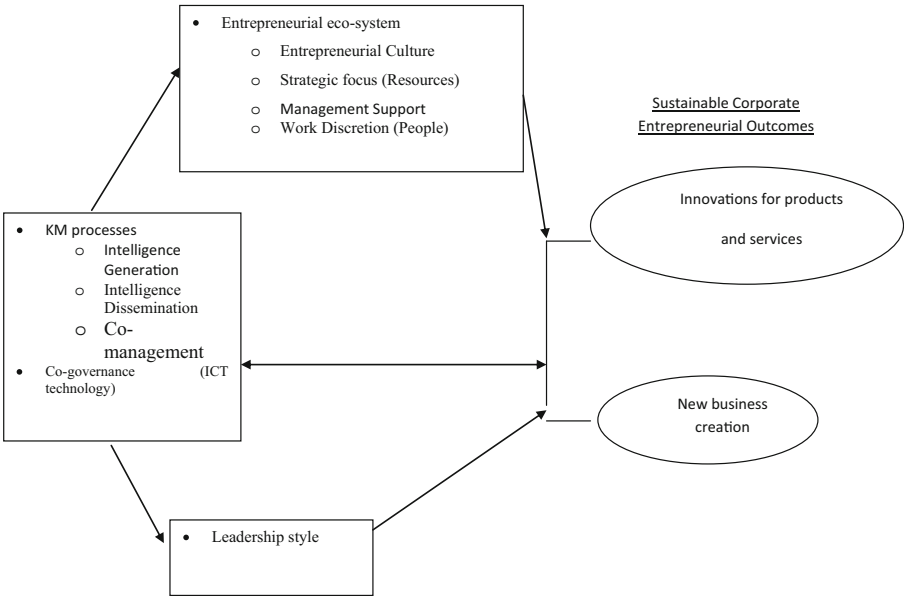

Fig. 1 Conceptual framework of research

consistent result if the data collection was repeated and is assessed by determining the proportion of systematic variation in scale. Calculating Cronbach's alpha coefficient of a scale is the most commonly practiced indicator of internal consistency with the ideal Cronbach's alpha co-efficient being over 0.07. Factor analysis was used for data reduction using statistical technique that allows simplifying the co-relationships between numbers of continuous variables. Exploratory factor analysis is a general name denoting a class of procedures used for data reduction and summarization. Exploratory factor analysis was used to condense a large set of variables or scale items down into a smaller, more manageable number of factors or components. Principle component analysis (PCA) is a key method in the exploratory factor analysis process used to explore the factors influencing co-management, behavior, and their correlations in the data obtained. Factor analysis is a data reduction statistical technique that allows simplifying the co-relational relationships between numbers of continuous variables (Beinhocker 2006). Confirmatory factor analysis (CFA) was used to form special form of factor analysis, most commonly used in social research. It is used to test whether measures of a construct are consistent with a researcher's understanding of the nature of that construct (or factor). As such, the objective of confirmatory factor analysis is to test whether the data fit a hypothesized measurement model. This hypothesized model is based on theory and/or previous analytic research. Questionnaire also aims to measure the study variables to analyze testing of the hypotheses. The study involves qualitative and quantitative variables. Therefore, the plan of measurement is based on qualitative assessment of the magnitude of the variables on comparative basis. Likert type scale has been used for measurement of variables where a respondent is asked to express his/her opinion on a scale, with options including "5 = strongly agree" to "1 = strongly disagree". With the assumption that equal intervals on the scale indicate equal measures of the property/variable, the scale may be assumed to be approximately close to the "interval scale" (Kothari 1985). The interval scale facilitates use of statistical measures like mean and standard deviation. Product moment correlation technique, *t* test, and *F* test are also appropriate in the case of interval scale (Kothari 1985).

Data, sample, and variables are explained in this section. The variables include the leadership style, culture, new product development, innovation, and strategic intent to develop the innovative ecosystems through systems approach (Kofinas et al. 2007). The variables also include role of culture in knowledge sharing and management for enhancing innovation within the organization. The sample was collected from all over India. The sample was collected randomly. The response rate was 19.25%. The total number of samples collected is 381 (Hair et al. 2014). This requires that there should be total number of variables multiplied by 25 which should be the sample size. During interactions with the employees practicing product innovation (during snowball inquiry, pilot study, questionnaire validation, and pre-testing stages), it emerged that product innovation was being used. Hence, keeping in mind the objectives of the study, the set of questions in various dimensions have been designed in independent study areas. Questions have been framed to measure the variables in the particular study area and also their influence on competitive performance.

The questionnaire also contained some control questions, which indicated the reliability of the respondents. Few questions similar to those asked in earlier studies were asked again in different context(s) to introduce cross-check(s) on the respondents' reliability. Brief description of the objective of the study and

directions with respect to filling out the questionnaire were given along with the questionnaire.

The various variables include role of culture in preserving the ecosystem (such as in the case of tribal knowledge management is shared between the parents and children through stories format) and influence of knowledge management on innovation of products and services (Carayannis 1999). Soe cases showed co-management factors such as partnerships with NGOs and government units at different levels of organization, forming cross-scale networks. Developing the right culture to preserve the sustainable culture, the companies can enlarge the lifecycle of the product and thereby achieve the sustainable growth within the company. Another variable is the strategic intent toward developing balance between the ecosystem in right usage of raw material and resources from the nature and intention to replenish the resources such as underground water and reducing, recycling, and reusing concept to preserve nature so that we can achieve sustainable performance. This can only be based on proper channels of knowledge management to reduce the exploitation of nature through time tested methods of replenishment which can be shared between the employees and tribal. Apart from these variables, involvement in innovation activities with strategic intent is included in the study because the innovation in reducing the resource requirement can create a better balance in the ecosystem and also save cost to the company. However, this needs to be included as a strategic mission of the company so that all the employees can intent on the implementation of such philosophy (vision, mission, objective, and goals (VMOG) model, Bhardwaj 2018). Work culture comprises of the autonomy at work including the sense of belongingness. If the employees have the sense of trust, attachment, and belongingness, they will never exploit the system or resources of the company. This can also be brought by the sharing of knowledge (intelligence dissemination) on how to put the resources for the betterment of the company. This also would require management support in the form of resource allocation and vision of the company toward creating the better work culture of sustainability. Moreover, Raudeliūnienė et al. (2016) analyze the factors that influence sharing process in the Lithuanian National Defence System, most enhancing its efficiency.

Data Analysis

Methods of data analysis were determined by the hypothesis to be tested or research questions to be answered (which also determined the format of the instrument and how the data was gathered). In context of this study, the statistical software package SPSS was used for data analysis. On the basis of the research, we found the following findings. The testing of hypothesis has been shown below.

> **Hypothesis 1** Entrepreneurial culture influences the development of new product and service significantly.

Table 1 shows that there is a significant correlation between innovation in products and services with lifecycle. The data analysis shows that innovation in products and services is significantly influenced by the culture of innovation within the organization. This culture is usually led by the leaders of the organization and vision makers. It is

governed by the VMOG model (vision, mission, objective, and goals) of the organization which drives the innovation within the organization. In case the organization wants to be innovative, it needs to embed this strategic direction in the vision of the organization. For example, Mahindra and Mahindra Company has embedded the innovativeness in their VMOG model.

Table 1 shows the correlation between innovation activities with lifecycle. It was found that there is a significant relationship between degrees of involvement and support the top management to enhance the innovation within the organization. This also enhances the lifecycle of the product by modification of the existing product which the customer perceives as a new product.

Hypothesis 2 Strategic intent in developing products influences NASA Knowledge Policy Document (NPD) positively.

The above stated hypotheses were tested and proved as follows. Table 2 shows the correlation between the innovation of products and strategic intent of the company. Strategic intent drives the co-management and co-governance of the clusters.

Table 2 shows that entrepreneurial culture which is an integral part of entrepreneurial ecosystem for survival in turbulent and hostile markets would require strategic intent to create such an environment facilitated by VMOG model (Liebowitz 1999). Until the companies are creating strategic directions for their employees through the PPTCR model (people, process, technology, culture and capability, and resources) it would be very difficult for the organization and employees to stay motivated toward continuous innovation. This is because, once the strategic vision is created, the resource allocation would happen enhancing knowledge sharing. It is also interesting to find from the study that leadership focus on continuous innovation such as corporate entrepreneurship is critical (Andersson et al. 2010a; Matricano et al. 2012). Also it is found from the study that autonomy given to the employees to develop products and services in innovative ways are also created through strategic intent (Lopes and Farinha 2017). For example, 3 M has strategic intent for continuous innovation and they provide work discretion to the employees for the innovation process and knowledge management (Carayannis 2013; Amidon 2002).

Table 1 Correlation of innovation in products and services with lifecycle

		(A) Innovation in products and services	(E) Lifecycle
(A) Innovation in products and services	Pearson correlation	1	0.293*
	Sig. (2-tailed)		0.021
	N	62	62
(E) Lifecycle	Pearson correlation	0.293*	1
	Sig. (2-tailed)	0.021	
	N	62	62

*Correlation is significant at the 0.05 level (2-tailed)

Table 2 Correlation of innovation in products and services with strategic intent

		(A) Innovation in products and services	(F) Strategic intent
(A) Innovation in products and services	Pearson correlation	1	0.253*
	Sig. (2-tailed)		0.048
	N	62	62
(F) Strategic Intent	Pearson correlation	0.253*	1
	Sig. (2-tailed)	0.048	
	N	62	62

*Correlation is significant at the 0.05 level (2-tailed)

Correlation Analysis

All eight macro variables of organizational antecedents and product innovation have been correlated using the Pearson correlation test. The total sample contained 381 responses. The results obtained from the test are shown in Table 3. The statistical significance of correlation is indicated with single and double asterisk marks for probability levels of less than 0.05 and less than 0.01, respectively.

There is a significant correlation among the macro variables co-management support for innovation and business creation (MS), work discretion for innovation (WD), intelligence dissemination of the market intelligence data facilitating product and service development (ID), and entrepreneurial ecosystems outcomes including number of products and services developed in recent past (entrepreneurial ecosystems using corporate entrepreneurship concepts). These are all the factors influencing the co-management variable. The study included the last 5 years of product innovations in the companies participating in the research study. Interestingly, the study shows that there is significant level of correlation between entrepreneurial ecosystems outcomes and intelligence dissemination (0.683) at 99% confidence level. This shows that knowledge management about the market intelligence data is also very critical for the integrating the customers' feedback and preferences in designing new products and services. The explanation for that might be that in most of the organizations, entrepreneurial

Table 3 Correlation of macro variables for the total sample

	MS	WD	ID	CEO
MS	1			
WD	0.367**	1		
ID	0.454**	0.557**	1	
CEO	0.501**	0.566**	0.683**	1

**Correlation is significant at the 0.01 level (2-tailed)

ecosystems outcomes are not possible without proper intelligence dissemination process.

Regression Analysis

The hypotheses of association for macro variables are tested by regression analysis. Since all the relationships are established through correlation analysis, no variables are dropped while carrying out the regression analysis. The stepwise regression models are developed and tested for the dependent macro variables, viz. management support, work discretion, and intelligence dissemination.

The first major predictor is intelligence dissemination (ID) as shown in Table 4. Intelligence dissemination also includes the sharing of knowledge thereby enhancing the process of knowledge management. The other predictors are work discretion and management support. All these variables together explain 54.2%of the variance; the rest is dependent on other variables and spurious variables are not included in the model. The corresponding ANOVA values for the regression model are shown in Table 4 indicating validation at 99% confidence level. The coefficient summary as shown in Table 4 gives beta values of intelligence dissemination (ID), work discretion (WD), and management support (MS) as 0.459, 0.235, and 0.206, respectively, which are fairly representative of their impact on the entrepreneurial ecosystems. Thus, intelligence dissemination (ID) is emerging as a major influence variable for entrepreneurial ecosystems thereby proving that knowledge management is very critical.

The model summary of macro variables is given in Table 4. Figure 2 shows the validated model for macro variables as predictors of entrepreneurial ecosystems.

Table 4 shows that if the management has strategic intent to develop sustainable products that are eco-friendly, it will enhance the sustainable growth of the organization. The study further shows that there is significant relationship between community sharing and knowledge management in replenishing and reducing and preserving resources of nature (Morrissey 2005). This knowledge base can be skillfully shared between generations through storytelling. Many tribal populations transfer knowledge from one generation to another through storytelling technique and community sharing through celebration of various cultural practices which help to preserve the eco systems for sustainable survival (Berkes 2009). Similarly, analogy can be drawn for the

Table 4 Regression model summary for corporate entrepreneurship as dependent variable

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.683	0.466	0.463	0.90723
2	0.719	0.516	0.511	0.86619
3	0.741	0.549	0.542	0.83857

[a] Predictors (constant), ID

[b] Predictors (constant), ID, WD

[c] Predictors (constant), ID, WD, MS

[d] Dependent variable CE

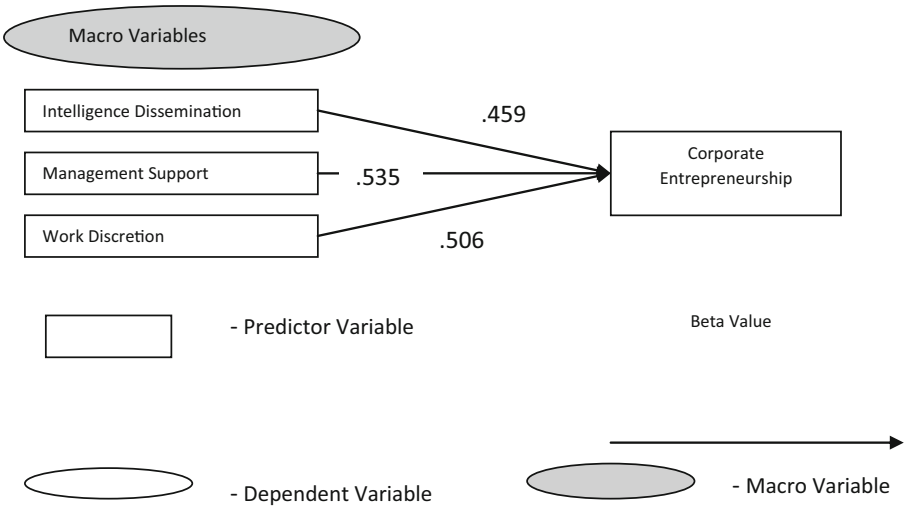

Fig. 2 Validated model for macro variables as predictors of entrepreneurial ecosystems

sustainable organization in high-tech organizations that these organizations need to intent on development of green technology–based products (Merlyn and Välikangas 1998). This also would require the strategic intent of the organization (Penrose 1959). It is also observed that there is tremendous scope of management support to build and preserve the ecosystem for sustainable enterprises (Olsson and Folke 2001; Nonaka 1994; Nonaka and Takeuchi 1995).

Validated Model

The summary of the three regression models is shown in Table 4 in terms of the independent variables acting as predictors, cumulative *R* square, and the hypotheses codes for the hypotheses accepted and the hypotheses rejected.

Figure 2 shows the validated model for macro variables as predictors of entrepreneurial culture. There are in all three hypotheses of association among macro variables and all of them have been accepted. The major predictors as per the hypotheses accepted relate to independent variables namely intelligence dissemination (ID), management support (MS), and work discretion (WD), which are either immediately preceding the dependent variables or at the best having a second level impact. The most critical among these variables is intelligence dissemination (Pentland 1995).

Hence, the organizations intending to promote innovation should have proper processes facilitated by co-management factors including knowledge management such as regular interdepartmental meetings to ensure the proper dispersion of valuable information. This will help the organizations to get the critical expertise and information to serve the customers better (Shapiro and Verian 1999). Moreover, without providing the autonomy and financial support to the employees for developing the ideas, they will not be able to generate or develop ideas (Stein and Zwass 1995; Tan et al. 1998; Vance and Eynon 1998).

The principal component factor analysis has been used to test the construct validity of organizational antecedents. In the extraction method of principal component factor analysis, ten factors with eigenvalues greater than 1.0 collectively explaining 94.16% of variance have been retained after Varimax rotation. It is seen from the factor analysis that there are ten variables which have shown loading including risk-taking, management support, rewards, work discretion, organizational flexible boundary, intelligence generation, intelligence dissemination, time availability, new business creation, and innovativeness (Wigg 1993; Zeleny 2000).

It is seen that all variables, as originally envisaged, are included in the constructs management support, work discretion, intelligence dissemination, new business creation, and innovativeness (Sungkur and Santally 2017). The macro variable intelligence dissemination shows loading on spending time discussing customer needs, periodical report circulation, cross functional meetings, inter-departmental meetings, and spending time sharing information about technology. These items have been included in the respective constructs. Thus, the confirmatory factor analysis of the organizational antecedents and entrepreneurial ecosystems outcomes confirms the validity of these organizational antecedents' and entrepreneurial ecosystems outcomes constructs. These items have been included in the final questionnaire for survey study.

Hypothesis 3 Leadership influences entrepreneurial culture and NPD positively.

Table 5 shows that leadership influences the innovation in products and services with leadership. Using correlation analysis, it was found that innovation in products and services with leadership.

Hypothesis 4 Entrepreneurial ecosystem and culture influences development of NPD positively.

The Process of Knowledge Management in Organizations

This study was undertaken with the help of case study method.

Table 5 Correlations between leadership influencing entrepreneurial culture and innovation

		(A) Innovation in products and services	(G) Leadership
(A) Innovation in products and services	Pearson correlation	1	0.583**
	Sig. (2-tailed)		0.000
	N	62	62
(G) Leadership	Pearson correlation	0.583**	1
	Sig. (2-tailed)	0.000	
	N	62	62

**Correlation is significant at the 0.01 level (2-tailed)

Table 6 Correlation of entrepreneurial culture and Innovation

		(A) Innovation in products and services	(H) Culture
(A) Innovation in products and services	Pearson correlation	1	0.466**
	Sig. (2-tailed)		0.000
	N	62	62
(H) Ecosystem and culture	Pearson correlation	0.466**	1
	Sig. (2-tailed)	0.000	
	N	62	62

**Correlation is significant at the 0.01 level (2-tailed)

Case 1: Challenges in Managing Organizational Knowledge: an IBM Story

Working with leading companies and government organizations, the IBM Institute for Knowledge-Based Organizations has identified a number of important roadblocks that organizations typically face when implementing knowledge management programs. These roadblocks are the following:

- Failure to align knowledge management efforts with the organization's strategic objectives;
- Creation of repositories without addressing the need to manage content;
- Failure to understand and connect knowledge management into individuals' daily work activities;
- An overemphasis on formal learning efforts as a mechanism for sharing knowledge; and
- Intending knowledge management efforts only within organizational boundaries.

Although these are not meant to be an exhaustive list, they represent issues that can hinder the effectiveness of a knowledge management effort, costing organizations time, money, resources, and—perhaps, most importantly—their ability to affect meaningful business results. Whether starting a new knowledge management effort, or reviewing projects that are currently under way, consider some of the following common pitfalls described in the following case studies.

Managing Organizational Knowledge in IBM

Making of vaults without tending to the need to oversee content in numerous knowledge management endeavors, a lot of consideration is put on executing archives: advancements intended to catch and store organized, or composed knowledge. These archives can run from shared document frameworks to completely actualized intranet locales. In spite of the fact that these advancements can, and do, assume an urgent part in putting away and recover archives, introducing these frameworks without tending to the related social and content management issues can bring about a large group of

issues. For instance, a purchaser items organization as of late made a limitless exhibit of databases to empower its workers to share basic client knowledge. The organization put a solid accentuation on gathering each conceivable applicable report into the framework. Before long, it was over-burden with old, obsolete client reports, exchange examination and contracts. In the wake of studying workers on the estimation of the new framework, they discovered that the association could no better find and take advantage of the knowledge that it required than it could before the new framework was presented. The time and cash spent on attempting to catch this knowledge gave little, if any, arrival. This organization took in the most difficult way possible that making fruitful vaults is a great deal more than basically executing innovation. Firms that have adequately utilized these sorts of frameworks perceive the requirement for human mediation in recognizing significant data, requesting content from specialists, redesigning these spaces all the time, and winnowing materials that are no more accommodating or important. Despite the fact that product can be helpful in inventing and seeking through records, the institute's examination has found that a definitive achievement of these frameworks is dictated by the association's capacity to create forms and commit budgetary and Office of Human Capital Management (HR) to keeping the materials pertinent and open.

Case 2: Building Organizational Capability Through Knowledge Share and Talent Development: a NASA Story

NASA's approach to knowledge management makes accessible individual as well as accumulated knowledge. This accessibility is integral to the agency's approach to talent development. Project and program managers need access to reports, experiences, and lessons learned however far back that information might go. If something starts to go wrong on a project or program at a critical juncture, they need to know where to find the information needed or where to find who has the critical skill, or wisdom, to offer a solution.

To capture and share lessons learned and integrate them into a talent development program, the agency developed a culture of knowledge sharing. This sometimes occurs in a classroom, while at other times, learning might occur in a forum, or through reading case studies, white papers and articles, or by watching videos.

NASA managed its immense trove of project and program through knowledge management. NASA created a basic structure—the Office of the Chief Engineer (OCE)—NASA's project management office (PMO). In 1976, when NASA established the office, the OCE was one individual whose role was to offer advice, expertise, and insight on engineering as an acknowledged expert to NASA's administration. It was not about knowledge capture or talent management.

As a result of the Challenger, Mars, and Columbia failures, however, NASA did a series of course corrections. In 2002, the OCE began intending on training, knowledge capture, lessons learned, and knowledge sharing. A key question driving this change was are we building our talent? In answer to that question, the OCE began its evolution to an enterprise PMO and, in 2004, the Academy of Project/Program and Engineering Leadership (APPEL) moved from the Office of Human Capital Management (HR) to the Office of the Chief Engineer. This move would advance the development of an agency-wide solution for talent development. In 2005, APPEL assumed responsibility

for engineering to help NASA meet a critical need—build systems engineering capability.

Although this seems counterintuitive, at NASA, HR wasn't within the mission in terms of program and project teams. Moving talent development to the OCE created a structure for the development of a strategy for individual and team training that would support project and program success on an enterprise level. NASA recognized that the capability to capture knowledge and lessons learned in the engineering, project, and program chain would eliminate the disconnection among these groups.

To succeed, NASA's projects and programs require thousands of things to go right. To fail, only one thing needs to go wrong. As NASA learned from its failures, it made significant organizational changes that today govern how lessons are captured; how knowledge is shared enterprise wide; and how talent is developed. The OCE is now responsible for policy, standards, workforce development, advanced concepts, strategy and mission architecture, integration across program, and mission boundaries and program assessment. APPEL as a component of the OCE leads the agency's definition and development of competencies and training activities.

Evolution of NASA's Chief Knowledge Office

Subsequent to a considerable measure of what NASA does is the thing that it has done some time recently; it turned out to be clear that to catch encounters and join them into lessons learned NASA would need to buildup an organization-wide philosophy for adequately imparting what worked and what did not. A central segment of that approach would be to influence narrating and reflection.

They describe the genuine encounters of experts and convey vital down to earth knowledge and best practices that perusers and audience members can apply to their own tasks and programs, urging them to stop, think, talk, and ponder their encounters and those of others. The organization has coordinated narrating sessions into its ability advancement system to make intelligent venture and program directors who share their bits of knowledge as a methodology for sharing knowledge and experience over the endeavor. In the first place, a ton of venture and program pioneers contemplated them sharing what they had realized. What they found through telling their stories was that they were adapting more about their own style, what worked, and what did not.

Human deduction is outfitted to our inclinations. In an unpredictable association where there are a wide range of perspectives from a wide range of societies with various observations, narrating is a technique for forming pioneers who can impart successfully and are interested in various perspectives. Considering that 80% of NASA's missions are worldwide, they get to be crucial for sharing background, knowledge, and lessons learned. In 2011, the NASA Aerospace Safety Advisory Panel (ASAP) got to be uncomfortable with the divided way of knowledge over the general office and prompted NASA to designate an office-level Chief Knowledge Officer (CKO).

This proposition was endorsed and Dr. Ed Hoffman was designated in 2012, with every Center, Mission Directorate, and agency support office taking after before long.

Answering to the OCE, NASA's Chief Knowledge Officer assumes liability for knowledge strategy and the incorporation of knowledge administrations over the

office's projects and extends office wide. Situating the part of the Chief Knowledge Officer at such an abnormal state imparts to the undertaking and its industry accomplices that protecting and applying unsaid and express knowledge was being considered important by the office.

Since that time, there have been noteworthy enhancements in the office's knowledge base, including a redesign to the knowledge administration report, the NASA Knowledge Policy Document (NPD) 7120.6, a stock of office knowledge administrations and items, and the production of an intelligent manual for presentation and access this office-knowledge stock.

The agency CKO developed a set of knowledge services strategic imperatives that target NASA objectives for knowledge and emphasizes the development and implementation of future knowledge initiatives, measures, and metrics

- In terms of people, sustain and expand the use of the agency's intellectual capital across NASA's enterprises and generations through better networks, alliances, and communities of practice.
- In terms of people, increase collaboration across organizational barriers through promotion of a culture of openness (Arnold and Fernandez-Gimenez 2007).
- In terms of systems, support the technical workforce in executing NASA's missions efficiently and effectively through lessons learned, mishap reports, and promulgation of best practices.
- In terms of systems, create a marketplace for knowledge that identifies the value of information and aligns practitioner and organizational imperatives through accessible information and user-friendly services.

In applying the benefits of 30 years at the agency, Dr. Hoffman recognized that any knowledge management approach for NASA needed to be adaptable and flexible enough to accommodate the varied requirements and cultural characteristics of each Center and Mission Directorate. A federated model was certainly the best fit for the agency, defining the NASA CKO and Deputy CKO functions as facilitators and champions for agency knowledge services.

The NPD 7120 NASA Knowledge Policy for Programs and Projects was rewritten to adjust to the fact that NASA had greatly expanded its knowledge activities over the past several years to include a wider array of services than simply archiving lessons-learned. The document's federated approach resulted in an iteratively reviewed inventory and definition of agency knowledge services captured on a NASA Knowledge Map.

The Evolution in Perspective

Through failure and the willingness to accept hard truths and learn from them, NASA evolved into the mature organization it is today. Challenger, the Mars Missions, and Columbia brought NASA to the realization that a rigorous and sustained commitment to excellence ensures excellence. After Challenger, assumptions intended completely on individual development. These assumptions would prove inadequate.

After the Mars failures, NASA realized that projects and programs happen in teams. They had talented people, but they were trained and prepared to work as individuals. As a result, they were unable to work effectively in teams.

After Columbia, NASA realized it had to take a knowledge management approach to ensure success with projects and teams.

These events, and what NASA learned from them, helped shape the OCE's evolution into an enterprise-wide PMO. It is a story about the integration of policies and guidance, talent development, learning, projects, programs, and consulting support to drive program excellence and advanced issues in technology.

"At NASA, stories engender organization sustainability. They are how NASA learns."

The latest chapter in NASA's evolution as a learning organization emphasizes the enterprise-wide influence of a PMO. Taking a federated approach, the PMO is the intent of recurring lessons that will guide the organization into the future. Experience has taught the agency that while these lessons can be simple to articulate, they can be difficult to achieve and even harder to maintain. Yet experience has also taught NASA that lessons learned can provide clear markers for the future.

A defining characteristic of a mature organization is its ability to adapt and change. In January 2013, NASA realized that their system for capturing and sharing knowledge was outdated and began to forge a new policy that emphasizes a more integrated approach to lessons learned and knowledge management. This integrated approach is knowledge services.

Knowledge Services at NASA

The advantages of knowledge administrations are regularly highlighted most distinctively when the mission is debilitated from different sources, for example, political, social, specialized, and budgetary—as seen most obviously through the Challenger and Columbia mishaps. On the other hand, in an undertaking and program association like NASA, there are numerous less extreme additionally vital open doors for knowledge administrations to add to positive results through venture surveys and authoritative reviews. These exercises can highlight insufficiencies that can then be tended to through knowledge administrations.

One fundamental lesson that NASA has educated is that the professional frequently knows best. Work is refined through building, exploratory and management experts, and knowledge benefits that arrange around the work, and the professionals have demonstrated generally significant.

A potential threat, distinguished through hard experience, is to consider knowledge work the selective area of knowledge experts. Inclusivity for all benefactors inside of the association—and also specialists in other government offices, industry, the educated community, and global accomplices—has demonstrated a significantly more fruitful knowledge technique.

At NASA knowledge administrations is a dynamic trade of intelligence and lessons learned through access to both individuals and innovation (Kalai and Zghidi 2017; Argote et al. 1990). While there can frequently be a challenge between innovation or

individual approaches, NASA trusts that an ideal parity of both is important to mission success.

NASA's Six Knowledge Service Categories Identified and Defined

The following six knowledge service categories were identified and defined for the Knowledge Map (Bollinger and Smith 2001; Bolloju et al. 2002):

1. Case studies and publications comprise of investigations and their sidekick readings that uncover knowledge from individuals and missions, and the elements adding to mission achievement, for example, the Goddard Space Flight Center (GSFC) Case Study program and the NASA CKO production ASK Magazine.
2. Face-to-face knowledge services comprise of exercises including the physical vicinity of members in the same land area and the catch and scattering of knowledge that adds to mission achievement, for example, the APPEL Masters Forum and the NASA Engineering Safety Center (NESC) Engineering Workshops.
3. Online tools comprise of an assorted arrangement of web-empowered, movement particular, synchronous, and offbeat capacities that outcome in knowledge that can be connected toward mission achievement. Samples of this are the Johnson Spaceflight Center (JSC), Shuttle Knowledge Console, and the Human Exploration and Operations (HEO) arrangement of the Group Systems Think Tank choice backing apparatus on the NASA Interactive Collaborative Environment (ICE) (Plummer and Armitage 2007).
4. Knowledge networks comprise of groups that share basic knowledge capacities and prerequisites, and through collaboration produce significant knowledge for mission achievement. Cases incorporate recognized groups of practice in the Office of the Chief Engineer (OCE), NASA Engineering Network (NEN), and the Human Exploration and Operations (HEO) Interactive Collaborative Environment (ICE) (Ostrom 2005; Raudeliūnienė et al. 2016).
5. Lessons learned and knowledge processes comprise of databases and related exercises particularly designed for catch, stockpiling, and recovery of knowledge for mission achievement. Illustrations incorporate the Office of the Chief Engineer (OCE), Lessons Learned Information System (LLIS), and the Jet Propulsion Laboratory (JPL) Stories chronicle.
6. Search/tag/taxonomy tools comprise of data and information transfers innovation and application advancement that outcome in enhanced capacities for route, association, and look improvement of knowledge to apply toward mission achievement (Cohen and Levinthal 1990; D'Atri and Sacca 2010). Cases of this are the JSC Semantic System and the NASA APPEL Knowledge Categorization venture (Davenport and Prusak 1998).

Case 3: Toyota's Personal Knowledge Approach

Toyota gives an illustration of an individual knowledge way to deal with exchanging knowledge inside of a worldwide association. At the point when Toyota manufactures

another industrial facility and needs to exchange knowledge about its generation framework to the new representatives in the processing plant, Toyota commonly chooses a center gathering of a few hundred new representatives and sends them for a while preparing and taking a shot at the sequential construction system in one of Toyota's current production lines. Following a while of concentrating on the generation framework and working nearby experienced Toyota sequential construction system specialists, these prepared laborers are sent back to their new manufacturing plant site to wind up the center of creation groups shaped with other new representatives. When they are repatriated, these prepared laborers are likewise joined by two hundred or so long-haul, profoundly experienced Toyota creation specialists, who then work nearby all the new representatives in the new industrial facility to guarantee that knowledge of how Toyota's generation process functions is completely exchanged to all representatives in the new plant. Toyota's utilization of quality circles additionally delineates an individual knowledge way to deal with making new knowledge. Toward the end of every work week, gatherings of Toyota creation laborers burn through one to two hours examining the execution of their stage in the generation framework to distinguish real or potential issues in quality, profitability, security, and so on. Through their examinations, every gathering proposes "countermeasures" to remedy distinguished issues, and talks about the consequences of countermeasures taken amid the earlier week to address issues recognized in before quality circle dialogs. Through such collaborations, Toyota workers share their thoughts for development, devise ventures to test new thoughts, and evaluate the aftereffects of their tests. Some study analyzed the effect of international collaboration on regional markets (Ivanova et al. 2017). This knowledge management rehearse, which is rehashed week after week as an essential part of the Toyota creation framework, continuously recognizes, takes out, and even anticipates wellsprings of procedure blunders. Enhancements created and executed by quality circles over numerous years have changed Toyota's generation framework into one of the most astounding quality creation forms on the planet.

Conclusion

The study shows that styles on innovation in products and services would enlarge and extend the sustainability of the lifecycle of products and services. For example, the product modification strategy would extend the declining sales of the products thereby extending the lifecycle. The study further shows that strategic intent is very critical for creating the vision for co-management and co-governance. Since many stakeholders are there in a particular cluster, it is interesting to find that it is this strategic intent of the companies established in the cluster which drives the knowledge sharing intention of the employees within and outside the firm. This VMOG model creates a strategic alignment with the companies that are creating strategic directions for their employees using PPTCR model (people, process, technology, culture and capability, and resources).

The study contributes toward the body of knowledge of theories related to knowledge management, co-management, and co-governance in clusters. It has been found that lifecycle is greatly affected by the mode of technology innovation. The research implications include the correlation between the co-governance and co-management for

future direction of research where there is a huge gap. Also, there are no studies available on the relationship between co-management factors and policy implications for such innovative clusters.

Also there are implications for decision makers including private/academic entrepreneurs and public (governmental and sub-governmental) actors: Two different groups of decision makers are being addressed simultaneously: (1) private entrepreneurs (firms, commercial firms, and academic firms) and academic entrepreneurs (universities), interested in optimizing knowledge management and in developing heterogeneously composed knowledge-based research networks; and (2) public (governmental and sub-governmental) actors that are interested in optimizing and further-developing their policies and policy strategies that target knowledge and innovation. One purpose of public *knowledge and innovation policy* is to enhance the performance and competitiveness of emerging economies as they are the driving force of growth.

Decision makers are systematically being supplied with crucial information, for how to optimize knowledge-referring and knowledge-enhancing decision-making. The nature of this "crucial information" is conceptual as well as empirical (case study-based). Empirical information highlights practical examples and points toward practical solutions (perhaps remedies); conceptual information offers the advantage of further-driving and further-carrying tools of understanding. Different groups of addressed decision makers could be the following: decision makers at private firms and multinational corporations, responsible for the knowledge portfolio of companies; knowledge and knowledge management consultants; globalization experts, intending on the internationalization of R&D, S&T and innovation; experts in university/business research networks; and political scientists, economists, and business professionals.

KM deals with explicit knowledge and tacit knowledge and should possess maturity attribute, dynamic attribute, and self-growth attribute (Yin and Lin 2002). Successful KM needs a trust-based organizational culture to facilitate knowledge sharing and should be supported by an organization structure which can result in organization learning and fits in the trust and open cultural environment. The visionary leaders would always guide their teams toward sustainable long term innovative solutions which also help to preserve the ecosystems and build it. This kind of leadership skills would also direct the energy of their employees toward development of sustainable products with the help of co-creation between the community, people, and employees. This kind of co-created products would always be the sustainable source of continuous innovation and growth for the organization. In future, it is predicted that sustainability of the product-development culture is going to be competitive, and advantage between the companies can be facilitated by co-management and co-governance. In this process of creating and preserving ecosystem of continuous growth, leadership plays an important role, failure to align knowledge management efforts with the organization's strategic objectives. Successful knowledge management programs often begin by addressing a critical business problem facing the company. However, many firms fail to align their knowledge efforts with their most pressing business issues (Demsetz 1991; Drucker 1993). When this occurs, significant time and effort is spent on projects that have minimal impact, while key needs are not addressed or are completely overlooked (El Sawy et al. 1997). For example, a manufacturing company started a number of knowledge-related initiatives, but failed to align these efforts with their most

critical business objective: the integration of a newly acquired subsidiary. Unfamiliar with the expertise and skills within the recently purchased company, the manufacturer lost an important contract that it should have easily won had it used the combined knowledge of both firms. Hence, a major opportunity was lost because the firm's knowledge management efforts were not aligned with the organization's strategic goals. Installing systems without addressing related cultural and content management issues can result in a host of problems. The paper also explores the scope of role of strategic direction, knowledge management, and new product development through market orientation of the firm thereby improving the competitiveness of the firm (Grant 1996; Gupta and Govindarajan 2000).

Research and Managerial Implications and Theoretical Contribution

The present study shows that there is significant relationship between leadership style, ecosystems creation, and market orientation involving community services for co-creating the products. If the creation of new products and services involve the community, it facilitates the sustainable development of the organization. It is also observed from the analysis that creating the sustainable culture by leaders is a very critical aspect of maintaining the ecosystem of innovation within the company. The theoretical contribution of the study includes the identification of the drivers of entrepreneurial ecosystem. The study also facilitates in finding the process of knowledge management which includes intelligence generation and dissemination.

The research implications include researching further the variables for creating sustainable ecosystem. It can also be critically assessed with the various aspects of knowledge sharing which can enhance the effectiveness of innovative capability in the organization. The future directions for research may include these aspects in detailed study. These studies may be taken up at company, country, and corporate levels.

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