

Matrix structure for supporting organisational innovation capability

Saunila Minna, Mäkimattila Martti, Salminen Juho

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MATRIX STRUCTURE FOR SUPPORTING ORGANIZATIONAL INNOVATION CAPABILITY

Abstract

The importance of an organization's capability to produce innovations has been noticed to be increasingly important. Previous literature has discussed appropriate organizational structures for innovation activities. The matrix structure is widely seen to be appropriate for innovation activities, as it aims to capture both the efficiency and specialization of a functional organization, as well as the customer focus and flexibility of a multidivisional organization. The aim of this study is to find out whether a matrix organizational structure supports harnessing hidden innovation capability. The paper presents a study conducted in an organization specializing in different areas of media business. The analysis shows that turning into a matrix is not an answer to realizing all dimensions of innovation capability. The paper contributes to the current understanding by providing guidelines for how innovation capability can be understood in a matrix design, and also by defining guidelines for further research.

Keywords: innovation capability; organizational structure; matrix organization; media business; innovation structures; organizational culture; leadership; external knowledge; creativity

1 Introduction

Today, more and more attention is paid to the ability of organizations to develop their innovations. The capability to innovate is likely to be a particularly crucial learning output, because it is the key to gaining dynamic competitive advantage (Romijn and Albaladejo, 2002). Lawson and Samson (2001) define innovation capability as "the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders". Therefore, the concept of innovation capability is intangible by nature. Innovation capability, as intangibles in general, is hard to concretize directly, but it can be done by defining the dimensions closely related to it. The dimensions of innovation capability should be developed in order to achieve higher innovativeness. One of the factors that have an impact on an organization's innovative behavior is organizational design (Mosurović and Kutlača, 2011). The innovative organization should be supported by organizational design which enables creativity, learning and interaction (Tidd et al., 2005). Lawson and Samson (2001) have also identified that proper organizational structures and systems are likely to have an effect on innovation capability. Bessant (2003) highlights the importance of the ability to create consistency between innovation values and behavior and the organizational context (structures, procedures etc.), as well as the ability to move innovative activity across organizational boundaries. According to Subramanian and Nilakanta (1996), decentralized and informal organizational structures facilitate innovations.

The matrix organization has been seen as an answer for organizations struggling with an increasing need for innovation and flexibility. For the matrix structure to function properly, it is important to build relationships and real dialogue between the units (Nesheim, 2011). The matrix structure may increase the frequency of communication in the organization, and help employees and managers to transfer and share knowledge across the organization (Ford and

Randolph, 1992; Ramezan, 2011). It can be suggested that the matrix structure facilitates innovation capability, as according to the literature it enables learning and interaction between departments and units. The paper presents a case study where the matrix organizational structure was realized to support harnessing the organization's innovation capability. The aim of the research was to find out whether a recently formed matrix structure would support innovation capability.

The paper is structured as follows. First, a review of literature that focuses on organizational innovation capability and the matrix organizational structure is provided. The next section presents the research methodology used in the study. Then, the results of the study are presented. The paper concludes with a discussion of the implications of the work and recommendations for further research.

2 Literature review

2.1 Organizational innovation capability

Innovation capability is a dynamic capability with multiple dimensions (Sáenz et al., 2009) (i.e. a capability which allows the organization to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997)). Innovation capability has been suggested to be a multi-faceted construct. Innovation capability, as intangibles in general, is hard to concretize directly, but it can be done by defining dimensions closely related to it. The dimensions of innovation capability can also be considered as inputs of innovation activities. According to Davila et al. (2006), inputs are resources dedicated to the creation of innovations. The inputs may be tangible, namely people, money, time, equipment etc., or intangible, such as motivation, knowledge and organizational culture.

As a synthesis of earlier literature, these dimensions include for example leadership (Bessant, 2003; Martensen et al., 2007; Skarzynski and Gibson, 2008; Kallio et al., 2012), employees' skills and innovativeness (Martensen et al., 2007; Skarzynski and Gibson, 2008; Tura et al., 2008; Kallio et al., 2012), innovation processes (Lawson and Samson, 2001; Skarzynski and Gibson, 2008; Kallio et al., 2012), organizational culture that supports innovation (Lawson and Samson, 2001; Wan et al., 2005; Martensen et al., 2007; Skarzynski and Gibson, 2008; Kallio et al., 2012), external sources for information (Romijn and Albaladejo, 2002; Tidd et al., 2005; Kallio et al., 2012), and the development of the individual knowledge of employees (Bessant, 2003; Tidd et al., 2005). However, innovation capability may not be a unitary set of attributes, and the attributes do not operate independently of each other but are interrelated (Francis and Bessant, 2005; Smith et al., 2008; Kallio et al., 2012). Different types of organizations may utilize different determinants when developing their innovation capability (Saunila et al., 2012).

In this study, the conceptualization of innovation capability is formed by utilizing the previous work of Kallio et al. (2012) and Saunila et al. (2012). Innovation capability is divided into five dimensions, which can be either drivers or obstacles of innovation capability: innovation structures, organizational culture, leadership, exploitation of external knowledge, and individual creativity. These categories are discussed in detail below.

Innovation structures

It is important for innovativeness to change old practices to meet current requirements by adopting new ideas (Börjesson and Elmquist, 2012). This requires suitable structures for innovation activities, which has been highlighted in the current literature (e.g. Dobni, 2008; Wan et al., 2005). Innovation processes are related to the generation, development and implementation of innovations (Smith et al. 2008). A collaborative environment is necessary for the process of creating and transferring knowledge (Van Winkelen and Tovstiga, 2009), and it also enhances innovativeness and new ideas (Pournaras and Lazakidou 2008). Also Subramanian and Nilakanta (1996) propose that the flexibility and openness of structures help to encourage new idea generation. Innovation requires supporting tools, processes and mechanisms to enable idea generation and to turn innovation into an asset for the firm (Skarzynski and Gibson, 2008).

Organizational culture

For the employees to be motivated to innovate, there must be a culture that both supports and rewards innovation (Wan et al., 2005). The organizational culture is related to the values and beliefs of the organization and how these impact the ability to manage innovation. This means the organization's attitudes to collaboration, communication and risk (Smith et al. 2008). High levels of integrity, competence, reliability, loyalty and openness to others may increase innovativeness. This requires for the employees to understand their roles, and then they will be able to develop their creative and independent sides further (Dobni 2008). Bessant (2003) discusses high-involvement innovation, and the concept comes essentially down to creating a culture where innovation is a way of life. Innovation should be deeply internalized to become a value to the firm. This requires a collaborative, open culture and incentives that reward challenging current actions (Skarzynski and Gibson, 2008). In a similar type of research, Wan et al. (2005) suggest that important issues for innovation are the belief that innovation is important, willingness to take risks, and willingness to exchange ideas. In addition, organizations need to be tolerant of the mistakes that will occur and to allow for recovery and learning from failure (Wan et al., 2005; Lawson and Samson, 2001).

Leadership

Leadership includes the way the management influences the management of innovation. For example, it takes into account the management style and how the management can motivate the employees to become more innovative (Smith et al. 2008), meaning that the individual innovation capability of the employees must be applied and managed correctly (Waychal et al., 2011). According to Dershin (2010), the role of the management is to provide supporting system for innovation activities, rather than look over the shoulders of innovators. This means that the management invests resources (money, time, effort, other resources and prioritization) in factors that the management can formulate, guide and control to some degree (Barrett et al., 2012). Teece (1997) suggests that old models of the organization with deep hierarchies need to be transformed into new leadership models where the employment relation is understood in non-traditional terms. Participative leadership boosts the employees' trust, commitment and appreciation of the managers (Yukl, 1998). This mutual trust and respect creates an atmosphere that encourages individuals to try out new ideas without fear of failure and its consequences. Thus, it is important for innovation that managers to invest time in increasing the personnel's opportunities to participate in development activities (Lampikoski and Emden, 1999; Wan et al., 2005).

Exploitation of external knowledge

A firm's capability to establish and use relationships with other organizations has also been emphasized as a source of innovations (e.g. Romijn and Albaladejo, 2002; Swink, 2006; Mei and Nie, 2008). Exploitation of the external knowledge dimension refers to the behavior of a firm of acquiring knowledge outside the organization. It has been stated that benefiting from collaboration in innovation requires leveraging complementarities between internal and external sources of innovation (Barbaroux, 2012). The strength of inter-firm relationships influences the extent of tacit knowledge transfer, and the tacit knowledge obtained from partner firms affects a firm's innovation capability (Cavusgil et al., 2003). Learning about external environment is vital for innovation, because interaction with suppliers, customers, industry associations, competitors and the like can provide missing external inputs which the organization itself cannot provide (Lawson and Samson, 2001; Romijn and Albaladejo, 2002).

Individual creativity

It has been stated that innovation is a skill that can be taught (Skarzynski and Gibson, 2008). The employees play an important role in affecting innovation management, and their creativity is needed in developing new ideas (Bresciani, 2009). The individual creativity of employees includes various personal characteristics associated with employees, as well as the motivation of employees to become innovative (Smith et al. 2008). For example, creativity can be defined as the creation of novel and useful ideas in any domain (Amabile et al., 1996). People who have creativity and intrinsic motivation (as well as skills) for their work will be favorable for creating a work environment that supports the creation of innovations. Creative thinking includes the following: the individual has new perspectives on problems, is willing to take risks, and has tolerance for ambiguity (Amabile, 1997). The effect of empowerment for innovation capability has also been acknowledged by highlighting the importance of the fact that the individual can affect the outcome of his work (Yang and Choi, 2009).

2.2 Organizational structures for successful innovation

Organizational structures and design have an effect on the innovation capability and behavior of organizations (Menguc and Auh, 2010; Mosurović and Kutlača, 2011). Previous literature has discussed appropriate organizational structures for innovation activities. According to DeCanio et al. (2000), organizational structure affects the behavior of organizations through at least two channels. First, the structure can have an effect on the firm's profitability or the speed in adopting productivity-enhancing innovations. Second, the structure of the firm can have consequences for the individuals or operating units that comprise the organization. Also, changes in external circumstances can produce dynamic adjustments in the firm's internal patterns of communication and connectedness.

Functional organizations are considered insufficient for innovation, because their high levels of formalization and control are in conflict with the character of innovation processes. An organic structure, which is more flexible and adaptive, is unanimously preferred. Organic structures provoke individual expression and encourage product champions to arise. The organic structure has also balance between formalization (in the interest of efficiency) and the advantages of a loose, open, creative and adaptive structure (Van der Panne et al., 2003). The characteristics of the organic structure, such as flexibility and interactiveness, help employees and managers to transfer and share knowledge across the organization (Ramezan, 2011).

One example of the organic structure, the matrix structure is a cross-functional structure that aims to bring people together from separate functional areas in the organization to undertake tasks (Ford and Randolph, 1992). The matrix structure is generally preferred as it responds to the need for integration and control (Van der Panne et al., 2003). According to Miles et al. (2010), the matrix would allow flexible integration and application of technologies from a variety of sources to the development of new products and markets. In the matrix design, downstream operating units draw on various upstream capabilities in the operation of existing businesses and in developing and delivering new products and services for new customers (Miles et al., 2010). It has also been claimed that the cross-functional structure both creates lateral communication, which increases the frequency of communication in the organization, and increases the amount of information the organization can handle. This type of structure is flexible in the use of human and capital resources, and it also increases individual motivation, job satisfaction, commitment and personal development (Ford and Randolph, 1992).

The matrix structure is flat and rather strongly functionally and divisionally departmentalized. The formalization has to be relatively extensive for communication and coordination to work well (Meijaard, 2005). Once an organization has established a hierarchical matrix structure, it is expected that the most important issues of coordination and dependencies are handled inside the various units or by the use of the hierarchy. However, especially in large and complex organizations, there will be dependencies and issues that require coordination between departments and units (Nesheim, 2011). Thus, the matrix may develop liaison roles, similar to the role of a project manager, to provide coordination across functional departments (Burns, 1993).

Overall, the matrix design aims to capture both the efficiency and specialization of the functional organization and the customer focus and flexibility of the multidivisional organization (Galbright, 1971; Miles et al., 2010; Fjeldstad et al., 2012). However, the cost of simultaneous efficiency and flexibility is high internal complexity (Fjeldstad et al., 2012). The matrix organization has also been claimed to create ambiguity over resources, technical issues, pay and personnel assignments, conflicts between functional and project managers and the personnel, as well as insecurity for managers and to erode their autonomy (Ford and Randolph, 1992). The matrix structure can also cause political battles over resources and a lack of accountability, resulting in risk-averse behavior and loss of market share (Strikwerda and Stoelhorst, 2009). The matrix structure cannot thus be plugged into an organization's existing structures and expect success it needs to be developed uniquely for a certain situation targeted to support the organization's needs (Ford and Randolph, 1992). The management of such organizations should acknowledge both the potential and the challenges of such structures (Nesheim et al., 2011).

2.3 Summary of the literature

As pointed out in earlier literature, innovativeness requires proper structures to succeed. However, more research is needed to study the organizational structures when aiming at better innovation capability (Menguc and Auh, 2010). Getting complex structures, such as a matrix, to work effectively is a challenge for organizations (Galbraith, 2012). The matrix organization is seen as a suitable way to increase for example flexibility and communication over departments and units. Thus the proposition of this paper is that innovation capability should also be improved through a successfully implemented matrix structure. People with different

backgrounds (age, gender, professional affiliation) should see the organizational innovation capability similarly throughout the organization. In this study innovation capability consists of five dimensions that can be either drivers or obstacles of innovation capability: innovation structures, organizational structures, leadership, exploitation of external knowledge, and individual activity. As a summary, when an organization implements a matrix structure, the innovation capability should develop as well. The matrix structure can thus be seen as a way to increase the cohesion of the organization as regards innovation capability. The prior goal is to make the innovation structures functioning, but also to develop unitary innovation capability through an organization, considering the other four dimensions of innovation capability (organizational culture, leadership, exploitation of external knowledge, and individual creativity).

3 Research methodology

3.1 Research setting

The case organization is a private organization specializing in various areas of media business, located in southern Finland, and seen as a very important actor regionally. It has several business units, each with their own functions in business and with different roles in the organization. This includes several printed papers, internet services, radio and traditional supportive units like sales, printing, distribution, and functions like IT and administration. The units have long traditions as separate organizations, some even competing with each other. There are altogether around 270 employees in the organization. The organization, like its competitors in media business, struggles with the common challenges in the rapidly changing business environment. They have understood that innovations are needed for renewal and future business success, as cutting costs is not enough for survival. An organization's capabilities of utilizing the knowledge and networks of the personnel are crucial, and adapting new technology is a key issue for innovation and for success in competition. The old line structure was not seen proper for the competitive business environment. The case organization has made strong efforts to force its innovation capabilities with organizational changes and by focusing resources on innovation activities, and by building intra- and inter-organizational collaboration. The goal has been to build unitary operations and innovation capability across the organization. The new organizational structure was launched in 2009, when the matrix organizational structure was realized to support harnessing the hidden innovation potential for business. This research project was conducted one year after the adapting of the matrix structure to study the effects of the new organizational design. The opinions of people in different units were used to measure the currency of consistent organizational innovation capability.

3.2 Questionnaire design

A questionnaire was constructed for the themes related to organizational innovation capability. Based on the literature review, 55 initial items were operationalized (see Kallio et al. (2012) for further details). The items were reviewed and revised with a group of researchers in order to ensure the appropriateness of each item. This process resulted in 42 items being eliminated, and 13 remained for the final version of the questionnaire. The selected items and their background are presented in Table 1. For each of the 13 items utilized, the respondents were asked to indicate their opinion on a Likert-type scale ranging from 1 (strongly disagree) to 5

(strongly agree). A neutral response “neither disagree nor agree”, was adopted to reduce uninformed responses.

Table 1. Measurement items

Item	Meaning for achieving higher innovation capability
INNOVATION STRUCTURES	
1 Ideas are systematically collected in our unit	Innovation should be supported by sufficient tools, processes and systems
2 We have a clear way of how ideas are processed and implemented	Effective further development of ideas is necessary for the success of the innovation process
3 I get feedback for my ideas	Feedback should be given concerning improvement suggestions for innovation
ORGANIZATIONAL CULTURE	
4 We ensure that the reasons for problems are investigated and eliminated	It is important to modify systems and processes fairly quickly
5 Different opinions are appreciated in our organization	An organization should tolerate individuals who do things in a different way
6 Cooperation between units works well	An organization should have an effective environment for collaboration within and between departments
LEADERSHIP	
7 I have the courage to try new things despite the possibility of failure	Individuals should be encouraged to try new ideas without fear of failure and its consequences
8 My ideas have an effect on our actions	Managers should increase the personnel’s opportunities to participate in development activities
EXPLOITATION OF EXTERNAL KNOWLEDGE	
9 I apply ideas from other fields of industry to my work	Good ideas emerge by applying information from outside an organization
10 I interact with customers in my work	Interaction with customers can provide missing inputs into the learning process which the organization itself cannot provide
11 Customers’ ideas are exploited in our unit	The ability to exploit external knowledge is a critical component of innovative capability
INDIVIDUAL CREATIVITY	
12 I enjoy my work	Internal motivation includes for example deep interest and involvement in one’s work
13 I participate actively in development	Individuals should have an opportunity to affect the outcome of their work

3.3 Sample and description of the data

To achieve an overall view of the innovation capability, the whole personnel of the organization was asked to fill in the questionnaire in the Internet. A total of 147 valid responses were received, representing a 54.4 per cent response rate.

The background information of the respondents is presented in Table 2. As can be seen, the respondents are quite equally divided into male and female respondents. The distribution of the respondents in different age groups is quite equal, except for people less than 30 years of age.

The distribution of the responses depending on professional affiliation is well in line with the total workforce of the case organization. Professional affiliation is defined as an employee's location in an organizational department and the job category.

Table 2. Background information of the respondents

		n	%
Gender	Female	74	49.7
	Male	72	48.3
	No response	3	2.0
Age	< 30	8	5.4
	30-39	44	29.5
	40-49	40	26.8
	≥ 50	52	34.9
	No response	5	3.4
Professional affiliation	Editorial	62	41.6
	Sales	35	23.5
	Administration	27	18.1
	Other: press, distribution, announcement, traffic	24	16.1
	No response	1	0.7

A description of the entire data is presented here through means and standard deviations. As regards the results of the different dimensions of innovation capability in Table 3, it can be stated that the issues concerning the exploitation of external knowledge (means 2.77-3.72) and individual creativity (means 3.26-3.66) seem to be on a satisfactory level. However, the dimension of innovation structures seems to be on a weak level. When focusing on the big picture of the items of this dimension, it can be stated that the items of this dimension reached lower means (2.40-2.56) than the other dimensions. In the dimension of innovation structures, the mean for the item “we have a clear way of how ideas are processes and implemented” was only 2.40. This indicates that the innovation process is not clear in the case organization. Also, idea generation is not systematic and proper feedback is not received. Also the item “We ensure that the reasons for problems are investigated and eliminated” of the culture dimension reached a low mean (2.47), which indicates that it has been perceived as unfavorable. The items that were considered as good were “I interact with customers in my work” with the mean of 3.72, and the item “I enjoy my work” with the mean of 3.66. Also the means for the items “I have the courage to try new things despite the possibility of failure”, “I participate actively in development” and “I apply ideas from other fields of industry to my work” were over three.

4 Results

The items, factor loadings, and reliability statistics are presented below. To assess the construct validity of the measurement scales, Factor Analysis (FA) was performed. The five scales were subjected to principal component analysis to test the unidimensionality of the constructs and to eliminate unreliable items. As shown in Table 3, the results of the FA suggest that the standardized loadings are highly significant for all the items (the loadings vary from 0.750 to 0.908), suggesting that the underlying constructs are valid. To test the reliability of the results,

a Cronbach's alpha test was performed. The alpha values of all five scales, as shown in Table 3, are greater than 0.60. The overall reliability of the construct is therefore supported.

Table 3. Means and standard deviations of the items, and standardized loadings

Item	Mean	Std. Dev.	Loadings	Cronbach's alpha
Innovation structures				0.809
1 Ideas are systematically collected in our unit	2.53	1.024	0.908	
2 We have a clear way of how ideas are processed and implemented	2.40	1.012	0.897	
3 I get feedback for my ideas	2.56	1.099	0.750	
Organizational culture				0.732
4 We ensure that the reasons for problems are investigated and eliminated	2.47	1.063	0.837	
5 Different opinions are appreciated in our organization	2.64	1.053	0.804	
6 Cooperation between units works well	2.53	1.050	0.780	
Leadership				0.667
7 I have the courage to try new things despite the possibility of failure	3.11	0.994	0.868	
8 My ideas have an effect on our actions	2.85	1.147	0.868	
Exploitation of external knowledge				0.692
9 I apply ideas from other fields of industry to my work	3.09	1.099	0.797	
10 I interact with customers in my work	3.72	1.247	0.792	
11 Customers' ideas are exploited in our unit	2.77	1.165	0.774	
Individual creativity				0.638
12 I enjoy my work	3.66	1.119	0.857	
13 I participate actively in development	3.26	1.147	0.857	

The correlations of the variables are presented in Table 4. It was found that the dimensions of innovation capability had significant and positive correlations with each other. In order to assess the extent of multicollinearity, the variance inflation factor (VIF) was computed. The VIFs were significantly below the cut-off value of 10, and therefore it is suggested that multicollinearity is not a problem.

Table 4. Means, standard deviations and correlations of the variables

	Mean	SD	1	2	3	4	5
1 Innovation structures	2.49	0.889	1.000				
2 Organizational culture	2.55	0.852	0.535***	1.000			
3 Leadership	2.98	0.930	0.508***	0.519***	1.000		
4 Exploitation of external knowledge	3.19	0.922	0.555***	0.456***	0.585***	1.000	
5 Individual creativity	3.46	0.971	0.428***	0.612***	0.496***	0.513***	1.000

Sign. *** ≤ 0.001

Next it was studied whether differences could be found between the different respondent groups regarding the respondents' perceptions of the different dimensions of innovation capability. The means of the sum measures with the analysis of variance were compared. The results of the analysis of variance are illustrated in Table 5.

The analyses revealed that no significant differences were discovered between the responses divided on the basis of gender or age (at 0.01 significance level). However, differences were found when the responses were divided on the basis of professional affiliation. Significant differences were found between the perceptions of people with a different professional affiliation regarding innovation structures that facilitate innovation, as well as the exploitation of external knowledge.

The significant differences were also studied by analyzing all the items individually. Significant differences were found in all the items concerning the dimension of innovation structures. In the dimension of exploiting external knowledge, a significant difference was only found in items 10 "I interact with customers in my work" and 11 "Customers' ideas are exploited in our unit". As regards item 9 "I apply ideas from other fields of industry to my work", no significant differences were found between the responses of people with different professional affiliations.

Table 5. Comparison of the responses regarding the dimensions of innovation capability

Factor	Mean				F-value
	Editorial	Sales	Administration	Other	
1 Innovation structures	2.77	2.44	2.10	2.37	4.309**
2 Organizational culture	2.58	2.69	2.49	2.44	0.513
3 Leadership	3.15	3.00	2.88	2.78	1.248
4 Exploitation of external knowledge	3.34	3.50	2.81	2.91	4.676**
5 Individual creativity	3.48	3.63	3.15	3.63	1.576

Sign. *** $p \leq 0.001$, ** $0.001 < p \leq 0.01$

5 Discussion

The matrix organization has been seen as an answer for organizations struggling with an increasing need for innovation and flexibility. It has been stated that an innovative organization should be supported by organizational design which enables creativity, learning and interaction (Tidd et al., 2005). The purpose of the paper was to study whether a matrix organizational structure should be realized to support harnessing the hidden innovation capability. On the basis of the analysis, the matrix structure did not manage to solve all the challenges faced in the case organization concerning innovation capability. Differences were found between the dimensions of innovation capability when comparing the results of people with different professional affiliations.

The most significant difference was found in the dimensions of innovation structures and exploitation of external knowledge, whereas no significant differences were found in the organizational culture, leadership and individual activity dimensions. For example Bessant

(2003) highlights the importance of the ability to create consistency between innovation values and behavior and the organizational context (structures, procedures etc.), as well as the ability to move innovative activity across organizational boundaries. The units of the case organization have long traditions as separate organizations, and the implementation of the matrix structure has not clearly been able to make the organizational boundaries lower, at least as regards innovation capability. According to Ford and Randolph (1992) the matrix structure cannot thus be plugged into an organization's existing structures and expect success. In the case organization, old courses of action are strong, and the challenges of breaking the old structures have not been overcome yet. As stated by Nesheim et al. (2011), the management of matrix organizations should acknowledge both the potential and the challenges of such structures. The transformation from the traditional line structure to a matrix does not take place without careful planning and commitment from both the management and the employees. Enough time has to be given to the transformation phase, because a unitary innovation capability across the organization cannot be created overnight. Also the employees of the organization have to be committed to the new structure. Without support and activity from the employees, no structure can make innovation potential as an asset to the firm.

Mäkimattila et al. (2012) have suggested that instead of having a matrix as the final solution, firms should think how they can make it possible to form temporal teams collaboratively intra- and inter-organizationally to carry out innovation tasks. Although turning into the matrix structure has helped to create unitary innovation capability at least to some extent, especially the innovation structures seem still to be a development target for the future. Turning into a matrix organization is not a coherent solution in every situation, and the next step would be to consider workable structures for developing the innovation capability further. The bottleneck may be turning ideas into practically applied solutions. If the innovation structures do not work properly, the implementation and use of innovative solutions do not function. By creating teams and practices for them, firms may benefit more from the matrix structure.

It has been widely stated in the current literature that it is hard to manage what you do not measure. Related to this issue, Saunila et al. (2012) have highlighted the intangible nature of innovation capability, which appears as difficulties in evaluation, especially in measurement. The challenges of measuring issues related to innovation capability can also make it difficult to manage innovation capability when turning into the matrix structure. If innovation capability is not measured and monitored, it is also hard to draw any conclusions on how it should be developed. Despite the challenges of the measurement of innovation capability, measurement is especially needed in the implementation phase of a new organizational structure in order to manage the transformation process.

6 Conclusions

This study has investigated the current state of organizational innovation capability in a recently implemented matrix structure. The study caters for various dimensions of innovation capability, departing from the majority of existing empirical innovation capability studies that focus on one or two aspects of innovation. In addition, this study is one of the first investigating innovation capability in a matrix organization. The study contributes to the current research by investigating the suitability of a specific structure, a matrix, for developing unitary innovation capability across the organization. Previous literature has concentrated on explaining the features of organizational structures that facilitate innovation capability. This study has shown that turning into a matrix is not the ultimate answer for a firm to achieve unitary innovation

capability. However, using the results of this study, practitioners can identify the critical aspects of organizational innovation capability when operating in the matrix design. The study has also highlighted the importance of measurement when turning into a matrix, which can help practitioners to plan the transformation phase. The questionnaire provided an extensive picture of the multi-dimensional nature of organizational innovation capability in a matrix organization. It was recognized that organizational innovation capability is a wide concept, and the results of this study can assist future research by providing guidelines for how innovation capability can be understood in the matrix design.

This study has some limitations, which in turn offer opportunities for additional work. First, our results are based on a sample of one organization, and thus more research is needed to ensure the generalizability of the results. Also the presented categorization of innovation capability needs to be further defined to capture the nature of innovation capability in more detail. Second, the items were selected to capture a variety of issues related to innovation capability, but additional insight may also be gained by selecting items that reflect different aspects of innovation capability from the ones discussed in this paper. Third, this study does not give any instructions on how to make the matrix structure work in order to enhance innovation capability. Rather, this study has managed to identify the challenging factors contributing to innovation capability in a matrix, and further research should examine how they can be developed. More research is also needed about measurement when turning into a matrix, in order to help managers to monitor and manage the transformation phase.

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References

- Amabile, T.M. (1997) Motivating creativity in organizations: On doing what you love and loving what you do, *California management review*, Vol. 40, No. 1, pp. 39–58.
- Amabile, T.M., Conti, R., Coon, H., Lazenby, J. and Herron, M. (1996) Assessing the work environment for creativity, *Academy of Management Journal*, Vol. 39, No. 5, pp. 54–84.
- Barbaroux, P. (2012) Identifying collaborative innovation capabilities within knowledge-intensive environments: Insights from the ARPANET project, *European Journal of Innovation Management*, Vol. 15, Iss. 2, pp. 232–258.
- Barrett, H., Balloun, J.L. and Weinstein, A. (2012) Creative climate: a critical success factor for 21st century organisations, *International Journal of Business Innovation and Research*, Vol. 6, No. 2, pp. 202–219.
- Bessant, J. (2003) *High-Involvement Innovation: Building and Sustaining Competitive Advantage Through Continuous Change*, Chichester, John Wiley & Sons.

Saunila, M., Mäkimattila, M. and Salminen, J. (2014) Matrix structure for supporting organizational innovation capability, *International Journal of Business Innovation and Research*, 8 (1): 20-35.

Bresciani, S. (2009) Innovation and creativity within firms: an empirical demonstration in the Piedmont area, *International Journal of Business Innovation and Research*, Vol. 3, No. 4, pp. 427–443.

Burns, L. (1993) Adoption and abandonment of matrix management programs: effects of organizational characteristics and interorganizational networks, *Academy of Management Journal*, Vol. 36, No. 1. pp. 106–138.

Börjesson, S. and Elmquist, M. (2012) Aiming at innovation: a case study of innovation capabilities in the Swedish defence industry, *International Journal of Business Innovation and Research*, Vol. 6, No. 2, pp. 188–201.

Cavusgil, S.T., Calantone, R.J. and Zhao, Y. (2003) Tacit knowledge transfer and firm innovation capability, *Journal of Business and Industrial Marketing*, Vol. 18, No. 1, pp. 6–21.

Davila, T., Epstein, M.J. and Shelton, R. (2006) *Making Innovation Work: How to Manage It, Measure It, and Profit from It*, New Jersey, Upper Saddle River.

DeCanio, S.J., Dibble, C. and Amir-Atefi, K. (2000) The Importance of Organizational Structure for the Adoption of Innovations, *Management Science*, Vol. 46, No. 10, pp. 1285–1299.

Dershin, H. (2010) A framework for managing innovation, *International Journal of Business Innovation and Research*, Vol. 4, No. 6, pp. 598–613.

Dobni, C.B. (2008) Measuring innovation culture in organizations: The development of a generalized innovation culture construct using exploratory factor analysis, *European Journal of Innovation Management*, Vol. 11, No. 4, pp. 539–559.

Fjeldstad, Ø.D., Snow C.C., Miles, R.E. and Lettl, C. (2012) The Architecture Of Collaboration, *Strategic Management Journal*, Vol. 33, Iss. 6, pp. 734–750.

Ford, R.C. and Randolph, A.W. (1992) Cross-functional structures: a review and integration of matrix organization and project management, *Journal of Management*, Vol. 18, No. 2, pp. 267–294

Francis, D. and Bessant, J. (2005) Targeting innovation and implications for capability development, *Technovation*, Vol. 25, No. 3, pp. 171–183.

Galbright, J. R. (1971) Matrix organization designs How to combine functional and project forms, *Business Horizons*, Vol. 14, Iss. 1, pp. 29–40.

Galbraith, J.R. (2012) The Evolution of Enterprise Organization Designs, *Journal of Organization Design*, Vol. 1, No. 2, pp. 1–13.

Kallio, A., Kujansivu, P. and Parjanen, S. (2012) ‘Locating the loopholes of innovation capability before launching development project’, *Interdisciplinary Journal of Information, Knowledge, and Management*, Vol. 7, pp. 21–38.

Saunila, M., Mäkimattila, M. and Salminen, J. (2014) Matrix structure for supporting organizational innovation capability, *International Journal of Business Innovation and Research*, 8 (1): 20-35.

Lampikoski, K. and Emden, J.B. (1999) Managing innovatively: exploit creative resources, Porvoo, WSOY. (In *Finnish*)

Lawson, B. and Samson, D. (2001) Developing innovation capability in organisations: a dynamic capabilities approach, *International Journal of Innovation Management*, Vol. 5, No. 3, pp. 377–400.

Martensen, A., Dahlgaard, J.J., Park-Dahlgaard, S.M. and Grønholdt, L. (2007) Measuring and diagnosing innovation excellence – simple contra advanced approaches: a Danish study, *Measuring Business Excellence*, Vol. 11, No. 4, pp. 51–65.

Mei, S. and Nie, M. (2008) Firm's capabilities and innovation: a case study of Wuhan optoelectronic cluster, *International Journal of Business Innovation and Research*, Vol. 2, No. 1, pp. 57–70.

Meijaard, J., Brand, M.J. and Mosselman, M. (2005) Organizational Structure and Performance in Dutch small Firms, *Small Business Economics*, Vol. 25, No. 1, pp. 83–96.

Menguc, B. and Auh, S. (2010) Development and return on execution of product innovation capabilities: The role of organizational structure, *Industrial Marketing Management*, Vol. 39, Iss. 5, pp. 820–831.

Miles, R.E., Snow, C.C., Fjeldstad, Ø.D., Miles, G. and Lettl, C. (2010) Designing Organizations to Meet 21st-Century Opportunities and Challenges, *Organizational Dynamics*, Vol. 39, No. 2, pp. 93–103.

Mosurović, M. and Kutlača, D. (2011) Organizational design as a driver for firm innovativeness in Serbia, *Innovation: The European Journal of Social Science Research*, Vol. 24, Iss. 4, pp. 427–447.

Mäkimattila, M., Saunila, M. and Salminen, J. (2012) Interaction and Innovation – Reframing Innovation Activities For Matrix Organization, *Working paper*.

Nesheim, T. (2011) Balancing Process Ownership and Line Management in a Matrix-like Organization, *Knowledge and Process Management*, Vol. 18, No. 2, pp. 109–119.

Nesheim, T., Olsen, K.M. and Tobiassen, A.E. (2011) Knowledge communities in matrix-like organizations: managing knowledge towards application, *Journal of Knowledge Management*, Vol. 15 Iss. 5, pp. 836–850.

Pournaras, E. and Lazakidou, A. (2008) Trust and innovativeness in virtual organizations, *International Journal of Business Innovation and Research*, Vol. 2, No. 3, pp. 262–274.

Ramezan, M. (2011) Intellectual capital and organizational organic structure in knowledge society: How are these concepts related?, *International Journal of Information Management*, Vol. 31, Iss. 1, pp. 88–95.

Saunila, M., Mäkimattila, M. and Salminen, J. (2014) Matrix structure for supporting organizational innovation capability, *International Journal of Business Innovation and Research*, 8 (1): 20-35.

Romijn, H. and Albaladejo, M. (2002) Determinants of innovation capability in small electronics and software firms in southeast England, *Research Policy*, Vol. 31, No. 7, pp. 1053–1067.

Sáenz, J., Aramburu, N. and Rivera, O. (2009) Knowledge sharing and innovation performance - A comparison between high-tech and low-tech companies, *Journal of Intellectual Capital*, Vol. 10, No. 1, pp. 22–36.

Saunila, M., Ukko, J. and Rantanen, H. (2012) Innovation capability and its measurement in Finnish SMEs. In Melkas, H. and Harmaakorpi, V. (Eds.) *Practice-based Innovation: Insights, Applications and Policy Implications* (pp. 417–435), Springer-Verlag Berlin Heidelberg.

Skarzynski, P. and Gibson, R. (2008) *Innovation to the Core: a blueprint for transforming the way your company innovates*, Boston, Harvard Business School Press.

Smith, M., Busi, M., Ball, P. and van der Meer, R. (2008) Factors influencing an organisation's ability to manage innovation: a structured literature review and conceptual model, *International Journal of Innovation Management*, Vol. 12, No. 4, pp. 655–676.

Strikwerda, J. and Stoelhorst, J.W. (2009) The Emergence and Evolution of the Multidimensional Organization, *California Management Review*, Vol. 51, No. 4, pp. 11–31.

Subramanian, A. and Nilakanta, S. (1996) Organizational Innovativeness: Exploring the Relationship Between Organizational Determinants of Innovation, Types of Innovations, and Measures of Organizational Performance, *International Journal of Management Science*, Vol. 24, Iss. 6, pp. 631–647.

Swink, M. (2006) Building Collaborative Innovation Capability, *Research-Technology Management*, Vol. 49, No. 2, pp. 37–47.

Teece, D.J., Pisano, G, and Shuen, A. (1997) Dynamic capabilities and strategic management, *Strategic Management Journal*, Vol. 18, No. 7, pp. 509–533.

Tidd, J., Bessant, J. and Pavitt, K. (2005) *Managing innovation: Integrating Technological, Market and Organizational Change*, West Sussex, England, John Wiley & Sons.

Tura, T., Harmaakorpi, V. and Pekkola, S. (2008) Breaking Inside the Black Box: Towards a Dynamic Evaluation Framework of Regional Innovative Capability, *Science and Public Policy*, Vol. 35, No. 10, pp. 733–744.

Van der Panne, G., Van Beers, C. and Kleinknecht, A. (2003) Success and failure of innovation: a literature review, *International Journal of Innovation Management*, Vol. 7, No. 3, pp. 1–30.

Van Winkelen, C. and Tovstiga, G. (2009) Understanding an organisation's knowledge-enabled innovation capability, *International Journal of Knowledge Management Studies*, Vol. 3, No. 1/2, pp. 97–115.

Wan, D., Ong, C.H. and Lee, F. (2005) Determinants of firm innovation in Singapore, *Technovation*, Vol. 25, No. 3, pp. 261–268.

Saunila, M., Mäkimattila, M. and Salminen, J. (2014) Matrix structure for supporting organizational innovation capability, *International Journal of Business Innovation and Research*, 8 (1): 20-35.

Waychal, P., Mohanty, R.P. and Verma, A. (2011) Determinants of innovation as a competence: an empirical study, *International Journal Business Innovation and Research*, Vol. 5, No. 2, pp. 192–211.

Yang, S-B. and Choi, S.O. (2009) Employee empowerment and team performance. Autonomy, responsibility, information, and creativity, *Team Performance Management*, Vol. 15, No. 5/6, pp. 289–301.

Yukl, G.A. (1998), *Leadership in organizations*, 4th edition, Upper Saddle River, Prentice Hall.