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ELECTRONIC BUSINESS MODEL SELECTION BASED ON FIRM'S INTELLECTUAL CAPITAL

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ABSTRACT

The development of e-business models is becoming increasingly popular within both the academic and business arenas, and decision maker have been facing an enormous range of e-business models from which they are going to choose one. The role of knowledge in new economy is so deterministic and e-business, as a highly knowledge-based area, requires more attention. We propose and provide a decision support framework for evaluating knowledge inventory, which includes: human capital, relational capital and structural capital, to select e-business models. Our model is a useful tool for managers in making better strategic plan within their organizations, in order to exclude those e-business models which are not applicable regarding knowledge capabilities.

Index Terms— electronic business model, decision support framework, intellectual capital, organizational knowledge

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" [16], 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" [5]. For traditional brick and mortal business models development, main heed of managers is its financial problems. As a result, before any action they evaluate its financial capital requirement. On contrary, in order to implement click and mortal business models or innovative pure e-business models managers and stakeholders evaluate its intellectual capital requirement instead of its financial capital aspects before any investment. "Work in the area of experimental economics and market design theory suggests that a small number of fundamental principles determine whether a particular marketing design can work well or not"[9].

Unfortunately, Current literature on both intellectual capital measurement and the development of e-business models does not adequately address the many complexities facing today's e-business initiatives and the two disciplines have no where been combined.

In developing the 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 e-business models available [18, 24]. Each of these models has different functional and knowledge characteristics resulting in different models each of which are applicable or suitable only to particular industries, markets or situations.

In addition to the complexity of the models, many factors are known to influence the strategic decision making process of organizations [7], which are also likely to impact the choice of e-business models. The choice of e-business model is a strategic decision, because the chosen model will form the framework for the organization to pursue its business activities in the e-business environment and will also affect an organization's overall strategic direction [11, 17].

The objective of this paper is to develop a prerequisite framework for helping decision makers to assess the suitability of e-business models during the intelligence phase of the decision making process. It also can be used to support managers with a toolbox to assist them manage their company. For example, if the level of knowledge area is not sufficient to implement a specific e-business model, managers should develop strategies for improving that knowledge area, giving attention to one or more of the defining factors of it.

An overview of intellectual capital measurement methods is provided in the next section. E-business models and its categorization are discussed in the third section, and selected reference models for this study is identified and explained with more details. The issue of deciding on appropriate business models is then outlined. This is followed by an explanation of the theoretical grounding for the proposed framework and a discussion of operationalising it using a series of Likert scales. The paper concludes with presenting some weaknesses of the framework and providing further study for refining this paper.

2. INTELLECTUAL CAPITAL MODELS

In order to discover factors which influence knowledge capability of an organization, a comprehensive review on articles related to organizational knowledge measurement was done and as a result different definitions regarding organizational knowledge was found, but most of them has a common approach to organizational knowledge and described it as: any influencing factor which increase market value of the firm but is not in the balance sheet of organizations. In the other words, it could be named intellectual capital. Botins (2001) [2] believes intellectual capital is the collection of intangible resources and the flows. Brooking [3] states that intellectual capital is the differences between the book value and the market value. Walsh and Ungson [23] noted that knowledge resides in organizational memory, manifested in retention facilities, including individuals, culture, transformations, structures and ecology. Dodgson (1993) has mentioned that research on knowledge can focus on outcomes of learning, the processes of learning, and the structures and strategies that enhance learning. DeCarolis and Deeds (1999) also employed the stock-flow concept, noting that it can be usefully combined with the tacitness of knowledge. Andriessen [1] noted that clarification is necessary regarding to three basic questions: why, how and what. The "why" question refers to the motives for valuing or measuring intellectual capital. The "how" question refers to the different approaches to valuing or measuring intellectual capital. Finally, the "what" question pertains to the intellectual capital classification schemes on which this study concentrates.

Although a large number of intellectual capital (IC) methods and models have been developed, a few of which are approved in any specific industries or organizations [2, 13]. The reminder of this section is a review of some of the best-known models for intellectual capital measurement.

Brooking [3] has introduced *"Technology Broker"* to clarify and measure IC in company with four components: market assets, human centered assets, intellectual property assets and infrastructure assets. According to authors, market assets equal the potential an organization has due to market-related intangibles such as brands, customers, repeat business, backlog, distribution channels, contracts and agreements such as licensing and franchises. Human centered assets are the collective expertise, creative and problem-solving capability, leadership, entrepreneurial and managerial skills embodied by employees of the organization. Intellectual property assets contain the legal mechanism for protecting many corporate assets and infrastructure assets including know-how, trade secrets, copyright, patent and various design rights, trade and service marks. Finally, infrastructure assets equal those technologies, methodologies and processes which enable the organization to function including corporate culture, methodologies for assessing risk, methods of managing a sales force, financial structure, databases of information on the market or customers, and communication systems.

Edvinsson and Malone [6] developed a dynamic and holistic IC reporting model called the *Navigator* with five areas of focus: financial, customer, process, renewal and development, and human capital. According to this model the hidden factors of human and structural capital, when added together, constitute intellectual capital. Consequently, structural capital includes customer capital and organizational capital, which is a combination of innovation capital and process capital. The authors considered both financial and non-financial building blocks that are combined to estimate the company's market value.

Finally, Sveiby [20] in 1997 proposed a conceptual framework based on three families of intangible assets: external structure (brands, customer and supplier relations); internal structure (the organization management, legal structure, manual systems, attitudes, R&D, software); and individual competence (education, experience).

To sum up, in the first step to design this study, intellectual capital elements was divided into several dimensions. We adopted Edvinsson and Maloni's model [6] which divides intellectual capital into three dimension; *human capital*, *customer capital*, *innovation capital*, and *process capital*. Dimensions of this model could be thoroughly mapped into influencing factors of e-business model taxonomy which would be discussed in next session.

3. ELECTRONIC BUSINESS MODELS

The term "business model" has been introduced by consultants and academics in the last decade as a substitute for the concepts such as strategy and strategy plan etc. In a business model the activity of buying and selling products as well as their representation is developed. "Business model concepts have been proposed to provide a link between strategy and operations" [12]. Many authors have classified the existing e-business models. Different authors have introduced variety of business model taxonomies. For example, Tapscott *et al.* [22] pointed out that there are five major categories of business models which differ in their degree of economic control and value integration. Linder and Cantrell [10] describe eight business models focusing on two main dimensions, which are a model's core, profit-making activity, and its relative position on the price/value continuum. Rappa's classification scheme [18] consist of nine generic form of e-business models, which spells-out how a company makes money by specifying where it is positioned in the value chain.

One of best taxonomies has developed by Timmers [21]. He has identified eleven different models and classified them by their innovation and function integration.

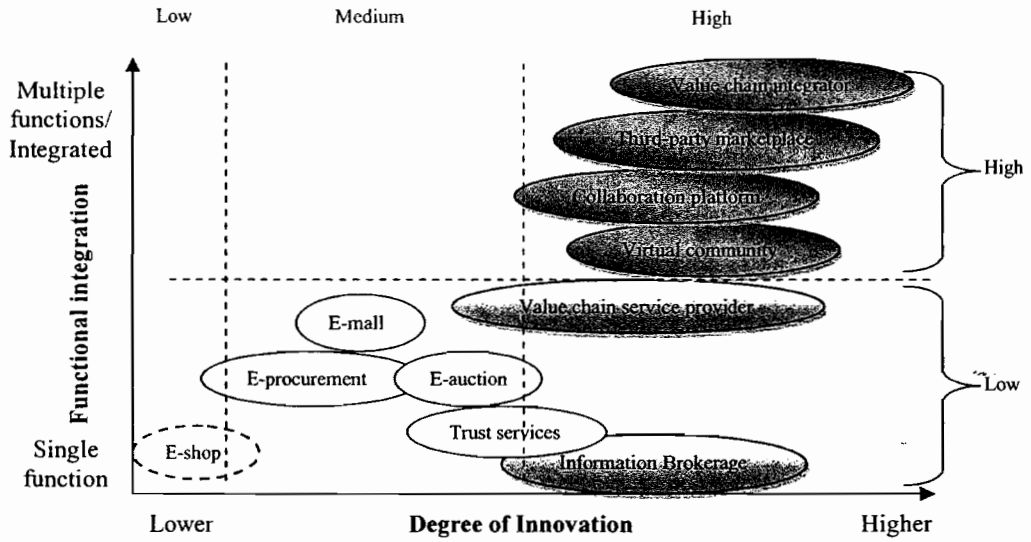

Figure 1. Classification of Internet business models (Timmers, 1999)

According to Hayes and Finnegan [8], this taxonomy classifies business models into three groups regarding their innovation; first group consist of *E-shop* which has low level of innovation. Second group consist of *E-procurement*, *E-mall*, *E-auction* and *Trust services* which have Medium level of Innovation. Finally the last group which consists of *Information Brokerage*, *Value Chain Service Provider*, *Virtual Community*, *Collaboration Platform*, *Third-party marketplace* and *Value-chain Integrator* has high level of innovation. He also has divided above e-business models regarding their functional integration into two groups; first group which are placed in the lower region of his diagram has lower functional integration. These models are *E-shop*, *E-procurement*, *E-mall*, *E-auction*, *Trust services* and *Information Brokerage*. The other five e-business models fit into the upper region which has higher functional integration. (See Figure 1)

Weill and Vitale [24] articulate eight types of e-business models that they believe are atomic. One or more models could make up an e-business initiative (See table 1).

Table 1. Atomic business models

Type of model	*Description*
Content Provide	Provides content (e.g., information, digital products and services via intermediaries)
Direct to Customer	Provides goods or services directly to customer often surpassing traditional channel players
Full Service Provider	Provides a full range of services in one domain (e.g., financial, health care) directly and via complementors attempting to own the primary customer relationship
Intermediary	Brings together buyers and sellers by concentrating information (e.g., search engines, auctions)
Shared Infrastructure	Brings together multiple competitors to cooperate by sharing common IT infrastructure
Value Net Integrator	Coordinates value net (or value chain) activities by gathering, synthesizing, and distributing information
Virtual Community	Facilitates and creates loyalty to an online community of people with a common interest, enabling interaction and service provision
Single Point of Contact	Provides a firm-wide single point of contact consolidating all services provided by a large multi-business organization (by customer events)

According to Wiell and Vitale each [24], atomic business model can be argued from three perspectives: Data, Relationship and Transaction. The relationship with the individual or business customer is perhaps the most important long term resource. A good relationship with a customer converts to loyalty and sustained revenues over the years. In this spirit, many firms sacrifice short term profits for longer term advantages like market share. They may also operate at a loss while they are building a customer base. (See table 2)

Table 2. Ownership of resources in atomic business model

Model Type	*Relationship*	*Data*	*Transaction*
Content Provider		√	
Direct to Customer	√	√	√
Full Service Provider	√	√	√
Intermediary	√	√	
Shared Infrastructure		√	√
Value Net Integrator		√	
Virtual Community	√	√	
Single Point of Contact	√	√	√

Proprietary data is one of the most essential resources for the firm to excel in the market. Whenever this data joined to art of its utilization to conduct relationship with customers, companies would achieve sustainable competitive advantage. Data about the customer would be in vast range from their demographic data to transactional data, survey results and voice of customer.

Wiell and Vitale [24] stated that whenever customers assume that they are conducting business transactions with our firm electronically, we own the transactions. For instance, if a customer only knows how to get to a retailer through the Z-Shops at amazon.com, then Amazon owns the transaction not the target company. The exchange of data may even be with the retailer and not Amazon. Table 2 shows the ownership of these three resources in eight proposed atomic e-business models.

For the purpose of this study and in order to build main axes for atomic business models, a mapping from Timmer's business models [21] and atomic business model is done. As a result for each atomic e-business model five influencing factors including transaction ownership, relationship ownership, data ownership, innovation level and functional integration level was constructed. These axes would be used in the next section to build the main framework of this study. (See table 3)

Single Point of Contacts, the last atomic business model, is suitable for public sectors and whole enterprises which has not been completely implemented yet [24]. So, it is omitted from our consideration due to its special usage which deprives other private organizations from its implementation.

4. TOWARD A NEW FRAMEWORK

New approach to e-business models started by researches of Ng [16], and Hayes and Finnegan [8]. Their goal was to develop a framework which aims at assisting manager to choose the appropriate e-business model based of their different capabilities. Hayes and Finnegan [8] based their framework on Timmers well-known model [21]. They considered five axes, which consist of economic control, functional integration, supply chain integration, innovation and sourcing, to evaluate firm's readiness for suitable e-business model adoption. At the same time, Ng [16] developed a preliminary framework for Australian agribusiness organizations to select business-to-business (B2B) e-business models.

Whilst these frameworks played a noticeable role in this arena, none of them had considered knowledge capabilities of organization to assess organizations potential for new e-business models adoption. In order to construct the prerequisites model, we have examined classification theories of particular e-business models based on the work of Weill and Vitale (2001) and Timmers (1999), and evaluated the required knowledge for implementing each of these atomic e-business models by metrics for measuring intellectual capital within organizations by Edvinsson and Malone [6].

Table 3. Ownership of five proposed criteria by atomic business models

Atomic business model	Mapped from Timmer's models	Transaction ownership	Relationship ownership	Data ownership	Innovation	Functional Integration
Content Provider	Information brokerage			√	High	Low
Direct to customer	E-shop	√	√	√	Low	Low
Intermediary	E-mall and E-auction		√	√	Medium	Low
Full service provider	Value chain service provider	√	√	√	High	Low
Shared Infrastructure	Collaboration platform	√		√	High	High
Value net integrator	Value-chain integrator			√	High	High
Virtual community	Virtual community		√	√	High	High

Edvinsson and Malone [6] proposed a comprehensive model for intellectual capital classification. This model developed a dynamic and holistic IC reporting model called the *Navigator* with five areas of focus: financial, customer, process, innovation, and human capital. According to Skandia's model the hidden factors of human and structural capital when added together comprise intellectual capital. In their model Intellectual capital consist of human capital and structural capital, and structural capital itself includes customer capital and organizational capital which is composed of innovation capital and process capital.

In order to construct the framework of this study, required level of these four dimensions of intellectual capital most be calculated for each atomic business models. Thus, we built our framework with the aid of five influencing factors, introduced in previous section: *innovation*, *functional integration*, *transaction ownership*, *data ownership* and *relationship ownership*.

"Human capital is at the heart of intellectual capital" [14], so any e-business model would demand human capital as much as possible to perform its task in the best manner. Therefore in every e-business model it plays its role similarly. As a result, we excluded human capital assessment as a differentiator between e-business models for the purpose of this study.

"At the core are two major components of the business model concept—business process and customer value" [19], so by the aid of Timmer's model [21] axes- *innovation* and *functional integration*- and Weill and Vitale model's axes- *transaction*, *data* and *relationship*- other three dimensions of intellectual capital are assessed for implementation atomic e-business models.

Firstly, in order to assess innovation capital, innovation level of targeted model is assumed. Undoubtedly, higher level of innovation in the business model would demand higher level of innovation capital too. Consequently, high, medium and low level of innovation would demand high, medium, and low level of Innovation Capital respectively. As a result *Content provider*, *Full Service Provider*, *Virtual Community* and *Shared Infrastructure* require **High** level of Innovation Capital. *Intermediary* and *Value Net Integrator* require **Medium** level of Innovation capital and, finally, only *Direct to Customer* requires **Low** level of Innovation capital. Secondly, in order to assess customer capital requirement for each atomic business model, data ownership and relationship ownership of them is used. In the atomic business there is the probability of ownership of data resource without relationship ownership [24], for instance, *Shared Infrastructure*. This will cause different level of relationship; firstly owning direct relationship with customer would demand **High** level of Customer Capital (*Direct to Customer, Full Service Provider, Intermediary and Virtual Community)*, secondly, owning only customer's data without relationship ownership would require **Medium** level of Customer Capital, and, finally, Lack of ownership of both customer data and customer relationship would place required Customer Capital in **Low** level (*Content Provider*). Finally, in order to assess required process capital for each atomic business model, their transaction ownership, introduced in Weill and Vitale model, and their functional integration level, introduced in Timmer's model [21], is used. Firstly, atomic business models which own transaction with high functional integration will require **High** level of Process Capital (*Shared Infrastructure*). Secondly, atomic business models which own transaction with low functional integration will require **Medium** level of Process Capital (*Full Service Provider and Direct to customer*). Finally, atomic business models which don't own transaction will require **Low** level of Process Capital (*Content Provider, Intermediary, Value Net Integrator* and *virtual community*). (See table 4 for the results)

It is essential to mention that the aim of this framework is to exclude some e-business models from the candidate list of e-business models. As a result managers would concentrate on selected business models to implement or will try to improve their organization's weakness to be ready for implementing those rejected e-business models for adoption. Therefore table 4 hypothesizes that if the knowledge capability of the firm match the knowledge resources required for the model, a particular business model is, only, more likely to make that firm a success. Therefore the next step form managers and decision makers would be analyzing other requirements for these e-business models, such as environmental or social condition for their adoption, which have passed knowledge capability filtering. A subset of models that was discussed earlier in table 1 is taken in consideration. However, it is possible to discuss other business models that are considered in this paper, we have focused on business models that have been verified by Wiell and Vitale [24] and have not seek to identify new models.

Table 4. The proposed framework

Atomic business models	*Process capital*	*Customer capital*	*Innovation capital*
Content Provider	Low	Low	High
Direct to Customer	Medium	High	Low
Full Service Provider	Medium	High	High
Intermediary	Low	High	Medium
Shared Infrastructure	High	Medium	High
Value Net Integrator	Low	Medium	Medium
Virtual Community	Low	High	High

5. FRAMEWORK DEVELOPMENT

The intellectual capital questionnaire could be used to allow an organization to diagnose its current position within the knowledge framework. By assessing performance against the three attributes, areas of strength and weakness could be identified, using the standard definitions associated with the intellectual capital measurement.

For each dimension, a series of questions in the intellectual capital questionnaire explores respondent's perception of the degree to which their organization use knowledge effectively, with a range of answers provided to each question corresponding to one of the three knowledge inventory segments. This was achieved by operationalising each characteristic, and using five-point Likert scale to judge the degree to which each operationalisation construct relates to the organization or market.

The Skandia IC report uses up to 91 new IC metrics plus 73 traditional metrics to measure the five areas of focus making up the Navigator model. Edvinsson and Malone [6] acknowledge that various indices may be redundant or of varying importance. Yet in trying to use their experience to create a *universal IC report,* they still recommend 112 metrics. Their metrics consist of measures to evaluate current position of a company regarding financial asset, human capital, innovation capital, process capital and customer capital. As we discussed earlier, in order to evaluate knowledge readiness of organization for atomic business model adoption, we assess *innovation capital*, *customer capital* and *process capital* regarding the point that all this models require good level of human capital.

Innovation capital has been defined differently in the literature with variety of authors but almost all of them agree that it comprises intellectual properties which are protected commercial rights such as copyrights and trademarks and intangible assets. Table 5 includes 38 measures introduced by Edvinsson and Malone [6] in their Navigator to assess innovational capital within organizations.

"*Customer capital* is the strength and loyalty of customer relations either within or outside an organization" [4]. "Customer relationships are considered by many as the most important component of relational capital" [14]. Table 6 includes 21 measures introduced by Edvinsson and Malone [6] in their Navigator to assess customer capital within organizations.

Process capital is not unanimously defined in the literature in spite of the fact that the concept of human capital and customer capital is well developed. But, mostly, "process capital contains the techniques, procedures, and programs that implement and enhance the delivery of goods and services" [4]. Table 7 includes 16 measures introduced by Edvinsson and Malone [6] in their Navigator to assess process capital within organizations.

Table 5. Measures of innovation capital

Indices	Score					Indices	Score				
Average customer age/customer	1	2	3	4	5	Average customer age/customer	1	2	3	4	5
Satisfied employee index	1	2	3	4	5	Direct communication to customer/year	1	2	3	4	5
Relationship investment/customer	1	2	3	4	5	Non-product-related expense/customer/year	1	2	3	4	5
Share of training hours	1	2	3	4	5	New markets development investments	1	2	3	4	5
Share of development hours	1	2	3	4	5	Structural capital development investment	1	2	3	4	5
Opportunity share	1	2	3	4	5	Value EDI system	1	2	3	4	5
R&D expense/administrative expense	1	2	3	4	5	Upgrades to EDI system	1	2	3	4	5
Training expense/employee	1	2	3	4	5	Capacity of EDI system	1	2	3	4	5
Training expense/administrative expense	1	2	3	4	5	R&D invested in basic research	1	2	3	4	5
Business development expense/administrative expense	1	2	3	4	5	Ratio of new products to full company product family	1	2	3	4	5
Share of employee under age 40	1	2	3	4	5	R&D invested in product design	1	2	3	4	5
IT development expense/It expense	1	2	3	4	5	R&D invested in application	1	2	3	4	5
IT expense on training/IT expense	1	2	3	4	5	Customer opportunity base captured	1	2	3	4	5
R&D resource/total resource	1	2	3	4	5	Average age of company patents	1	2	3	4	5
Investments in new product support and training	1	2	3	4	5	Patents pending/software, data, database developed	1	2	3	4	5
Competence development expense/employee	1	2	3	4	5	Competence development expense/employee	1	2	3	4	5

Table 6. Measures of customer capital

Indices	*Score*	*Indices*	*Score*
Market share	1 2 3 4 5	Revenue generating staffs	1 2 3 4 5
Number of customers	1 2 3 4 5	Service expense/customer/year	1 2 3 4 5
Annual sales/ customer	1 2 3 4 5	Ratio of sales contacts to sale closed	1 2 3 4 5
Customer lost	1 2 3 4 5	Satisfied index	1 2 3 4 5
Average duration of customer relationship	1 2 3 4 5	IT investment/salesperson	1 2 3 4 5
Average customer size	1 2 3 4 5	It literacy of customers	1 2 3 4 5
Customer rating	1 2 3 4 5	Support expense/customer	1 2 3 4 5
Customer visits to the company and the number of hits on the company's Web site	1 2 3 4 5	Average time from customer contact sale response	1 2 3 4 5
Days spent visiting customers	1 2 3 4 5	Service expense/customer/contact	1 2 3 4 5
Customers/employees	1 2 3 4 5		

Table 7. Measures of process capital

Indices	*score*	*Indices*	*score*
Administrative expense/total revenue	1 2 3 4 5	IT capacity	1 2 3 4 5
Processing time, out payments	1 2 3 4 5	Corporate quality performance	1 2 3 4 5
Contacts field without error	1 2 3 4 5	Corporate performance/quality goal	1 2 3 4 5
Function points/employee-month	1 2 3 4 5	Discontinued IT inventory/IT inventory	1 2 3 4 5
PCs and laptops/employee	1 2 3 4 5	Orphan IT inventory/IT inventory	1 2 3 4 5
Network capacity/employee	1 2 3 4 5	IT capacity/employee	1 2 3 4 5
Administrative expense/gross premium	1 2 3 4 5	IT performance/employee	1 2 3 4 5
Cost for administrative error/management revenue	1 2 3 4 5	Change in IT inventory	1 2 3 4 5

6. COMPUTER AND ELECTRONIC COMPANY CASE STUDY: USING THE FRAMEWORK

Our framework is intended for use in the primary phases of e-business model planning. Therefore, by its usage some e-business models will be excluded, and decision makers will be able to narrow down a large number of available business models to have a smaller number of alternatives which can be implemented more thoroughly. This framework is helping decision makers with consideration of their knowledge inventory. Nevertheless, it is essential to combine this framework with other frameworks such as those proposed by Hayes and Finegan's [8] or Eric Ng's [16], to figure out a comprehensive decision support framework.

This framework has been developed for knowledge-based organizations, which their assets include not only physical commodities but also intellectual capital or organizational knowledge [15]. However, this framework could be applied to other industries too, but for each scale decision makers need to determine the number of attributes that are applicable to their organization. For instance, an organization which doesn't propose delivery, may exclude the questions related to it. For each attribute the minimum score is one, resulting in the minimum score for each scale as the number of attributes. Consequently, the maximum score is determined by multiplying the number of questions by five.

To implement this framework, first of all, decision makers should score each attribute lonely. Secondly, they will convert the summation scores of each scale to percentage. Finally, a comparison between results in percentage to three dimensions of intellectual capital, innovation capital, process capital and customer capital, for each atomic business model would be done.

Low, medium and high are determined as being 0-33%, 34-67% and 68-100% (respectively) of the available marks. This classification is then compared with the classification of e-business model presented in table 4 to determine the suitability of each e-business model for organization.

At the end of our study, to illustrate the scoring of the framework, it is applied to a knowledge-based IT company which is known to authors. The company had the potential to implement e-business models. Electronic and mechanical machines automation is the main activity of the company. It has over 200 employees. From them 15% have PhD, 25% have Master of degree, 40% are under graduated and the rest of them are without academic education. The rate of educated employees in this organization indicates its highly knowledge-based situation. Customers of this company mainly consist of large private organizations or public sector which wants to automate some of their functions using IT tools such as image processing *etc.*

The rating scales were filled by five senior managers and five educated employees to avoid individual interests. (See table 8).

Table 8. Data resulted from questionnaire which filled by senior managers and employees

	Innovation capital	*Process capital*	*Customer capital*
Score	103 from 190 scores	57 from 80 scores	51 from 105 scores
Percentage	54%	71%	48%
Rating	Medium	High	Medium

For example, the maximum score for innovation capital is calculated as 190- being 38 times 5. The sum of scores for the all items was 103, resulting in score of 54% (103 divided by 190). At the next step, the result of rating which is shown in table 8 were compared with characteristics of e-business model previously shown in table 4: firstly, regarding innovation capital, *content provider*, *full service provider*, *shared infrastructure* and *virtual community* would be excluded from candidate list of e-business models, because of their high requirement of innovation capital compared to medium level of innovation capital in this organization. Secondly, in the same way, comparison between required process capital and calculated one, illustrated in table 4, indicates that this organization qualify for all of e-business models due to its high degree of process capital. Finally, based on the customer capital compression, this organization doesn't qualify for e-business models which need more than medium level: *Direct to customer*, *Full Service Provider*, *Intermediary*, and *Virtual Community*". These contradictions are signed by bolded italic words in table 9.

Therefore knowledge characteristic of this organization declares that this organization has knowledge capability to implement only one atomic business model: *Value Net Integrator*. After completing this framework, managers will decide whether to simply exclude inappropriate atomic business models or strengthen the weak intellectual capital dimensions to qualify for adoption those rejected one.

7. CONCLUSION

However in the digital economy intellectual capital is more deterministic than other influencing factors, the importance of other influencing factors such as financial capital, environmental situation *etc.* would not be abolished, so this framework works as prerequisite to other frameworks, such as Hayes and Finnegan's framework [8], which aims at assessing organizational readiness for e-business adoption.

Our framework has the potential to assist decision makers by providing a method to exclude from consideration those e-business models that are unsuitable given prevailing intellectual capital needed for each of them. The framework has designed to help managers for building new business model in electronic environment upon their previous business landscape, not for those companies which only do their business electronically. It the other word, the framework best fit for brick and mortar companies which aim at migration to click and mortar ones.

This study approved that success failure of e-business implementation in Iranian companies not only depends on external influencing factors, but also internal influencing factors such as intellectual capital. Although the case company had excellent financial situation and was so pioneer among its rival companies, according to this framework its intellectual capital deprived decision makers from implementing most of e-business models, unless they strength weak dimensions of intellectual capital within their organization. Consequently, analyzing other Iranian companies that in recent years have implemented e-business models confirmed their financial failure and bankruptcy.

Although, most of Iranian industrial managers believe that cultural, environmental and economical condition of Iran hinder them from successful e-business implementation, this study cast doubt on it by analyzing their internal factors. Besides, probing Iranian people life shows that they are, on contrary, so attracted to e-business. For example, Internet usage in Iran is at high level, besides, there are almost computers and internet connections everywhere. Furthermore, some aspects of e-business such as e-banking are successfully implemented and is so advanced in Iran.

We believe that the framework will increase the manager's power to select a suitable e-business model intelligently, by helping manager make a list of model for full evaluation. Nevertheless, there are some limitations and discussions on its performance.

Firstly, however, the influencing factor chosen- innovation, functional integration, data ownership, relationship ownership, and transaction ownership- are so deterministic there some other factors that should be considered, so this framework in combination with other frameworks.

Secondly, measures which are used to evaluate intellectual capital of specific organization are so general. So, further research must be done in specific industry regarding its characteristic. The influencing factors and the intellectual measurement tools which are used certainly needs some reformation on those targeted industries. For example, in some specific industries which delivery quality has less importance, managers may delete questions regarding it for intellectual capital measurement.

Finally, in order to evaluate the performance of the framework, it will be useful to examine the framework in a click and mortar organization that has already implemented some of atomic business models. With the previous knowledge of business models performance on that cases and comparison it with the framework, we will be able to evaluate the power of the framework for e-business models selection.

Table 9. Comparison between required knowledge and available knowledge in Target Company

	Process capital		Customer capital		Innovation capital	
	Calculated	*Required*	*Calculated*	*Required*	*Calculated*	*Required*
Content Provider	High	Low	Medium	Low	***Medium***	***High***
Direct to Customer	High	Medium	***Medium***	***High***	Medium	Low
Full Service Provider	High	Medium	***Medium***	***High***	***Medium***	***High***
Intermediary	High	Low	***Medium***	***High***	Medium	Medium
Shared Infrastructure	High	High	Medium	Medium	***Medium***	***High***
Value Net Integrator	*High*	*Low*	*Medium*	*Medium*	*Medium*	*Medium*
Virtual Community	High	Low	***Medium***	***High***	***Medium***	***High***

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