Exploring the role of intellectual capital in the development of e-business models

Evidence from the Iranian carpet industry

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Abstract

Purpose – This paper aims at exploring the role of structural capital (SC) dimensions – customer, process and innovational – in the development of e-business models (eBM). The Iranian carpet industry is tested regarding five types of eBMs: Direct to customer, Full Service Provider, Virtual Community, Shared Infrastructure and Value Net Integrator.

Design/methodology/approach – First, measures for SC dimensions and required core competencies for eBMs are extracted from the literature. Then, the correlation level between SC dimensions and different eBMs are hypothesized. Finally, after using a questionnaire in 30 Iranian carpet companies, the hypotheses are tested.

Findings – This study indicates that three dimensions of SC influence different eBMs in their own way. While one instant dimension is strongly effective for one eBM, it does not significantly affect the other one.

Research limitations/implications – The role of human capital – the second part of intellectual capital – on the development of eBM as well as the dependency of some other eBMs such as intermediaries on intellectual capital should be investigated in further research.

Practical implications – Using the help of this study, firstly, companies will concentrate on the most effective dimensions of SC in developing a special eBM. Secondly, they will exclude those eBMs which are not applicable regarding their knowledge capabilities.

Originality/value – This study brings together two disciplines that have not been considered together before: the development of eBMs and the management of intellectual capital.

Keywords Electronic business, Business model, Intellectual capital, Structural capital,
Knowledge management, Carpet industry, Iran

Paper type Research paper

1. Introduction

"The choice of e-business model is one of many strategic decisions that organizations make when conducting business activity in the e-business environment" (Ng, 2005), and "organizations will need to identify internal leaders for business model change in order to manage the results of these processes and deliver a new, better business model for the company" (Chesbrough, 2010). Wirtz *et al.* (2010) believed that "a firm's environment has a fundamental bearing on the kinds of business models that can create value in a given market context".

Since the selected model will form the framework for the organization to pursue its business activities in the e-business environment and to influence an organization's

overall strategic direction, the choice of eBM is a strategic decision (Malhotra, 2000). In developing a framework, organizations need to have a thorough knowledge of the types of models available for adoption, while there is no single unique classification system for the types of eBM available (Rappa, 2001; Timmers, 1998). Each of these models has different functional as well as knowledge characteristics resulting in different model requirements (Oliveira and Martins, 2010). Moreover, each model is applicable or suitable only to particular industries, markets or situations:

> As many industries continue to be in constant flux, it is important for managers to understand how they can address environmental changes and adjust their business model so that their firm can gain – or sustain – a competitive advantage (Wirtz *et al.*, 2010).

Teece (2010) stated that "a provisional business model must be evaluated against the current state of the business ecosystem and against how it might evolve".

In addition to the complexity of the models, many factors which influence the choice of eBMs affect the strategic decision making process of organizations (Eisenhardt and Martin, 2001). In traditional BM development, managers mainly consider the financial issues. As a result, they mostly evaluate financial capital requirements. On the contrary, managers evaluate intellectual capital requirement in order to develop click and mortar BMs or innovative pure eBMs (Namvar *et al.*, 2009). Unfortunately, the current literature on both intellectual capital management and the development of eBMs does not adequately address the many complexities that today's e-business initiatives face. In fact, the two disciplines have nowhere been considered together; this is where this article aims to make its contribution.

In this study, the role of intellectual capital on development of different eBMs will be investigated. Based on the review of literature, intellectual capital consists of human capital as well as structural capital (SC). Due to different characteristics of these two dimensions, which require a special study per each, only the effects of three dimensions of SC, i.e. customer, process and innovational, on eBM development will be analyzed here. In addition, in spite of research done on the Iranian carpet industry as one of the prominent industries with a global reputation (Latifi *et al.*, 2001; Maktabi, 2007; Motamedzade *et al.*, 2007; Sobhe, 1997), little has been done to analyze e-business adoption. Consequently, to evaluate the developed hypotheses, this industry was interviewed and analyzed.

2. E-business models and their core competencies
"A business model describes the design or architecture of the value creation, delivery and capture mechanisms employed" (Teece, 2010). It acts as various forms of model: to provide means to describe and classify businesses; to operate as sites for scientific investigation; and to act as recipes for creative managers (Baden-Fuller and Morgan, 2010). Zott and Amit (2010) conceptualized a firm's BM as a system of interdependent activities that transcend the focal firm and spans its boundaries. They defined the BM as depicting the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.

"Business model concepts have been proposed to provide a link between strategy and operations" (Mäkinen and Seppänen, 2007). Masanell and Ricart (2010) noted that, "strategy and business model, though related, are different concepts: a business model is the direct result of strategy but is not, itself, strategy". However, Teece (2010)

believes that "a business model is more generic than a business strategy", and "coupling strategy and BM analysis is needed to protect competitive advantage resulting from new BM design".

Weill and Vitale (2000) articulated eight types of eBMs called "atomic business models": Direct to Customer, Full Service Provider, Virtual Community, Shared Infrastructure, Value Net Integrator, Content Provider, Intermediary and Single Point of Contact, and differentiated them based on three criteria: relationship, data and transaction. In this study, regarding the comments of industrial and academic experts, those applicable types of atomic eBMs in carpet industry were chosen. As a result, three eBMs were excluded from the analysis (i.e. Content Provider, Intermediary and Single Point of Contact). Five other ones chosen for the analysis are described as below:

(1) Direct to Customer provides goods or services directly to customer often surpassing traditional channel players.

(2) Full Service Provider provides a full range of services in one domain directly and via complementors attempting to own customer relationship: provision.

(3) Virtual Community facilitates and creates loyalty to people with a common interest enabling interaction and service.

(4) Shared Infrastructure brings together multiple competitors to cooperate by sharing common IT infrastructure.

(5) Value Net Integrator coordinates value net activities by gathering, synthesizing and distributing information.

Then, the equivalents of these eBMs were extracted from Timmer's (1998) model. Therefore, functional integration and innovation level, in addition to the above-mentioned criteria, were added to derive five criteria for each atomic eBM. It is necessary to express that although three of atomic eBMs (Value Net Integrator, Virtual Community and Shared Infrastructure) were mentioned similarly by Timmers (1998), the two other eBMs were noted differently:

(1) Direct to Customer is an e-shop with more capabilities such as personalization; therefore, in spite of low innovation level which is considered for e-shop by Timmers, Direct to Customer would require high innovation level.

(2) Full Service Provider from atomic eBMs is a type of Value Chain Service provider mentioned by Timmers with more than one service; hence, its functional integration level is high.

Finally, required core competencies to implement each of these eBMs are extracted. Table I summarizes their characteristics. In this table, two columns (innovation and functional integration) are borrowed from Timmers and other columns from Weill and Vitale (2000).

3. Structural capital dimensions and their measures
Bontis (2001) believed that intellectual capital is the collection of intangible resources as well as the flows, and Brooking (2002) stated that intellectual capital is the difference between the book value and the market value. In spite of the lack of a unique classification, most of the authors described it as a combination of human capital and other intangible resources (Brooking, 2002; Bounfour, 2003; Bozbura and Beskese, 2007; Edvinsson and Malone, 1997;

	Relationship	Transaction	Innovation	Functional integration	Core competencies
Direct to Customer	Y	Y	H	M	Forming and managing strategic partnership with suppliers, payment processors, fulfillment houses, and others in the supply chain Using the ownership of the customer information assets to understand customer needs, thereby increasing revenues and margins Marketing, prospecting, and selling electronically using banner advertisements, emails, affiliate programs, click-throughs from allies Managing and integrating online and offline business processes to assure customer value Creating unique content to reduce price competition on commodities
Full Service Provider	Y	Y	M	H	Relationship management (with customers and other major players in the value chain) Customer and product information management IT infrastructure (the most important among the other models) Brand management and development
Virtual Community	Y	N	H	M	Building a lasting sense of community Sourcing or creating attractive content at an economically attractive price Discovering member needs and understanding the value members attach to meeting those needs
Shared Infrastructure	N	Y	M	H	The ability to deliver the infrastructure service(s) around which the alliance was formed

(continued)

	Relationship	Transaction	Innovation	Functional integration	Core competencies
Value Net Integrator	N	N	H	H	The skill to manage a focused coalition of competitors, generally having diverse backgrounds, resources, and goals Efficiently running complex infrastructure to attract participants Managing relationship with customers and all other major players in the value chain Managing information: collecting, synthesizing, distributing, and presenting information Linking the IT architecture to strategic objectives Developing and managing the brand Analyzing and interpreting information from multiple sources Identifying and using levers of influence rather than direct control Evaluating cost and customer benefit of various types of information

Notes: H – high level of characteristic; M – medium level of characteristic; Y – owning the resource; N – not owning the resource

Table I.

Namvar *et al.*, 2009; Roos *et al.*, 1997; Stewart, 1997; Sullivan, 2001). However, the definition of its second part – non-human capital – is a challenging matter. While some authors named it SC (Bounfour, 2003; Edvinsson and Malone, 1997; Moon and Kym, 2006; Namvar *et al.*, 2009; Roos *et al.*, 1997; Stewart, 1997), some others termed it differently as "infrastructure asset" (Brooking, 2002), "internal structure" (Sveiby, 1997), "intellectuala" (Sullivan, 2001), and "organizational capital" (Bozbura and Beskese, 2007).

In this study, Skandia Navigator (Edvinsson and Malone, 1997) is chosen to identify intellectual capital dimensions in which a combination of human capital and SC is found. In this model SC consists of two dimensions:

(1) Customer capital which is the strength and loyalty of customer relations either within or outside an organization.

(2) Organizational capital which includes:

   · *Innovational capital.* It comprises intellectual properties which are protected commercial rights such as copyrights, trademarks, and intangible assets.

   · *Process capital.* It contains the techniques, procedures, and programs that implement and enhances the delivery of goods and services.

Therefore, customer, process and innovational capital will be deeply considered here. Table II indicates the measures mentioned by different authors to describe these dimensions.

| Measures	References
Customer capital	
Using customer ideas and comments	Edvinsson and Malone (1997), Moon and Kym (2006)
Customer retention and churn avoidance level	Roos *et al.* (1997), Edvinsson and Malone (1997)
	Roos *et al.* (1997), Edvinsson and Malone (1997)
Customer attraction level and new markets entrance	Edvinsson and Malone (1997)
	Roos *et al.* (1997), Edvinsson and Malone (1997)
Market share	
Customers satisfaction level	
Process capital	
Level of products without errors	Roos *et al.* (1997), Edvinsson and Malone (1997), Moon and Kym (2006)
Information systems	
Communication systems	Edvinsson and Malone (1997), Moon and Kym (2006)
Organizational culture	Edvinsson and Malone (1997), Moon and Kym (2006)
Time-optimized production	Edvinsson and Malone (1997), Moon and Kym (2006), Sveiby (1997), Brooking (1996), Bontis (2001)
Organizational structure	
Cost-optimized production	Roos *et al.* (1997), Edvinsson and Malone (1997)
	Moon and Kym (2006), Brooking (1996)
	Roos *et al.* (1997), Edvinsson and Malone (1997)
Innovational capital	
Innovative product creation	Roos *et al.* (1997), Edvinsson and Malone (1997), Moon and Kym (2006)
Management support for innovation	
Usage level of new idea	Moon and Kym (2006), Edvinsson and Malone (1997)
Innovative environment	Roos *et al.* (1997), Edvinsson and Malone (1997), Moon and Kim (2006)
Educational programs	
	Moon and Kym (2006)
	Roos *et al.* (1997), Edvinsson and Malone (1997)

Table II.
Structural capital
dimensions and measures

4. Hypotheses development

The assessment of internal factor for organization to adopt eBMs was initiated by research done by Ng (2005) and Hayes and Finnegan (2005). Their goal was to develop a framework aiming at choosing appropriate eBM within companies based on their capabilities. Hayes and Finnegan (2005) developed their framework based upon Timmer's (1998) well-known model. To evaluate firms' readiness for eBM adoption, they considered five criteria consisting of economic control, functional integration, supply chain integration, innovation and sourcing. Some other researchers also aimed at assessing the requirement of eBMs in different industries (Argoneto and Renna, 2010; Dilworth and Kochhar, 2007; Hughes *et al.*, 2008; Janssen *et al.*, 2008; Ng, 2005; Shin and Park, 2008; Zhao *et al.*, 2008). Whilst these studies played a noticeable role in this arena, none had considered intellectual capital as well as SC to assess organizations potentiality for new eBMs adoption (Fathian *et al.*, 2008).

In this study, for each atomic eBM, based on the characteristics in Table I, the required level of three dimensions of SC should be assessed to develop the hypotheses. As a result, 15 hypotheses are developed – three hypotheses for each of five eBMs. Figure 1 shows the logical process of SC assessment for eBMs. In this flowchart, the conditions of choosing one dimension of SC as "strongly effective" on one eBM is described. In other words, if the conditions are not satisfied, the dimensions of SC will be "moderately effective" on that eBM.

First, in order to develop hypotheses on customer capital, relation ownership of eBMs is considered. Thus, based on Figure 1 and Table I, the following hypotheses would be resulted:
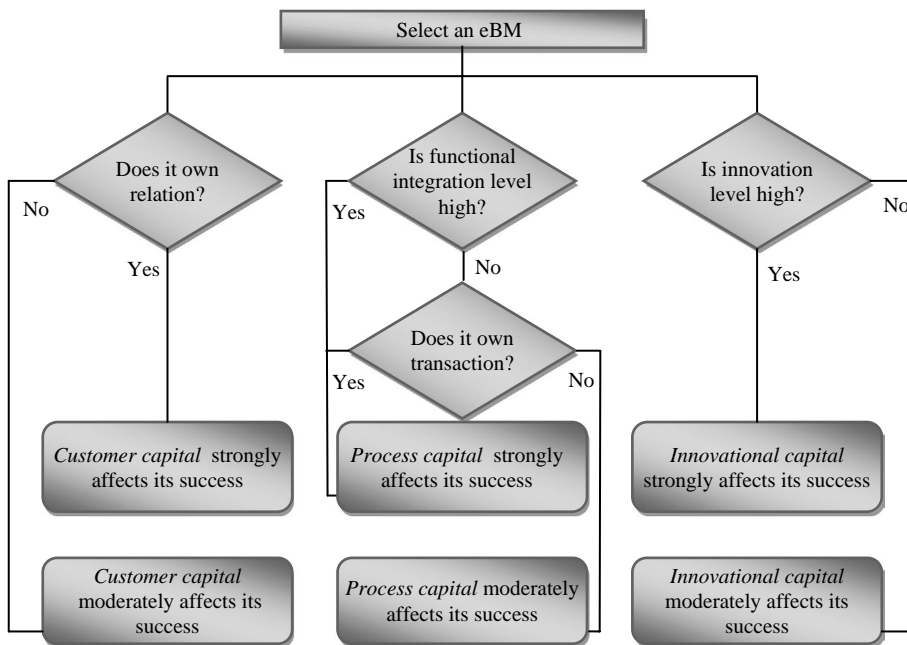
Figure 1.
Logical process of hypotheses development

H1a. Customer capital strongly correlate with Direct to Customer.

H1b. Customer capital strongly correlate with Full Service Provider.

H1c. Customer capital strongly correlate with of Virtual Community.

H1d. Customer capital moderately correlate with Shared Infrastructure.

H1e. Customer capital moderately correlate with Value Net Integrator.

Second, to develop hypotheses on process capital, transaction ownership and functional integration of eBMs are taken into account. Whether an eBM owns transaction or has high functional integration level, it would be highly affected by process capital:

H2a. Process capital strongly correlate with Direct to Customer.

H2b. Process capital strongly correlate with Full Service Provider.

H2c. Process capital moderately correlate with Virtual Community.

H2d. Process capital strongly correlate with Shared Infrastructure.

H2e. Process capital strongly correlate with Value Net Integrator.

Finally, innovation level of eBMs is speculated to develop hypotheses on innovational capital. Those eBMs with high innovation level in Table I would be highly affected by innovational capital:

H3a. Innovational capital strongly correlate with Direct to Customer.

H3b. Innovational capital moderately correlate with Full Service Provider.

H3c. Innovational capital strongly correlate with Virtual Community.

H3d. Innovational capital moderately correlate with Shared Infrastructure.

H3e. Innovational capital strongly correlate with Value Net Integrator.

The above hypotheses are summarized in Table III.

	Customer capital		Process capital		Innovation capital	
	Hypotheses	Predicted correlations	Hypotheses	Predicted correlations	Hypotheses	Predicted correlations
Direct to Customer	*H1a*	**	*H2a*	**	*H3a*	**
Full Service Provider	*H1b*	**	*H2b*	**	*H3b*	*
Virtual Community	*H1c*	**	*H2c*	*	*H3c*	**
Shared Infrastructure	*H1d*	*	*H2d*	**	*H3d*	*
Value Net Integrator	*H1e*	*	*H2e*	**	*H3e*	**

Table III.
Hypothesis summary

Notes: *Moderate correlation; **high correlation

5. Hypotheses evaluation

5.1 Sample design

The Iranian carpet industry was chosen based on some of its unique characteristics; first, it is one of the prominent carpet industries in the Middle East. Second, Iran is also well known because of its handicrafts, especially in the area of carpets. Finally, in spite of many opportunities for e-business development in this industry, it has not yet been implemented. A recent report by the Iranian Ministry of Industry, Mine and Trade indicates that during six months in 2010, Iranian carpet export exceeded \$12,8000,000. It was about half as much as the textile export in that period. Also, it was about 5 percent of total carpet production in Iran.

Thirty carpet companies were chosen to participate in the research. Interviews were directly conducted in most cases; however, in some cases after an introduction by phone, the questionnaires were mailed. First, in the questionnaire, participants were asked to fill in personal information. Second, they filled in company information for the purpose of assessing their SC, and the core competencies of eBMs, based on five-point Likert-type scale from 1 – strongly weak to 5 – strongly good. Since the answers to most of the questions were not clear-cut and depended on the perception of the sample person, the questionnaires were sent to two people in the same company to increase the internal validity of the research.

5.2 Response analysis

A total of 60 questionnaires was distributed, and 56 were returned. Six of them were excluded from the analysis due to missing data. The respondents positioned different jobs within their companies including direct manager (37.1 percent), marketing manager (45.7 percent), production manager (14.4 percent) and technical provider (2.8 percent).

Due to the dependency of several statistic tests on normality, the first step in the analysis is evaluating the normality of data. So the Kolmogorov-Smirnov test with Lilifor's correction is applied. In contrast to the χ^2 test, the Kolmogorov-Smirnov test is more appropriate to smaller samples, since it is able to detect non-normally distributed data in those cases. Further, in contrast to a "normal" Kolmogorov-Smirnov test, the Lilifor's correction does not assume that population parameters (means and standard deviation) are known (Bollen *et al.*, 2005). Since there is a small sample and the population parameter is not known, the Kolmogorov-Smirnov test with Lilifor's correction is used.

All variables are tested for normality. Normality is assumed if the significant level is greater than 5 percent. All variables of this study meet this prerequisite. As a result, all of them are normally distributed.

5.3 Reliability analysis

In the next step, the reliability of indexes and measures used in the questionnaire are calculated. The goal is to find out whether the set of questions relating to each component of SC and core competencies of eBMs is able to measure these components. Cronbach's α is used to investigate the reliability of each construct (Table IV). First of all, all of the coefficients were at least 0.623; thus, according to Nunnally (1967), the resulting scales are acceptable and sufficiently reliable. Furthermore, the overall Cronbach's α was 0.966. Hence, all the factors in the research should be taken into account for further statistical analysis.

Dimensions	Cronbach's α
Measures of customer capital	0.762
Measures of process capital	0.732
Measures of innovational capital	0.840
All dimensions of SC	0.892
Core competencies of Direct to Customer	0.623
Core competencies of Full Service Provider	0.662
Core competencies of Shared Infrastructure	0.883
Core competencies of Virtual Community	0.757
Core competencies of Value Net Integrator	0.886
All core competencies of eBMs	0.941
All dimensions	0.966

Table IV.
Result of Cronbach's α
analysis

Besides, regarding content validity, confirmed by eight experts from both industries and universities, the questionnaire is based on previous research and theories (Tables I and II).

5.4 Construction of scale value

All the variables that remain after the reliability analysis have to be reduced and summarized in order to make interpretation of the correlation analysis easier. Due to acceptable results of the reliability analysis, none of the variables were deleted and scale values are built based on all of them. To construct scale values for customer capital, the mean of the measuring variables is taken. Similarly, to calculate scales of process and innovational capital, the same procedure is applied. Therefore, for SC, three new variables (scales) each composed of 50 observations resulted: customer, process and innovational capital.

For each eBM their required core competencies are used. The same procedure was applied to eBMs and the mean of measuring variables is taken. For eBMs, five new variables (scales) each composed of 50 observations resulted: Direct to Customer, Full Service Provider, Virtual Community, Shared Infrastructure and Value Net Integrator.

Another method for the summarization of data is factor analysis with Varimax rotation. According to Bollen *et al.* (2005), the difference between the methods used is as follow: when building scales based on the mean of the original variables, the weights assigned to the variables are equal. However, when summarizing variables with the help of factor analysis the weights assigned to the variables vary. To sum up, since the relation of observations to the number of variables that are to be summarized into factors is very low, factor analysis is not suitable for this research.

5.5 Correlation analysis

Since the research has verified the rationality and validity of the SC dimensions and five types of eBMs, a correlation analysis to confirm the relationship is applied. Table V illustrates summary of the results. The following is also concluded from the table:

- Customer capital can remarkably correlate with Direct to Customer, Full Service Provider, Virtual Community and Value Net Integrator at 0.01 levels. It correlates with Shared Infrastructure at 0.05 levels.

	Customer capital	Process capital	Innovational capital
Direct to Customer			
Pearson correlation	0.578**	0.634**	0.561**
Sig.	0.000	0.000	0.001
Full Service Provider			
Pearson correlation	0.514**	0.545**	0.503**
Sig.	0.002	0.001	0.002
Virtual Community			
Pearson correlation	0.453**	*0.317*	0.433*
Sig.	0.007	*0.068*	0.011
Shared Infrastructure			
Pearson correlation	0.382*	0.443**	0.422*
Sig.	0.026	0.009	0.013
Value Net Integrator			
Pearson correlation	0.595**	0.665**	0.651**
Sig.	0.000	0.000	0.000

Note: Correlation is significant at: *0.05 and **0.01 levels (two-tailed)

Table V.
Correlation analysis

- Process capital can remarkably correlate with Direct to Customer, Full Service Provider, Virtual Shared Infrastructure and Value Net Integrator at 0.01 levels; however, there is no significant correlation between Virtual Community and process capital.
- Innovational capital can remarkably correlates with Direct to Customer, Full Service Provider, and Value Net Integrator at 0.01 levels. It correlates with Virtual Community and Shared Infrastructure at 0.05 levels.

5.6 Discussion

Table VI indicates that four hypotheses (*H1e*, *H2c*, *H3b* and *H3c*) are not supported by the correlation analysis in two different ways: first, in spite of what has been perceived in two hypotheses (*H2c* and *H3c*) as strongly correlated, they were moderately correlated according to data analysis (see dashed elliptical in the table). Second, despite our perception of the two hypotheses (*H1e* and *H3b*) as moderately correlated, they were strongly correlated (see dashed rectangular in the table). Details on the above-mentioned contradictions are discussed below:

First, regarding *H3b*, in spite of the moderate correlation between Full Service Provider and innovational capital in the proposed hypotheses, their high correlation was supported in data analysis. Experts in the carpet industry believed that although low level of innovation is required to propose one instant product or service, it is vital to employ innovative solutions to propose both in one package.

Second, in *H2c* and *H3c*, the proposed correlation between Virtual Communities and process as well as innovational capital was not supported. In fact, data analysis supported only the strong correlation between customer capital and Virtual Community. Due to lack of transaction in this model, no correlations with process capital were found. Nevertheless, according to this analysis, to achieve sufficient customer relations, Virtual Communities would be strongly correlated with customer capital.

Hypotheses	Customer capital		Hypotheses	Process capital		Hypotheses	Innovational capital	
	Predicted relations	Correlation analysis		Predicted relations	Correlation analysis		Predicted relations	Correlation analysis
Direct to Customer								
H1a	**	**	H2a	**	**	H3a	**	**
Full Service Provider								
H1b	**	**	H2b	**	**	H3b	*	**
Virtual Community								
H1c	**	**	H2c	*	*	H3c	**	**
Shared Infrastructure								
H1d	*	*	H2d	**	**	H3d	*	*
Value Net Integrator								
H1e	*	**	H2e	**	**	H3e	**	**

Note: *Immoderately correlated; **highly correlated; "–" no correlation

Table VI.
Hypotheses evaluation

Finally, in *H1e* moderate correlation between Value Net Integrator and customer capital was hypothesized. On the contrary, data analysis supports strong correlation between them. Undoubtedly, success in this model significantly depends on customer data analysis. Hence, in spite of lack of direct relations with customers in this model, it is highly correlated with customer capital.

6. Conclusion

Although the role of intellectual capital is undeniable in any business environment, its role in e-business is more deterministic. Its two main dimensions, namely human capital and SC, significantly influence e-business. Nevertheless, due to the special characteristics of SC, this study dealt with the investigation of its effects on the development of eBM in the Iranian carpet industry. Three main dimensions of SC (customer, process and innovational capital) were separately analyzed and their correlation level with different eBMs was explored. The results approved that these three capitals should be adopted differently to develop each eBM.

Direct to Customer is one of the most interesting eBMs for the Iranian carpet industry. Customers often order some special combinations of colors and designs which lack availability in the market. If a comprehensive Direct to Customer is implemented, companies will be able to personalize carpets based on customer special demands. According to this study, to implement a successful Direct to Customer, companies need high knowledge level in all dimensions of SC. To design a personalized product with Direct to Customer, first, customer capital is used to understand the new customer demands. Then, innovational capital is utilized to design an innovative product. Finally, this personalized design should be produced and delivered to customer with the aim of process capital.

Full Service Providers provide a full range of services in one domain directly and via complementors attempting to own customer relationship. Some of the surveyed carpet companies provide a range of products and services together for customers, however, to do so in an internet environment requires a comprehensive consideration on all dimensions of SC.

Virtual Communities are not usually designed just for a specific industry, but their implementation in the Iranian carpet industry will play an efficient role in sharing information among manufactures, suppliers, customers and other actors in this value chain. Virtual Community's independency on process capital is a surprising result of data analysis. While significant correlation exists between Virtual Community and two other dimensions of SC, such independency is the only case where there is no significant relationship between a dimension of SC and an eBM. Hence, to initiate a successful Virtual Community which creates loyalty among people with a common interest and enables interaction, innovational capital and especially customer capital should be more contemplated.

Shared Infrastructure, according to both proposed hypotheses and data analysis, depends more on process capital than innovational and customer capital. Shared Infrastructure brings together multiple competitors to cooperate by sharing common IT infrastructures. While not all carpet companies are interested in such investment, a Shared Infrastructure is an attractive opportunity for them to initiate e-business with minimum investment. In order to run complex IT infrastructure efficiently, high levels of process capital which facilitates delivering the infrastructure services is needed.

Value Net Integrator is a B2B eBM which is significantly correlated with all dimensions of SC. Due to its high dependency on know-how, it is hard to implement this eBM in today's Iranian carpet industry. Collecting, synthesizing, distributing and presenting information in carpet value chain in addition to linking the IT architecture to strategic objectives are required to construct a successful Value Net Integrator in this industry.

To sum up, we believe that this study will increase the insight of managers to adopt eBMs in the carpet industry by empowering managers to evaluate different models. Nevertheless, some other studies could be conducted to clarify the effects of intellectual capital on the development of eBMs. First, the role of human capital, which has not been considered in this study, should be investigated on eBMs. Second, different kinds of Intermediaries such as e-auctions, as very promising eBMs, could be taken into account to assess the knowledge required for their development. Finally, In spite of the generality of the proposed hypothesis, other industries should also be studied to evaluate the performance of the proposed hypothesis.

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