

Application of VERDICT for Electronic Readiness Assessment within Iran's Automotive Industry

Pourya. Aminali¹, Amir. Albadvi^{2*}, Pet. Naude³

1-M.S.c in Marketing and E-Commerce, Industrial Engineering Department Tarbiat Modarres University

2- Associate Professor, Industrial Engineering Department, Faculty of Engineering, Tarbiat Modarres University

3- Associate Professor of Marketing, Manchester Business School, The University of Manchester

*P.O. Box 14115-143

albadvi@modares.ac.ir

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Abstract

Over the recent years, rapid development of Information Technology (IT) and Electronic Commerce (e-Commerce) has dramatically affected world trade and the way business is conducted. Also the benefits of using e-commerce and other internet-based technologies have been well recognized through extensive surveys pointing the dominant role of IT in different industries. However, implementation of any new technology such as e-commerce in business relationships and applying ICT tools require vital infrastructures and urges major changes within companies to adopt the new technology. Therefore, to ensure a productive and beneficial implementation of internet-based technologies, in the first step, one needs to investigate infrastructures and measure electronic readiness (e-readiness) of organizations in this regard.

To address such a need, this paper describes a procedure to assess e-readiness of SMEs in technology-affected environments by applying VERDICT as an e-readiness assessment model. This study as an initial application of VERDICT within automotive industry, investigates e-readiness level of downstream within the biggest vehicle manufacturer of Iran i.e., Iran Khodro Industrial Group, and has also some contributions in the applied model based on empirical findings which were achieved through an extensive survey by distributing revised questionnaires of VERDICT and following a quantitative approach.

Furthermore, an efficient route of benchmarking provides scientific comparison between e-readiness level of the case studied in this paper and that of other companies selected from another market in UK. Ultimately, the achievements of this research would result in some implications for both theoretical and managerial people where an outline would be provided for organizations across different industries to facilitate electronic commerce applications efficiently by investigating and improving their essential infrastructures through assessing their overall level of electronic readiness.

Keywords: E-Commerce, Business Relationships, Infrastructures, E-Readiness Assessment, VERDICT.

1. Introduction

The Internet facilitates direct, unmediated linking of exchange parties (Berthona, et.al 2003, [1]). Besides, national information

infrastructures are the basis of innovation and competitive performance of socio-economic development programs in relation to the emergent global information society.

(Albadvi,2004, [2]). Therefore with the growing importance of the internet-based technologies, nowadays countries and companies across several industries are increasingly leveraging new technologies such as e-commerce to achieve a competitive advantage where impersonal IT-based communication channels are becoming the cornerstone of many new relationships (Naude & Holland, 1996, [3]). However as Soetanto (2003, [4]) argues, implementation of Internet-based technologies, such as e-commerce, for achieving business targets, brings about changes in organizations, in their current processes and workflows. It is therefore important to evaluate the business process implications of adopting e-commerce for companies in technology-affected markets. This is the main focus of this paper.

2- Conceptual Framework

2-1- Electronic Readiness Concept

E-readiness has different meaning for different people, in different contexts, and for different purposes (Peters, 2001 [5]). Thus it is important. first of all, to define e-readiness in the context of this paper. E-readiness is defined here as “the ability of an organization, department or workgroup to successfully adopt, use and go in benefit from information and communication technologies (ICTs) such as e-commerce (Ruikar et.al.,2006,[6]). A careful scan of the mentioned definition shows the necessity of readiness evaluation for any company that seeks to adopt and implement internet-based technologies. However, as the first step of this assessment procedure, an appropriate model should be employed to evaluate a company in the most appropriate manner (Aminali, 2007, [7]).

2-2- Review of e-Readiness Assessment Models

Most of e-readiness assessment models could be divided into two main categories: those that focus on basic infrastructure or a nation's readiness for trade or economic growth, and those that focus on the ability of the overall

society to benefit from ICT. These two categories which are described in terms of “e-Economy” and “e-Society” assessment tools are not however mutually exclusive (Peters, 2001, [5]). Because due to (WITSA,2000 ,[8]) and (APEC,2000 ,[9]), when “e-Society” tools such as WITSA (World Information Technology and Services Alliance) and APEC (Asian Pacific Economic Cooperation) incorporate business growth and use of ICT as part of their larger analysis, “e-Economy” tools such as CSPP (Computer Systems Policy Project) include some factors like privacy and universal which are the matter of interest to the larger society (CSPP,1998 & Bui.et.al.2002, [10],[11]). Therefore another way to look at the e-readiness assessment models would be to consider them in terms of “E-Systems” where e-system models examine the underlying technology infrastructure that is a prerequisite for both “e-economy” including e-commerce and “e-society” (Peters, 2001, [5]).

Over the last few years, while most of models focus on assessing readiness of countries, governments and policies for adopting Internet-based technologies, some other models following the approach of e-systems came to exist and were applied to assess e-readiness of companies within specific industries. Examples of these models include SCALES and RACE, where SCALES (Supply Chain Assessment and Lean Evaluation System) was designed to assess SMEs' e-readiness for adopting Lean Manufacturing techniques and RACE (Readiness Assessment tool for Concurrent Engineering) was developed and widely used in electronics industries (Ruikar, et.al.,2004 [12]).

Therefore as Peters (2001, [5]) argues, scanning the characteristics of available e-readiness assessment models reveals the fact that the range of these modes is broad and each tool has a specific approach to e-readiness assessment and follows different method for measurement. Consequently following Peters's approach, we look for the most appropriate model which could fulfill the requirements of our study, including:

- Direct assessment of e-readiness within a company to adopt e-commerce technologies;
- The capabilities to assess e-readiness in scale of a company or SME independent of country or economy;
- Following the approach of “e-system” to assess e-readiness of companies within a specific industry;
- Distinguishing well-defined categories through which e-readiness assessment could be assessed in our case study;
- Having some well-defined methodologies through which data gathering could be done in whole scale, i.e.g “sale and after sales services centers of company over Iran”.

Therefore, after investigating procedures of almost all available models, we finally came to the conclusion that VERDICT is the most proper model for our research targets.

2-3- The VERDICT Model

VERDICT (acronym for Verify End-user e-Readiness using a Diagnostic Tool) was first introduced by researchers of Loughborough University of UK in 2006, and was used in automation and engineering industries by K.Ruikar [6].

According to the characteristics and capabilities of VERDICT we found it precisely proper for objectives of our research, therefore through some negotiations with creators of the model, we acquired the model's materials and adopted them by collaboration of model creators and other experts, to apply in automotive industry of Iran.

VERDICT is a combination of two e-readiness assessment models: “BEACON” and “IQ Net” (Ruikar, et al, 2006 [6]). The BEACON model (Benchmarking and Readiness Assessment for Concurrent Engineering in Construction) assesses the readiness of construction companies to improve their project delivery processes through the implementation of concurrent engineering (Khalfan, 2001 [13]). It also consists of four elements: Process, People, Project and Technology. I Q Net readiness

scorecard on the other hand was developed by CISCO (Cisco system, 2004, [14]) based on the book Net Ready by which gauges the readiness of IT service providers. In this model companies are also required to respond to some statements and upon completion, they will be assessed based on their e-readiness.

VERDICT is the combination of two above mentioned models with adoption of a similar methodology through which end-users are presented with a set of statements and an assessment of their e-readiness is based on their responses (Ruikar, et.al.2006, [6]). However, VERDICT differs from the two later models in the following issue: While the BEACON model focuses on concurrent engineering (CE) and the IQ Net readiness scorecard addresses the readiness of technology companies (e.g., software companies) to develop applications and profit from what is termed e-economy”, VERDICT assesses directly the e-readiness of companies to adopt e-commerce technologies (Ruikar, et.al.2006, [6]).

2-4- The Mechanisms of VERDICT

VERDICT is based on the premise that for any company to be e-ready, its management, people, process and technology have to be e-ready (Emmett,2002, [15]). So the e-readiness levels of all four mentioned categories are measured through VERDICT procedures. This is performed by finding the average score of each category depending on judgment of the respondents as to which level they agree with the statements of the asked questions in the questionnaire. According to Ruikar (2006, [6]), the average scores are then presented within three defined boundaries where

- An average score greater than or equal to zero and less than 2.5 shows “Red” situation and indicates that several aspects within a category need urgent attention to achieve e-readiness.

- An average score greater than or equal to 2.5 and less than 3.5 shows “Amber” situation and indicates that certain aspects within a category need attention to achieve e-readiness.

- An average score greater than or equal to 3.5 shows “Green” situation and indicates that the end-user organization has adequate capability and maturity within each category to be e-ready.

The choice of these boundaries is based on average scores and there is scope for further normalization once the best of breed is established. Furthermore, containing an Internet-based prototype for web-based applications, VERDICT could assess overall e-readiness of the end-user companies and aid them not only to gauge their overall e-readiness, but also to review periodically progress in achieving e-readiness to adopt e-commerce applications that facilitate B2B collaboration (Aminali,2007, [7]). This paper as part of a broader research project to study the business process implications of e-commerce applications on SMEs through a real case in automotive industry, contributes mainly in development of VERDICT model, which has just been applied for assessment of some construction organizations in UK.

In this paper we apply VERDICT in automotive industry through an in-depth study to assess e-readiness level of downstream within Iran Khodro Co, the Iran’s leading vehicle manufacturer in the region and possibly the biggest industrial conglomerate in the Middle East. Our study is conducted over the huge population of mentioned company’s 700 official agents all over Iran. (IKCO, 2006 [16]). The results of this study reflect new approaches to VERDICT model to be used in adopting e-commerce within SMEs .

3- Methodology

3-1- Research Design

In order to control the parameters of the applied model concerning e-readiness assessment in technology-affected markets, the

automotive industry as one of the largest industrial sectors of the world which contributes from 4% to 8% of the GDP and accounts for 2% to 4% of the labor force in the Organization for Economic Co-operation and Development (OECD) countries (Autofacts,2004, [17]) was selected. Iran Khodro company (IKCO) as the leading vehicle manufacturer in middle-east was Also drawn from Iran’s industry. This company owning a market share of 60% in average from Iranian automotive market (IKCO, 2006 , [16]), targets the objective of creation and managing some factories to manufacture various types of vehicles and related parts to sell and export into global markets.

As Ruikar (2002, [18]), argues limiting the study to one participating company is important in order to obtain responses from managers who have as similar as possible conceptualization of application of new technologies in their company .Therefore in this study, the distribution chain of IKCO along with company’s sales and after-sales services as an important section (Zeithaml, 2002,[19]) was chosen to be investigated for e-readiness.

Sales and after-sales services functions (Williams & Lane, 2002 [20]) in this case is conducted through a complex network consisting a huge central organization -“Iran Khodro Sale and After-sales services” (IKSA) - and about 700 official agents with more than 15000 personnel all over Iran. This network and all managers of these 700 centers were chosen as the sample of this study to be provided with the questionnaires.

3-2- Questionnaire Development

When conducting a national survey, construct equivalence is crucial: underlying meanings and interpretation of items should be equal across regions (Williams & Lane, 2002 [20]). To establish construct equivalence and then proceed to data gathering process, a four-step procedure was followed. The first Step was

conducting focus group interviews with some experts and managers of IKCO to generate ideas on how to measure e-readiness level in downstream of the company. This resulted in using a revised version of VERDICT questionnaire for a broad survey. Next, the original questionnaire of VERDICT was achieved and translated accurately into Persian with authority of the model creator. Then, interviews were held with top managers in order to evaluate the questionnaire and revise it according to the automotive industry requirements. Based on the comments generated during interviews, some items were changed and some questions were eliminated. Finally, the prepared questionnaire was changed by vice president of company and a quantitative pilot test was conducted with a small sample of sales managers, which resulted in some minor adaptations to the final questionnaire. The results of pilot test showed also the understandability of questionnaire and reflected acceptable values of internal consistency where "Cronbach's Alpha" proved the related reliabilities (Aminali,2007, [7]).

3-3- Data Collection

The central organization of IKSA distributed the questionnaire to the respondents in all cities of Iran through official web site of the company and broadcasting e-mails. Respondents also received an appeal letter from the company's top sales executive with instructions to participants that explained the research. The instructions assured each participant that only the researchers would have access to specific responses, thereby ensuring anonymity. All completed questionnaires were returned directly to the research team. In total, 700 managers were contacted and 176 responded to the items of questionnaire. From 176 received questionnaires, 36 were eliminated because of missing data or some incomplete responses. So 140 remaining responses resulted in an overall useable response rate of 20 percent that formed a sample of which demographics are summarized in Table1.

Table 1: Respondent Demographic Information

| Country Area | Frequency | Percentage | Cumulative Percentage |
|--------------|-----------|------------|-----------------------|
| Center | 14 | 55.0 | 55.0 |
| East | 77 | 10.0 | 65.0 |
| North | 11 | 7.9 | 72.9 |
| South | 18 | 12.9 | 85.7 |
| West | 20 | 14.3 | 100.0 |
| Total | 140 | 100.0 | |

* The research sample was classified into five areas on the map of country based on geographic distribution of centers

4- Data Analysis and Results

4-1- Measurement Issues

The measurement scales for this study have been drawn from the extant literature with only minor modifications needed to fit the study's context. These measures are well established in the sales and after-sales services, marketing, and information technology literatures (Albadvi, et.al 2006 ,[21]). Also revealing an adequate level of reliability ($\alpha > .75$) for each category (Cronbach, 1951 [22]), the "Cronbach's alpha"s were calculated, as suggested by Nunnally and Bernstein (1994 [23]). The reliability for each category is presented in Table2. The measurement occurred through a 5-point scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Also a "Don't know" option with assigned score of 0 was included. Therefore respondents chose among six possible options for each question due to their agreement or disagreement with statements.

Table 2. Attributes mean, standard deviation and reliabilities

| Attributes | Alpha | SD | ^a Mean (Total) | ^b Mean (For Capital City) | ^c Mean (For Other cities) |
|------------|-------|------|---------------------------|--------------------------------------|--------------------------------------|
| Management | 0.848 | 1.57 | 3.29 | 3.40 | 3.20 |
| People | 0.799 | 1.46 | 3.31 | 3.69 | 3.25 |
| Process | 0.804 | 1.49 | 3.15 | 3.41 | 3.07 |
| Technolog | 0.79 | 1.50 | 2.94 | 3.15 | 2.87 |

^a
140 centers in total, contributed in this survey from all regions of Iran

^b
32 centers from Tehran ,the capital of Iran, account for about 30% of sample size

^c
108 centers from Other cities of Iran , account for about 70% of sample size

4-2- Results of e-Readiness Assessment

This section presents e-readiness level of the studied case in automotive industry through VERDICT and compares the results to that of other research, which has been done among leading construction organizations of UK. To this end, first, the summary of responses to each category and the recorded average scores in our study are presented in table 3.

Table 3. Category-wise table summarizing average scores in each category based on “Ruikar’s defined boundaries”

| Category Name | Average Score | Situation Based on “Ruikar’s Boundaries” |
|-------------------|---------------|--|
| <i>Management</i> | <i>3.30</i> | <i>Amber</i> |
| <i>People</i> | <i>3.25</i> | <i>Amber</i> |
| <i>Process</i> | <i>3.07</i> | <i>Amber</i> |
| <i>Technology</i> | <i>2.87</i> | <i>Amber</i> |

Due to VERDICT approach the minimum score that can be obtained for each category equals zero where the respondents don’t know the answers to any of the questions and therefore noe-readiness is deduced for the category. Also the maximum score that can be defined for each category to imply an ideal e-readiness equals 5 where the respondents strongly agree with all the questions related to that category. The choice of obtaining scores for each category is based on average scores of responses. The obtained scores in term fall in the boundaries of VERDICT to reflect results and provide a scope to normalize the scale for further benchmarking when the best of breed is established.

In this study, all categories of Management, People, Process, and Technology, obtaining average scores greater than 2.5 and less than 3.5, achieved the “Amber” situation of the VERDICT model. Therefore it is inferred that certain aspects within all categories of the investigated company need attention to achieve e-readiness. Also from the figure it is seen that within the company:

- Technology, obtaining the lowest score comparing to the other categories, is known as the least e-ready category with average score of 2.94.

- People and Management having average scores close to “Green” situation of VERDICT, have better situations of e-readiness and it is predictable for them to achieve e-ready position sooner by some improvements.

- Since the difference between the most e-ready category and the least e-ready one within the company is not more than 0.37, it could be inferred that no big gap exists among e-readiness level of categories in the company. Therefore almost the same level of attention is needed for all categories to be e-ready.

4-3- Benchmarking through the VERDICT Approach

The obtained results of research could be plotted on a radar diagram for more analysis and benchmarking as illustrated in Fig.1. The radar diagram includes spokes, which represent dimensions of the model and show the values of the obtained scores (Ruikar,2006, [6]).

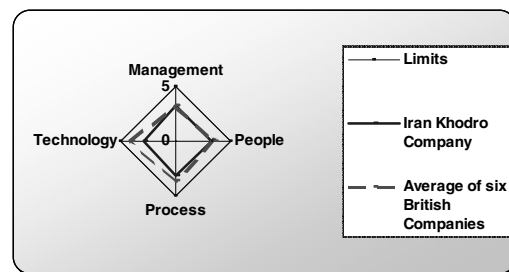


Fig. 1. Radar diagram illustrating average e-readiness of respondent company as compared to British companies

This gives a visual representation of our results (shown in blue) in comparison to those of another study which has been done in UK for construction industry (shown in red as the best-of-breed). Data for the best-of-breed is achieved from the VERDICT paper by Ruikar (2006, [6]) which mentions to industrial evaluations conducted by managerial staff of six leading UK construction organizations in Table 4.

Table 4. Category-wise comparison of e-readiness scores for some end-user evaluation British companies

| Average scores in each category | | | | |
|--|------------|--------|---------|------------|
| | Management | People | Process | Technology |
| Company 1 | 3.48 | 3.46 | 3.83 | 3.54 |
| Company 2 | 3.46 | 3.62 | 3.50 | 3.85 |
| Company 3 | 3.33 | 3.62 | 3.83 | 4.46 |
| Company 4 | 3.52 | 3.54 | 3.58 | 4.69 |
| Company 5 | 3.33 | 3.85 | 3.42 | 4.00 |
| Company 6 | 2.29 | 2.54 | 3.17 | 3.62 |
| Average | 3.23 | 3.44 | 3.55 | 4.02 |
| a | | | | |
| Results (Amber) (Amber) (Green)(Green) | | | | |

a
The average scores result for each situation based on Ruikar's defined boundaries, where : scores greater than or equal to zero and less than 2.5 show the Red situation , scores greater than or equal to 2.5 and less than 3.5 show the Amber situation and scores greater than or equal to 3.5 indicate the Green situation.

The Radar diagram shows that in gap analysis of e-readiness level between British companies and Iran Khodro Co. the most significant distinction relates to the Technology category where British companies having superior ICT infrastructures and technological supports, are considerably more e-ready than the Iranian one. Also from the figure and the obtained average scores it is seen that:

- While management in British companies has the lowest score in comparison to the other categories, in IKCO. Management has

the second place to go to be e-ready. Therefore having higher average score compared with the British companies, "Management" in IKCO seems to be somehow more e-ready.

- The people category in average has approximately the same level of e-readiness within IKCO and the British companies. Therefore it is inferred that having some qualified staff, the mentioned companies should invest on training their personnel as well as improving their organizational conditions to be e-ready in this category.

- The process category in the British companies also is better compared with IKCO. Although not a significant gap was observed between Process readiness of the British companies and that of IKCO, this category like the Technology, in British companies exceeds the boundaries of Green situation and seems to possess adequate capability to be e-ready.

4-4- Factor Analysis

This section presents the sub-categories of VERDICT, by applying factor analysis on data gathered from our survey. As mentioned before, data gathering in our research was done through distributing of questionnaire. The questionnaire consists of four main categories: management, people, process and technology. To study the internal components of the applied framework and to achieve a structured model which reflects the importance and relationship among main categories of VERDICT, we used factor analysis on received questionnaires to find common characteristics among questions of each category and recognize the related sub-categories.

This was done, by employing factor analysis with SPSS 13 to classify each category into some sub-categories, which are in fact the basic indicators of the

VERDICT criteria. The overall result of classification is summarized below.

The Management category was classified to four sub-categories (indicators) by four principal factors and we applied the term MA-F(s) (Management and Factors). Each factor as an indicator of the category relates to a set of questions with some common characteristics that measure an aspect of the main attribute in assessing e-readiness. Therefore by recognizing these factors, the Management category was classified into four sub-categories which were represented by MA-F(1) to MA-F(4). In a similar manner the People category was divided into two sub-categories and PE-F(s) was used as the abbreviation for the People and the Factors in this category. Also the Process and the Technology categories were classified into their representative sub-categories (indicators) and PR-F(s) as well as TE-F(s) were applied as appreciations to show the related sub-categories (Table 5).

Table 5 Summary of the Categories and Indicators

| Indicator Category Cronbach's Alphas |
|--|
| Effect of managerial strategies Management $\alpha = .728$ MA-F1 adoption of e-commerce Management $\alpha = .701$ MA-F2 competition in applying new-technologies Management $\alpha = .75$ MA-F3 concerns of opportunities and treats Management $\alpha = .738$ MA-F4 |
| Effect of organizational issues People $\alpha = .706$ PE-F1 IT Knowledge of staff People $\alpha = .712$ PE-F2 |
| Automation in workflows Analysis Process $\alpha = .733$ PR-F1 BPR implementation Process $\alpha = .729$ PR-F2 |
| Technical support Technology $\alpha = .76$ TE-F1 ICT infrastructures. Technology $\alpha = .749$ TE-F2 |

a These indicators were measured through employing the five-point Likert scales, where 1=strongly disagree, 3=neutral, and 5=strongly agree.

Moreover, as suggested by Nunnally and Bernstein (1994, [23]) the reliabilities of these indicators were investigated by calculating Cronbach's alphas and an adequate level of reliability ($\alpha > 0.70$) for each scale, was revealed.

4-5- Structural Model Estimation

In order to substantiate our findings and gain further insights into importance and relationships among attributes of VERDICT, we used the structural model in presenting latent variable evaluation through main categories. Structural Equation Modeling (SEM) with LISREL 8.5 was employed to test various structural models of the theoretical constructs (Jöreskog & Sörbom, 2001, [24]). The structural model which fit properly to the data represented a χ^2 of 187.58 ($p < 0.007$) with 6 degrees of freedom. The ratio of χ^2/df was 0.82, which is below the suggested 5.0 value, indicating a good fit (Hayduk, 1987 [25] & Mulaik, et.al.1989 [26]).

The root mean square error of approximation (RMSEA) for the model was 0.054, and the root mean square residual (RMSR) was 0.065, both of which indicate adequate (Hayduk, 1987, [25]). Overall, the structural model indicated an acceptable fit with a normed fit index (NFI) of 0.95, a Tucker-Lewis coefficient (TLI) of 0.97, and a comparative fit index (CFI) of 0.96 ([Hu & Bentler, 1999 [27]). This fit provides support for the suitability, importance and relationship between the intended latent constructs and their indicators. (Fig 2)

Also the loads of VERDICT main categories in assessing the latent variable of e-readiness on this research were computed and exhausted in a separate matrix as the covariance matrix. (Table 6).

Table 6: Covariance Matrix for Main categories of VERDICT model

| Management | People | Process | Technology | |
|------------|--------|---------|------------|------|
| Management | 1.00 | | | |
| People | 0.49 | 1.00 | | |
| Process | 0.58 | 0.61 | 1.00 | |
| Technology | 0.49 | 0.49 | 0.52 | 1.00 |

*Covariance matrix is exhausted from measurement equations with degree of freedom=2 and chi square = 0.87

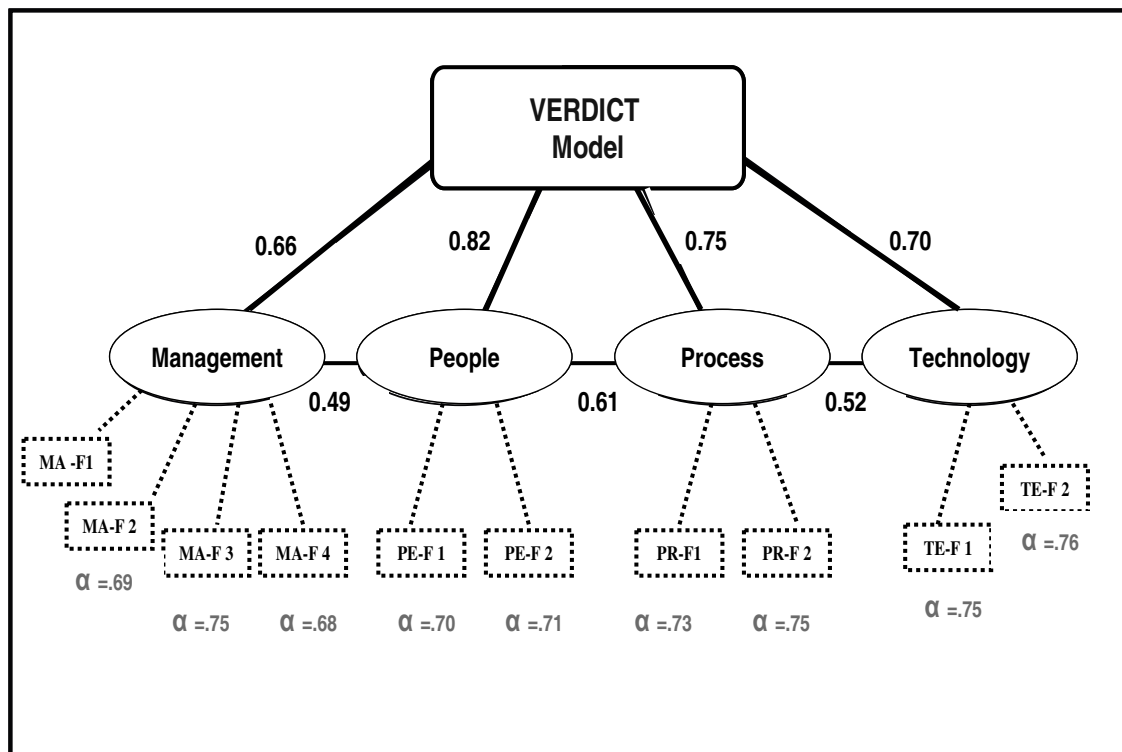


Fig. 2. Developed model of VERDICT and relationships among indicators

5. Conclusion

5.1. Discussion

In this paper we applied the VERDICT e-readiness assessment model to automotive industry to evaluate e-readiness level of sales and after-sales services within Iran Khodro Co. The methodology of gathering in this deductive research was based on surveys through a revised version of VERDICT questionnaires and following a quantitative approach. Our research was conducted on population of company's official agents throughout Iran, based on the premise that for any company or department to be e-ready, the management, the people, the process and the technology attributes have to be e-ready (Emmett, 2002, [15]). The outcomes of this study which were achieved after a pilot test and a broad survey, provided a framework for productive applications of IT tools in technology-affected markets. Also along with

facilitating competitive benchmarking against the best-of-breed (Ruikar, 2006 [6]), we contributed in development of the original model by starting to identify the sub-categories of model and to generate a structural model for demonstrating the relationships among the model's attributes. Ultimately, through this research we provided SMEs across different markets with an outline to ensure beneficial implementation of the new technologies within their departments. So that, various applications of IT which could be useful for marketing are expected also to be implemented efficiently in this manner.

5.2. Managerial Implications

In an era that organizations work to gain a successful foothold in a competitive environment, effective usage of IT and Internet-based technologies is taken into account as an important competitive advantage. On the other hand, it is important

for companies seeking to adopt internet-based facilitators such as e-commerce to assess their e-readiness for adopting these new-technologies. Therefore companies who are currently using, and those who already use these tools need to take measures to successfully adopt and So benefit from new technology tools. The outcomes of this research address this need and provide companies with a framework to assess their e-readiness toward four criteria which VERDICT proposes as necessities of a company to be e-ready. So, two key value-adding aspects of this article are: (a) Applying VERDICT as a powerful e-readiness assessment tool in new areas and (b) adding new features to VERDICT to enhance its applications for further analytical purposes.

Therefore, companies could leverage the proposed procedure of this paper to assess their e-readiness level in order to facilitate B2B collaborations as well, through implementation of Internet-based tools.

5.3. Theoretical Implications

Our study has a number of theoretical implications that deserve future research. First identifying the sub-categories of VERDICT which are in fact the main indicators of framework. In this research by proper use of statistical procedures and proving the reliabilities of findings, we classified each category into representative sub-categories through which e-readiness could be assessed accurately in each attribute of the VERDICT. Secondly, as illustrated in section 4, we applied VERDICT model in benchmarking against the best-of-breed. For this purpose we compared e-readiness level of the studied case to that of leading construction organizations of UK to show apparent gaps. This provides scopes for further enhancement of VERDICT in gap analysis. Third, in order to achieve further improvement of model specifications, we developed a structural model to presents the loads of attributes in assessing e-readiness and to show the existing relationships among the main categories. Finally, the findings of

this research provided us with the conclusion that in order to assure a productive implementation of new-technology in trade environments, paying attention to financial indicators is necessary. Therefore further researche could focus on the role of these predictor variables while assessing e-readiness within organizations.

6. Reflections

6.1. Limitations

When considering the results of this study, two limitations bear mentioning. First, as Ruikar, (2006, [6]) indicates classifying the questions into sub-categories and weighting categories according to their level of importance to achieve e-readiness is a complex process. thus, the relative loads of the criteria in e-readiness assessment of organizations may vary according to the nature of industries and the related disciplines. Therefore additional researches in more cases are needed to generalize the presented weights and relationships.

Secondly, due to the lack of some licensed utilities and analytical softwares in Iran , our analysis may impose some limitations on the development of the structural model. Although this distinction did nothing to obviate our findings, access to more capable tools would help us to investigate the relationships among the discovered sub-categories similar to what we did in the case of the main categories. However, it could be the opportunity of future researches to investigate those mention relations and present a three-layer structural model.

6.2. Future Research

Regarding the importance of technology adoption and e-readiness assessment issues, some areas for future research do exist. First, there is a scope for future studies to indicate how e-readiness could be achieved in organizations after assessments. Therefore, further research in the development of strategies that consider financial and economical parameters is require in this

regard. Second, in order to establish better e-readiness levels, other researches could be done among different industries to address the need for the best-of-breed in future comparisons or benchmarking. Third, to increase the validity of the relations investigated, further research utilizing the presented structural model and the sub-categories across various organizations would increase the generalizability of the relation.

Finally, finer investigation of issues concerning productivity could be addressed through a study which covers an extended period of technology adoption and implementation. The hypothesis testing method about the difference of means could assist in discovering such differences that may be existent within firms before the adoption of new technology and after its successful implementation.

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