

Dimensions of Slovenian Innovativeness

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Abstract: The emergence of knowledge economy, intense global competition and considerable technological advance has caused organizations to innovate in all their activities, which creates new dimensions of innovativeness. Wang and Ahmed [1] found five equally important dimensions of innovativeness on a sample of organizations from England, Wales and Scotland. We investigated a dimensionality of innovativeness in Slovenia, which is one of the transition countries with lower level of innovation intensity in order to test a hypothesis that the number of dimensions developed in the organization is the important determinant of its innovation intensity. The results of the confirmatory factor analysis based on a sample drawn from manufacturing firms in Slovenia show that Slovenian firms mainly concentrated their efforts in two dimensions, i.e. the product and process innovativeness and much less attention has been paid on developing behavioural, and marketing innovativeness.

Key-words: Organisational Innovativeness, Dimensions of Innovativeness, Slovenia

1 Introduction

The importance of innovation is established as a necessary ingredient for organisations simply wanting to remain competitive or pursue long-term advantages [2]. For economies, innovation is frequently cited as a critical element of growth. Given the importance of innovation, research from a variety of disciplines has looked for answers to find out “What can be done to improve innovation?” [3], [4].

The multidimensional character of innovations and innovation capability was investigated by many authors [5], [6], [7], [8], [9], [10], [1]. The primary concern of these studies was to reveal dimensions or to develop the scale for measuring the innovation capability [1]. The impact of the dimensions on the organisation’s innovation capability was not taken into account in the above mentioned studies.

Wang and Ahmed [1] analyzed a multidimensional character of an organisation’s overall innovativeness on a sample of organisations

from England, Wales and Scotland and found five equally important dimensions. They were behavioural innovativeness, product innovativeness, process innovativeness, market innovativeness, and strategic innovativeness. We assumed that the level of an organisational innovativeness depends on the number of dimensions that the organisation has been able to develop. The level of overall innovativeness is higher, if the organisation has developed more dimensions. To obtain more information about the existence of this relationship we chose a sample of Slovenian organisations and investigated the multidimensional character of their innovativeness. The common characteristic of Slovenian organisations was a lower level of innovation intensity in comparison with the organisations in the study of Wang and Ahmed [1].

In Western countries, the complexity of the business environment has been growing gradually over past decades. In contrast, in the Eastern and Central European transition countries, the changes from a centrally planned to a market driven

economy were radical, which resulted in the inability of the organisation to simultaneously change internally and cope with external changes effectively. Many old practices originating from the old systems are no longer compatible with the requirements of a rapidly changing environment, which has consequently discouraged the development of new products and their source, i.e. the creative and innovative type of employees willing to take the risk to develop new products, introduce innovative processes, etc.

Slovenia is one of the transition countries in which the lack of innovation capability has also been confirmed by a few empirical studies on attitudes and behaviour of Slovenian entrepreneurs, especially in SMEs [11], [12], [13], [14]. In Table

1, some statistical data on innovation activities of European, British, and Slovenian firms are given. The percentage of innovative firms that introduced innovation presented in column 1 is equal to the sum of data in columns 2, 3, and 4. The small difference in sum is probably caused by rounding error. Data for the period of 2001-2002 show that only 20.2 % of Slovenian firms introduced innovation, which is a low level in comparison with 41 % of European firms and 29.1 % of British firms. The largest gap between Slovenian and other firms was noticed in process innovation. Data on process innovation given in column 3 refers to new or significantly improved manufacturing processes and distribution methods. Unfortunately, data on other dimensions of innovativeness is not available.

Table 1. Innovation activity by firm size in Europe, Great Britain and Slovenia

	% of innovative firms that have introduced innovation	% of firms that have introduced only product innovation	% of firms that have introduced only process innovation	% of firms that have introduced product and process innovation	% of firms with not yet completed/ abandoned innovation activity
	(1)	(2)	(3)	(4)	(5)
Europe	41.0	10.0	7.0	23.0	3.0
Great Britain	29.1	12.2	7.6	9.3	6.7
Slovenia	20.2	5.6	1.8	12.8	14.2
Small	12.0	4.3	0.9	6.8	7.8
Medium-sized	27.3	6.7	3.2	17.5	19.2
Large	53.6	10.8	4.0	38.5	41.0

Source: [15], [16].

2 Conceptual framework and hypothesis

An organisation's capacity to innovate can be thought of as the potential of that organisation to generate innovative outputs. As such it is dependent upon the resources and capabilities that the organisation possesses [1].

The capability-based theory of competitive advantage suggests that a firm can achieve sustainable competitive advantage through distinctive capabilities possessed by the firm [17], [18]. The firm must constantly re-invest to maintain and expand existing capabilities in order to inhibit imitability. Capability is considered to be a core competence when it has strategic value, i.e. it ought to improve the competitive situation significantly and in a sustainable manner. Core competence is

unique and in short supply. An important source of a unique competitive position is that it should not be possible to imitate routines [19].

Although capabilities are resource dependent [17] resources do not exclusively determine what the firm can do and how well it can do it. Penrose [20] also argues that a firm achieves rents not because it has more or better resources, but because the firm's distinctive capabilities allow it to make better use of available resources. Accordingly, firms do not compete on new products, but rather on a deeper factor – the capacity to innovate.

Capabilities can be distinguished regarding the knowledge they contain. Functional capabilities allow a firm to develop its technical knowledge [18] while integrative

capabilities allow a firm to absorb knowledge from external sources and blend the different technical competences developed in various company departments [21].

Innovation capability is defined as a higher-order integration capability, i.e. the ability to mould and manage multiple capabilities. Organisations possessing innovation capability have the ability to integrate their key capabilities and resources to successfully stimulate innovation [22] Wang and Ahmed [1] defined the organisational innovativeness as an organisation's overall innovative capability of introducing new products to the market, or opening up new markets, through combining strategic orientation with innovative behaviour and processes.

In the past, different dimensions of innovation and their importance were emphasised by different authors, e.g. Schumpeter [7], Miller and Friesen [8], Capon et al. [9], Cooper [10], Wang and Ahmed [1]. Taking into account their findings, five dimensions of an organisation's overall innovativeness can be established. They are product innovativeness, marketing innovativeness, process innovativeness, behavioural innovativeness and managerial innovativeness.

Product innovativeness is often referred to as perceived newness, novelty, originality, or uniqueness of product [1]. A product innovation can be described as a novel product which is clearly different from the previous one [23]. These definitions bring up the problem of specifying the term novelty. In the literature, two common dimensions underlie most definitions: technology and markets. The first dimension determines the extent to which the technology involved in a new product is different from prior technologies. The second dimension determines the extent to which the new product fulfils key customer needs better than existing products or the extent to which it generates and fulfils new needs. Considering two levels for each dimension leads to four types of product innovations: incremental innovations, market breakthroughs, technological breakthroughs, and radical innovations [23].

Incremental innovations involve relatively minor changes in technology and provide relatively low incremental customer benefits

per dollar. Market breakthroughs are based on core technology that is similar to existing products but provide substantially higher customer benefits per dollar. Technological breakthroughs adopt a substantially different technology than existing products but do not provide superior customer benefits per dollar. In contrast to the previous three, radical innovations involve substantially new technology and provide substantially greater customer benefits per dollar, relative to existing products.

Marketing innovativeness emphasises the novelty of market-oriented approaches. It refers to innovations related to market research, advertising and promotion as well as identification of new market opportunities and entry into new markets [1]. Innovative firms pay close attention to their markets. The difference lies in distinguishing between current and future markets [23]. The concept of defensive marketing is based on the consideration that it is more efficient to make every effort to satisfy the needs of customers that have already been recruited, than to keep having to win new customers. In this respect, the satisfaction of customers is a key market-oriented control variable. The experience with analyses of the customers' satisfaction with current products shows that, at best, they provide information on marginal improvements on performance, such as a modification in the level of a product feature, and radical product changes can only be expected in rare cases [24]. On the other hand, the experience of radically innovative firms suggests that such firms focus on future customers and competitors [23].

Process innovativeness represents changes in the way firms produce end products or services [6]. Process innovativeness captures the introduction of new production methods and new technology as well as new management approaches that can be applied to improve production and management processes [1]. Process innovation historically seemed to favour the large, bureaucratic firm, operating on mature markets with high organizational slack [25]. As computer technology advances, the cost of systems and software decline and technological sophistication of the workforce improves, no longer are adaptations reserved for the

technologically elite, opening the doors for process innovation in the small firms [10].

The primary focus of managerial innovativeness is to measure an organisation's ability to manage ambitious organisational objectives and identify a mismatch of those ambitions and existing resources in order to stretch or leverage limited resources creativity. For example, it can be measured by introducing computer-based administrative applications, developing new rewarding/training schemes, introducing new departments or projects, etc. [26].

Behavioural innovativeness is a fundamental factor that underlies innovative outcomes [1]. It can be presented at different levels. Individual innovativeness is interpreted as the individual's willingness to change. Team innovativeness is the team's adaptability to change. It is not simply a sum of innovative individuals, but synergy based on the group dynamics. Managerial innovativeness demonstrates management's willingness to change, and commitment to encourage new ways of doing things, as well as the willingness to foster new ideas [27].

All five dimensions jointly highlight an organisation's overall innovativeness. Product innovativeness and marketing innovativeness are inter-twined. They are externally focused and market based, while behavioural innovativeness, managerial innovativeness and process innovativeness are all internally-focused. Wang and Ahmed [1] analyzed those five dimensions on a sample of 231 firms from England, Wales, and Scotland. Their analysis showed that all five dimensions had almost equal impact on the innovation capability of British firms. Their conclusion was based on the standardized regression weights of the first-order factors' loading on the overall organisational innovativeness which took the values between 0.77 for the behavioural innovativeness and 0.89 for the market, and the strategic innovativeness [1].

We assumed that innovation capability and consequently the intensity of firm's innovation activities depend mainly on the equally developed five dimensions. Less developed dimensions diminish the firm's innovation capability and the intensity of its innovation activities. This assumption was tested on the sample of Slovenian firms with the following hypotheses:

- H1. The innovation capability of Slovenian firms is also a multidimensional category.
- H2. All five dimensions have no equal impact on the innovation capability of Slovenian organisations.
- H3. The impact of behavioural dimension, managerial dimension and marketing dimension on Slovenian innovation capability is substantially smaller than the impact of the other two dimensions, i.e. product dimension and process dimension.

3 Research methodology

There were two objectives of the research strategy: 1) to develop a reliable and valid constructs, and 2) to study the impact of the dimensions on the innovativeness of Slovenian firms. The construct behavioural innovativeness was measured by five items while marketing innovativeness, managerial innovativeness, process innovativeness and product innovativeness were measured by two items each. The items are described in Table 2.

The scale development process must include an assessment of whether the multiple measures that define a scale can be acceptably regarded as alternative indicators of the same construct. To test a hypothesised factor structure a two-step approach developed by Gerbing and Anderson was used [28]. They recommended that the measurement model is first developed and evaluated separately from the full structural equation model which simultaneously models measurement and structural relations. In the approach described, confirmatory factor analysis was applied using AMOS and the Maximum Likelihood estimation method.

In the first step, all 13 items were included in the first-order measurement model for organisational innovativeness. The model fitness indices were assessed and subjected to respecification. In the second step, a second-order confirmatory factor analysis was applied based on respecified model. The multidimensional models were compared with the competing one-factor model.

3.1 Sample and data collection

A sample of 1000 Slovenian manufacturing firms was randomly selected from the IPIS database. A total of 254 completed questionnaires were returned, representing a 25.4 % response rate which is a normal response rate for most surveys. The rate of usable responses was 21.4 %. A seven-point Likert scale with verbal anchors of scale was used in the questionnaire. CEOs were chosen as informants as they were most likely to observe and analyse the characteristics of the organisation. A pilot study was conducted including 5 experts to aid questionnaire wording and design. The sample consists of 16 % of large firms, 53 % of midsized firms, and 31 % of small-sized firms. The sample is somewhat biased to larger firms.

3.2 Data analysis and results

Initially, means and standard deviations were examined to get an overview of the data obtained. The results are presented in Table 2.

The initial model fit indices for the first-order measurement model for all 13 variables were $\chi^2=173.765$, $df=61$ $p<0.05$, the normed χ^2 exceeds the upper limit, goodness of fit index (GFI) is 0.882, adjusted goodness of fit index

(AGFI) is 0.825, root mean square error of approximation (RMSEA) is 0.093, normed fit index (NFI) is 0.849, comparative fit index (CFI) is 0.895. Their values showed that the original model had to be respecified to obtain better fit with sample data. The pattern of normalized residuals analysis confirmed the need for a respecification. Item BEHREW had small squared multiple correlation (0.323) and large error variance (2.29) and was therefore removed. Items MANN0 and MANRAD had large error covariance (38.754). These two items were thus deleted because each estimated construct is defined by at least two indicators.

Having eliminated 3 items, the modified first-order confirmatory factor analysis model fit indices were: $\chi^2=33.062$, $df=28$, $p>0.1$, the normed χ^2 is between 1 and 2, GFI=0.972, AGFI=0.944, RMSEA=0.029, PGFI=0.495, NFI=0.959, CFI=0.993. All fit indices show that model fits data very well. The standardized regression weights of all variables loadings onto their respective factors were between 0.538 and 0.955, with all critical ratios above 1.96 (which means that all the regressions are statistically significant at the 0.95 confidence level). Their values are given in Figure 1.

Table 2. The organisational innovativeness construct

Variable	Description	Mean	Standard Deviation
BEH	<i>Behavioural innovativeness</i>	5.027	1.438
BEHCONT	How well do formal procedures and control support creativity and innovation in your firm? [1=very badly, 7=very well]	4.568	1.301
BEHCREA	The staff is encouraged to be creative and innovative. [1=never, 7=always]	5.682	1.415
BEHEVAL	Innovative suggestions of the staff are evaluated. [1=never, 7=always]	4.817	1.681
BEHMIST	Mistakes regarding creative and innovative efforts of individuals are tolerated and used as the opportunity for learning. [1=never, 7=always]	5.042	1.323
BEHREW	Employees are recognized for their creative work also with non-financial rewards and recognitions. [1=never, 7=always]	3.860	1.850
MAR	<i>Marketing innovativeness</i>	3.545	1.435
MARNO	How many marketing innovations were introduced in the firm during the last five years? [1=none, 7= far more than competitors]	3.672	1.454
MARRAD	Marketing innovations were mainly [1=incremental, 7=radical].	3.417	1.416
MAN	<i>Managerial innovativeness</i>	4.049	1.579

MANNO	How many innovations did the firm introduce in the managerial system? [1=none, 7=far more than the competitors]	4.175	1.592
MANRAD	The improvements in the organisational system were mainly [1=incremental, 7=radical].	3.941	1.586
PROC	<i>Process innovativeness</i>	4.106	1.638
PROCNO	How many innovations did the firm introduce in production processes? [1=none, 7=far more than the competitors]	4.302	1.445
PROCRAD	Innovations in production processes were mainly [1=incremental, 7= radical].	3.911	1.576
PROD	<i>Product innovativeness</i>	3.925	1.638
PRODNO	How many new products did the firm launch on to the market during the last five years? [1=none, 7=far more than the competitors]	4.000	1.583
PRODRAD	Product improvements were mainly [1=incremental, 7= radical].	3.850	1.691

The reliability of the scales using Cronbach's alpha as a measure of internal consistency was encouraging with all the scales adequately meeting standards for such research [29]. The behavioural innovativeness scale achieved an alpha of 0.722, product innovativeness 0.716, process innovativeness 0.716 and marketing innovativeness 0.886.

To confirm the multidimensional structure of the organisational innovativeness construct the second-order confirmatory factor analysis was used. The fit indices obtained for this model showed similar results as the first-order confirmatory factor analysis and were: $\chi^2=37.275$, $df=30$, $p>0,1$, $GFI=0.968$, $AGFI=0.941$, $PGFI=0.528$, $RMSEA=0.034$, $NFI=0.953$, $CFI=0.99$. The slight difference in the first-order and second-order estimates occurred due to different degrees of freedom.

The hypothesized multidimensional models were compared with a competing unidimensional model. The one-factor model

which loaded all 10 indicators to one factor, yielded statistically not significant chi-square of 228.617 while the four-factor model resulted in the statistically significant chi-square of 33.062, suggesting a significant improvement. Furthermore, the improvements in GFI, RMSEA, CFI and NFI were substantial, indicating that the multidimensional model presents a better fit to the data. These results confirm hypothesis H1.

The standardized regression weights of all component factors loadings onto the general factor organisational innovativeness are given in Table 3. They ranged from 0.385 to 0.972. The smallest regression weight belonged to behavioural innovativeness while the largest one to the product innovativeness. The model itself and the results obtained are presented in Figure 1.

Table 3. Loadings of the second-order confirmatory factor analysis

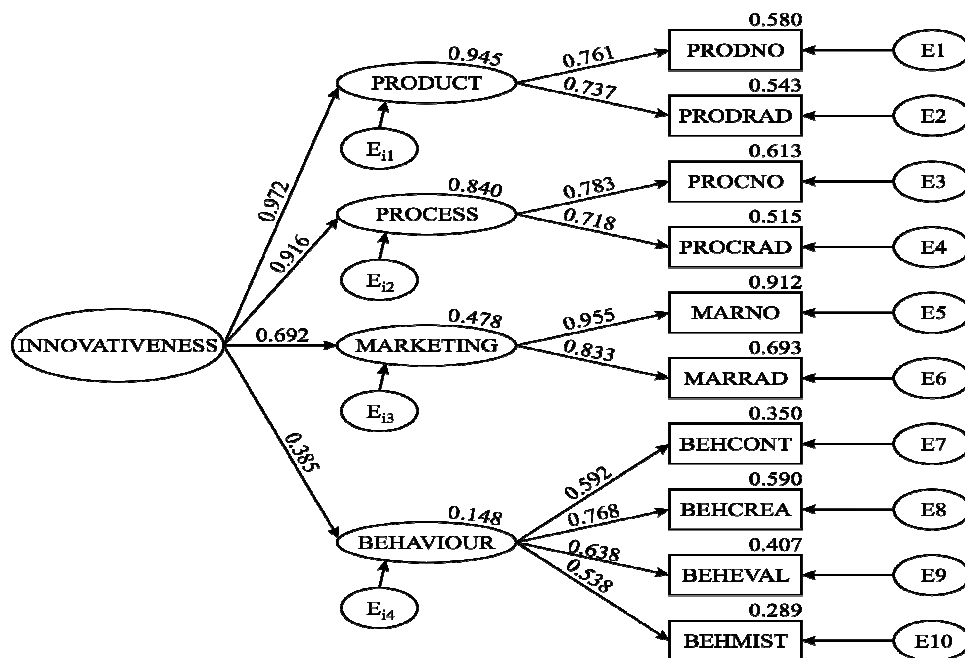
Factors	R ²	Standardized Regression Weight	Critical Ratio
Behavioural innovativeness	0.148	0.385	3.977
Product innovativeness	0.945	0.972	8.169
Process innovativeness	0.840	0.916	7.769
Marketing innovativeness	0.478	0.692 ^a	

Note: ^a This critical ratio is not available, because the regression weight for the component factor marketing innovativeness is fixed at one.

Standardized regression weights (see Table 3 and Figure 1) show the impact of individual dimensions on Slovenian innovativeness. As we hypothesized in H2, the importance of all five dimensions is not equal, which confirms the H2. The hypothesis H3 is confirmed by the

substantially smaller standardized regression weight belonging to behavioural innovativeness (0.385) followed by the regression weight for marketing innovativeness (0.692).

Figure 1. Second-order confirmatory factor analysis



4. Conclusion

The results of this study show that Slovenian firms have developed more than one dimension associated with their innovativeness. We found four dimensions. Unfortunately, the existence of managerial dimension was not confirmed.

The researches carried out in more innovative firms [1] showed that all five dimensions, i.e. product, process, behavioural, marketing, and strategic dimensions had similar impact on the organisational innovation capability. In their study, the standardised regression weight ranged from 0.59 to 0.80. They also found out that two components, i.e. strategic and marketing innovativeness had a slightly larger impact on the innovation capability than product and process innovativeness. Our results show that the highest impact on the Slovenian innovation capability had another two components, i.e. product and process innovativeness. Behavioural innovativeness was found as the

component with the smallest impact on the innovation capability.

All these results enable us to draw the conclusion that Slovenian firms mainly concentrated their efforts in the product and process innovativeness and much less attention has been paid to the development of behavioural and marketing innovativeness. We did not investigated the reasons for such behaviour of Slovenian firms but they could be found in their wish for visible results of their innovations efforts or in the fact that imitation of 'soft' dimensions is much more difficult than the imitation of 'hard' dimensions. Having coupled our results with the well-known fact that Slovenian firms are not innovative enough, we can conclude that poor support of behavioural and marketing innovativeness is probably one of the important reasons why Slovenian firms are not capable to compete with innovations, and especially with radical innovations.

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