

THE EVALUATION MODEL TEST OF BUSINESS INTELLIGENCE MATURITY LEVEL IN ELECTRONIC BUSINESSES (CASE STUDY: INTERNET SERVICE PROVIDER COMPANIES)

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ABSTRACT

This study aims to test a model for evaluating the level of business intelligence maturity in electronic businesses. The phenomenological method is used in the qualitative section and a descriptive-survey method is applied in the quantitative part. The statistical population in the qualitative section is composed of electronic business managers and senior experts who are in the field of Internet services and selected by the maximum differentiation method of the participants and saturation is achieved after 10 interviews. In order to investigate the validity of the qualitative data, construct, external, descriptive and interpretive validity are used and Rao and Perry's (2003) trinal approach is used to verify the reliability. The results of qualitative research are categorized in the form of five levels of business intelligence maturity which include initial maturity, repeatable maturity, defined maturity, managed maturity, and optimized maturity. In addition, initial maturity includes 1 dimension and 5 indices; repeatable maturity consists of 5 dimensions and 25 indices; defined maturity includes 6 dimensions and 71 indices; managed maturity consists of 13 dimensions and 97 indices, optimized maturity includes 8 dimensions and 34 indices. After designing the business intelligence maturity model, the quantitative section is investigated. Face and content validities are used in order to study validity. On the other hand, reliability of the tool is estimated by Cronbach's alpha (0.934). 100 persons among five selected companies of Internet service provider (20 persons per each company) are considered as statistical samples using the convenience sampling method. Friedman test is used to analyze the data. The findings indicate that two companies are in the third level, two companies are in the fourth level and one is in the fifth level of maturity in the evaluation of business intelligence maturity in the five selected companies.

Keywords: Business Intelligence, Electronic Business, Defined Maturity, Initial Maturity, Managed Maturity, Optimized Maturity, Repeatable Maturity.

INTRODUCTION

The business environment has changed in many aspects in the current era. One of the most important changes is the rapid growth of information technology (IT) in general and the Internet and related technologies in particular which are combined with the change of economy nature and created a new kind of business called electronic (e-business). Electronic business can be introduced as a set of processes and tools that allow companies to use Internet-based information technology to conduct domestic and foreign trade (Pilinkiene et al, 2013). All activities in this type of business, such as sending documents, exchanging data between producer and distributor,

and business partners, clients, and market is formed based on Internet (Brzozowska & Bubel, 2015).

Among them, organizations that have adapted themselves to variations and changes in business practices will succeed in this new wave. However, achieving complete success requires this fact that organizations, models and business strategies make themselves consistent with it. What is certain is that e-business requires mechanisms that integrate and analyze data in real time according to the importance of the subject of electronic business and very complex and variable internal and international environment, and facing with many challenges including pressure for greater transparency and accountability, increase of responsibilities and activities, very fast changes of technology. Business intelligence is considered as one of these types of mechanisms. Businesses can simply acquire the required ability and knowledge to adapt with different business situations by use of business intelligence (Patil, 2016).

Business intelligence is a kind of information system that can be used to support complex decision-making and to solve semi-structured problem (Kowalczyk & Buxmann, 2015). The business intelligence system reflects the ability of management and logical decisions, and can integrate various types of data from various sources and discover new knowledge of the data for accurate prediction and decision-making (Yan et al, 2012). Business intelligence provides easy access of management to business information and allows managers to make business decisions and analyze information by providing methods and tools (Brichni et al., 2017). Hence, organizations are required to use business intelligence to focus on their decision-making processes (Liao et al., 2012) by which they increase their capabilities continuously. In the light of this knowledge and intelligence, a full picture of the current and future status of competition scene will create in front of the managers in order to make better decisions.

In addition, organizations need to evaluate their current performance and compare the processes, tools, and methods which are available in the organization with the best practices and processes, and evaluate their predictability, control, and effectiveness factors in order to implement effectively the business intelligence; therefore, there is a need for a model to evaluate their maturity (Van Looy, 2014). For this purpose, various models are proposed, such as Gartner's business intelligence maturity model, business intelligence model-performance management, HP maturity model, and the maturity model of business intelligence investment (Shaaban et al., 2011). In fact, it can be said that the models proposed for measurement of the business intelligence maturity measure the degree of evolution and excellence of these systems in the organization. Also, these models are a guide to change management, and draw the operations and actions needed for organizational change. One of the key factors in achieving a better business value in the field of business intelligence is that the level of maturity of business intelligence is consistent and proportionate as much as possible with the maturity level of organization; it is in this case that the highest benefits of business intelligence is achieved (Rajteric, 2010).

In general, maturity models consist of a series of maturity levels for a group of organizational goals. The lowest level indicates the initial status of the organization which has quantitative capabilities in the discussed domain and the highest level represents the concept of ultimate maturity. Progress in the evolutionary path between these two endpoints involves gradual progress according to the possibilities and capabilities of the organization. Additionally, the maturity model serves as a measure for assessing the situation in the evolution path (Becker et



al., 2009). Therefore, it can be concluded that maturity models can be used to increase productivity and create competitive advantage in organizations.

According to this fact that electronic business seeks to apply all information systems in order to strengthen and control business processes, one of the issues that is important in the electronic business is the design of an appropriate model for evaluating the level of business intelligence maturity in these types of businesses. The study of past researches has shown that the majority of researches have investigated and evaluated the maturity of business intelligence in other areas. For example, Bosilj Vuksic *et al.* (2017) examined the impact of business intelligence maturity on the performance of business processes. Lessanibahri *et al.* (2015) measured the maturity of business intelligence in health care in order to continuously measure and improve the processes in health care and Ahmed and Capretz (2011) presented a comprehensive and integrated strategy to assess the maturity trend of software production lines. Tan *et al.* (2011) identified the critical factors in the maturity of business intelligence, and Huffman & Whitman (2011) also developed the capabilities of the organizational intelligence maturity model. The findings of the above researches indicate that researchers have focused on the maturity of business intelligence from the organizational-managerial, applied-technical point of view. However, the human-social approach can be added to it and the space for evaluating the maturity of business intelligence in the electronic businesses can be upgraded by addressing all the domains and dimensions neglected in the previous models. By considering this issue that the present study intends to design a model for evaluating the maturity of business intelligence in electronic businesses, therefore, it can be said that this study is different from previous studies and could, in turn, fill the study gap in this field.

Research questions

1. What is the model for assessing the level of maturity of business intelligence in e-business? (Qualitative research part)
2. What is the model test of assessment of business intelligence maturity level in electronic businesses? (Quantitative research part)

RESEARCH METHOD

This research aims to test a model for assessing the level of business intelligence maturity in electronic businesses. Initially, a model for assessing the level of business intelligence maturity in e-businesses based on exploratory mixed approach is designed and the model is tested in the next step. Therefore, the present study is performed in two qualitative and quantitative phases. The method for collecting data in the qualitative part is a semi-structured interview with specialist, experts and managers of electronic businesses who are working on the Internet service provider (ISP) and have the necessary knowledge and experience in business intelligence. Collecting data in the quantitative part is performed by a researcher-made questionnaire from interviews conducted in the qualitative part. In this questionnaire, the subject can choose scores 1 to 5 based on the Likert scale and according to the type of question. In addition, the questionnaire can choose the value degrees between 20% to 100%. The participants in the qualitative part were 10 senior managers and experts of Internet service provider companies that are selected by using the maximum differentiation sampling method. In the quantitative part, five companies that have electronic business and operate in the field of Internet services (ISP) are selected by the researcher. The researcher selects 20 specialists and experts from each



company using a convenience sampling method to participate in the research. Finally 100 persons are selected from 5 selected companies as the sample. The method of information analysis in the qualitative part is based on the phenomenology method found on the Colaizzi pattern. 227 meaningful codes are extracted from the analysis of interviews with 10 participants in the qualitative part. In this step, the researcher selects 40 experts to determine the maturity level of each of the identified indicators using Delphi technique and snowball sampling and asks them to identify each indicator can be in what level of maturity of business intelligence according to the definitions of table (2). Finally, 232 codes remain from the total of 277 original codes within three rounds of Delphi which are classified at five levels of maturity of business intelligence (Level 1: Initial maturity, Level 2: Repeatable maturity, Level 3: Defined maturity, Level 4: Managed maturity, level 5: optimized maturity). Kendall's concordance coefficient is used to check the agreement degree of experts. The concordance coefficient (0.919) is estimated which indicates an appropriate concordance between respondents. In the quantitative part, Friedman's test is conducted to assess the level of business intelligence maturity. Construct, descriptive, and interpretive validities are used in order to investigate the content validity of the qualitative data, and Rao and Perry' triple approach (2003) is used in order to verify the reliability. In the quantitative part, face and content validities are used to study the validity. In order to evaluate content validity, Lawshe content validity ratio is used. The obtained content validity value is estimated as (0.88); on the other hand, the reliability of the tool is estimated by Cronbach's alpha as (0.934). In Fig. 1, the conceptual model of the research method is depicted.

Table 1. Distribution of questionnaire questions value based on the level of business intelligence maturity

Scale	Level 1	Level 2	Level 3	Level 4	Level 5
Scores	20%	40%	60%	80%	100%

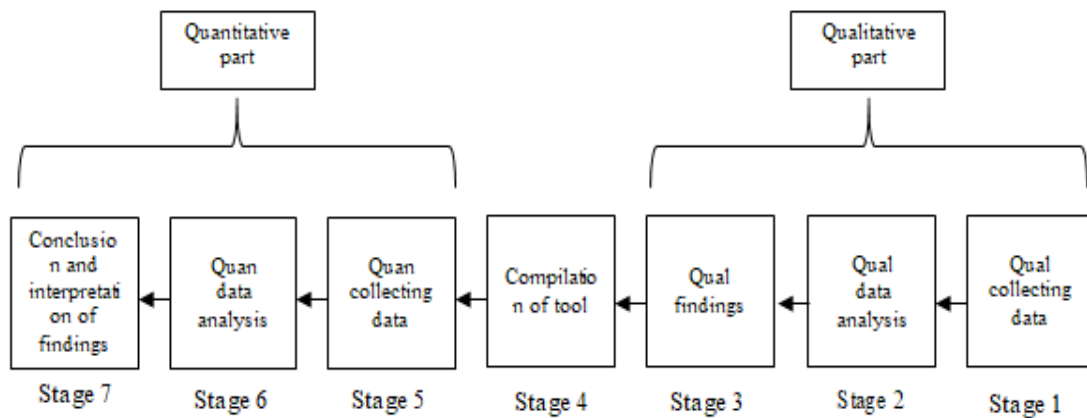


Figure 1. Exploratory mixed research design model (Creswell & Plano Clark, 2010, p. 93)

Table 2. Definitions of the levels of business intelligence (researcher's compilation)

Identified Level	Description
Level 1 (Initial Maturity)	This stage of processes maturity is not standard and documentary and there is no awareness about the quality of information. As a result, no effort is made to evaluate and improve processes. The organization only responds when there is a problem in the quality of information. At this point, the reaction of the organization is completely passive and preventive activities have no meaning. Conflict and contradiction between the data is manually managed and conversation sessions are a lot for decision-making about change of data and other issues because the system does not automatically and standardly perform the data management work. Some reports print in the framework of management reports and spreadsheets are used for reporting and analysis.
Level 2 (Repeatable Maturity)	The processes at this level are planning, documentation, control and supervision. But they are still reactive and passive. At this stage, the organization is somewhat lawful and, can repeat its previous successes in similar circumstances according to performed the documentation.
Level 3 (Defined Maturity)	This level deals with defined and determined processes. At this level of processes, sub-processes and activities, standards, tools, etc. are defined at the organizational level. A defined process is a process which is well-defined at all levels of the organization; all members of the organization are familiar with it and implement it.
Level 4 (Managed Maturity)	At this level, processes are evaluated and analyzed according to the defined criteria, they are studied based on pathology and deviations are identified. In other words, the organization is in a position at this point to control its processes by collecting data and analyzing them.
Level 5 (Optimized Maturity)	At this level, the performance of processes is controlled and evaluated in order to identify and remove disadvantages continuously, and innovative and optimal processes are replaced by existing processes while feedbacks are reviewed in order to respond better to the needs of organization.



FINDINGS

1. What is the model for assessing the level of business intelligence maturity in e-business? (Qualitative research section)

Table 3. Assessment model of business intelligence maturity

Row	Level	Dimension	Descriptions
1	Level 1: initial maturity	Reporting	Reporting by portal.
2			Use of the EPM system.
3			Use of spreadsheet.
4			Participation of all staff in reporting.
5			Attention to selling elements in reporting
6	Level 2: Repeatable maturity	Advertising	Use of media for informing new plans to clients.
7			Attraction of client by advertising.
8			Use of mouth-to-mouth advertising.
9			Preserving the client using promotional techniques (holding a festival, lottery, and contest).

10			Monitoring on advertising by checking how clients are familiar with the company.		
11			Introducing and encouraging clients to use radio internet with the help of advertising.		
12			Replacing digital advertising instead of traditional advertising.		
13			Getting real feedback from digital advertising.		
14		Management and performance evaluation		Weekly, monthly and annually performance evaluation.	
15				Providing feedback of performance evaluation to staff.	
16				Evaluation of personnel performance by use of reporting.	
17				Evaluation of personnel performance as provincial in line with the development plan of organization.	
18				Performance evaluation using 360- and 90-degree assessment.	
19				Evaluation of personnel performance by the same degree co-workers.	
20				The personnel's right to object to results of performance evaluation.	
21				Control	
22		Supervision of monitoring unit on the activities of branches throughout the country.			
23		Use of SNR tool for checking possible on-line noises.			
24		Documentation		Storage of portal information as on-line.	
25				Use of data center for information archive.	
26				Save of subscribers conversations in the database.	
27				Maintaining documentation in detail in project-centric processes.	
28				Use of VOIP software archive.	
29		Automation		Use of automation system, rollcall system, letter-writing, CRM and ticketing.	
30				Converting the client registration system from manual to automation and mechanization.	
31		Level 3: defined maturity	Accessibility level	Determining accessibility level in reporting.	
32				Accessibility to details of information in the reporting.	
33				Accessibility to reports at the desired time interval.	
34				Increase of security and accuracy of accessibility level.	
35			Customer orientedness		Continuous interactions with client.
36					Creating a sense of belonging in the customer.
37					Customer retention even with non-profitable methods.
38					Enhancement of customer satisfaction with post-purchase follow-up.
39					Founding a customer club.
40	Scoring to the customers based on record of history.				



41			Servicing to the customer based on client's need and desire.
42			Providing advice and guidance to users in order to select the right service.
43			Compliance with the principle of honesty in providing services.
44			Providing better services by making friendship relations with customer.
45			Study of personality psychology in order to improve customer better relationship management with customer.
46			Quicker responses to the customer using online shopping.
47			Communicating with the customer through cyberspace.
48			Encouraging customers to introduce new customer.
49			Fitness of the price with the assigned traffic volume.
50			Contacting with customers and reviewing their opinions.
51		Management of processes	Sending and receiving data by use of ticket.
52			Use of MIS for performing processes.
53			Saving time by processes existence.
54			The division of activities into cyclical and project oriented activities.
55			Tracking process and organizational activities by use of processes.
56			Periodic review of the processes of the ticketing system.
57			The overlapping of the ticketing system by becoming process-oriented of company activities.
58			Identifying the importance of processes to all personnel.
59		Standardization of processes	Registering information on the portal based on predefined standards.
60			Existence of standards to avoid errors and maintain quality of information.
61			Observing the laws and regulations of the organization of radio regulations and communication of the country.
62			Use of predefined rules and regulations to prevent idiosyncratic performance.
63			Observing the standards in treaties and contracts.
64			Implementing ISO in the company.
65			Modification of performance evaluation indicators.
66			Indicators of business unit performance evaluation are: number, type, volume, importance and responsibility of assigned affairs to a person, number of incoming and outgoing calls, waiting time behind the subscriber lines, customer satisfaction of responsiveness and manner of contact, monthly sales (number, amount), income and sales growth rate, monthly attracted customer number, work discipline, effort, creativity, innovation, opinion of the unit manager.



67			The indicators for evaluating performance of technical and support unit are: type, volume, importance and responsibility of assigned affairs to a person, number of incoming and outgoing calls, waiting time behind the subscriber lines, customer satisfaction of response and manner of contact, number of lost customers due to the poor quality of services, customer satisfaction of service quality, number of customers who did not have the technical ability to receive the service, the number of resolving failures, problems and qualitative improvement of service, the number of predictions and preventing possible events in the network (such as: power outage, equipment damage), average failure time and customer problem solving, and effort to reduce this time, optimized structure (functional and cost), the downtime in month, year percentage of infrastructure and network growth, the acquisition and use of modern knowledge and technology, and the number and type of inspections and PM equipment and networks, innovation, creativity and change in work.
68			The indicators of the financial unit performance evaluation are: the number, type, volume, importance and assigned responsibility to a person, the amount of receipt and non-receipt of debts, the number of registered document in a day, month, the number of mistakes in issuing the invoice and document, customer satisfaction of contact, paying and receiving timely debt and liability.
69		Improvement of quality information	Increasing the quality of the provided data to the customer.
70			Increasing quality without dependence on a supplier.
71			Use of original monitoring software to improve data quality.
72			Continuous check of data quality by the quality control unit.
73			Pay for license right to use some software.
74		Improvement of service level	Providing new based on customer consumption.
75			Providing better service with special prices and offers and high quality services.
76			Bandwidth management and assignment of some bands for various uses to subscribers.
77			Making intelligent of user consumption.
78			Hardware and software coordination in order to achieve better service delivery.
79			Use of remote control systems.
80			Optimizing network service.
81			Providing delayed service and less lost packet.
82			Fast user authentication.
83			Reducing network error.



84			Use of free bandwidth capacity to provide better service.		
85			Deciding to provide new customer service based on customer surveys.		
86			Providing services tailored to the culture of regions.		
87			Expanding wireless coverage for all areas of the city.		
88			Use of medium software to simplify and make easier access of beginner users with the system.		
89			Reducing customer dissatisfaction after use of VOIP.		
90			Use of VOIP for extraction of peak hours and managing it to provide better services.		
91			Continuous reporting from VOIP to improve service levels.		
92			Designing applications for easier customer access to services.		
93			Sustainability in providing and improving the quality level of services.		
94			Server host of organizations.		
95			Providing virtual server services.		
96			Providing dedicated server services.		
97			Providing satellite communication services.		
98			Providing dedicated IP to the number of customer requirements.		
99			Providing scheduling table, launch and delivery of customer service.		
100			Providing equipment of center Internet in trust.		
101			Installation and conducting of services for customers in person and free of charge.		
102			Level 4: Managed Maturity	Assessment and skill of analysis	Detecting provided service errors and resolving them by use of report analysis.
103					Reviewing method of providing service to the customer by marketing team.
104	Analysis of the results of performance evaluation by managers and supervisors.				
105	Applying organizational changes by use of performance evaluation results analysis.				
106	Adapting suggestions of research and development team with customer real needs.				
107	Assessing suppliers in order to identify better suppliers.				
108	Use of designer consulter groups for feasibility of projects.				
109	Analysis of market activities based on the obtained information from social networks, site and field research.				
110	Obtaining new decisions and policies based on the information obtained from the analysis of competitors' status.				
111	Investigating the activities of competing companies from formal and informal channels.				
112	Observing competitors' activities by assigning responsibility of the supervision over affairs of several companies, by personnel.				



113			Investigating the degree of the company mastery on the market through different market analysis methods.	
114			Customer behavior analysis using surveys in the cyberspace.	
115			Utilizing technical information and support in analyzing user behavior and market analysis.	
116		Business development and organizational processes	Consulting with other companies in providing new customer service.	
117			Partnerships with other companies as holding.	
118			Collaborate with multiple suppliers in parallel.	
119			The multiplicity of representatives as the company development.	
120			Earning point of value added projects using companies in tenders.	
121			Holding exhibitions and international conferences.	
122			Collaboration with police of information production and exchange space.	
123			Providing consultation to other companies in choosing a market development strategy.	
124			Market development by maintaining a top position and status	
125			Organizational Management	The attention of senior executives to negative feedbacks from the bottom of the organizational pyramid.
126				Strengthening the spirit of criticism of company managers.
127				Strengthening the culture of change in the company.
128		Becoming simpler decision-making of managers by EPM.		
129		Use of centralized management to promote activities.		
130		Human resource management, systems and processes using ITIL.		
131		Managers' awareness of organization affairs using bottom-up reports.		
132		Senior managers' trust to middle managers of the company.		
133		Filtering personnel information using CRM and VOIP.		
134		Improvement of organizational targeting and planning.		
135		Identifying strategies for barriers and organizational Weaknesses.		
136		Coherent leadership and stability in the intentions.		
137		Organizational education	Attention to the training and updating of personnel and recruitment personnel.	
138			Insist on the implementation of the necessary training courses.	
139			Preparation of educational files in the PDF format and holding online training.	
140			Time management and saving time of staff by use of online training.	
141			The importance of attending in the training needs assessment.	



142			Holding technical training courses for sales personnel.
143			Holding customer relationship management courses for technical personnel.
144			Select qualified people to attend training courses.
145			Effective customer relationship training for personnel based on the same standard.
146		Human resources management	Attention to moralization and workplace improvement.
147			Expansion of informal interactions and relationships and friendly relationships of management with personnel in the workplace.
148			Paying salaries based on a job classification scheme.
149			Assessing staff' feedbacks in order to improve welfare-motivational services.
150			Prioritizing knowledge forces in the recruitment process.
151			Attraction of powerful human resources through scientific seminars.
152			Reducing the cost of hiring using scientific seminars.
153			Focus on and attention to the topic of succession in the company.
154			Payment of bonuses based on employee performance appraisal.
155			The attention of managers to qualified and suitable personnel.
156			Financial and motivational support.
157			Attention to occupational safety and psychological safety of personnel.
158			Planning for excellence of satisfaction in personnel.
159			Increasing staff commitment after using VOIP.
160			New force support by experienced forces.
161			Supporting personnel by supervisor of units.
162			Organizational value
163		Performing activities as a team.	
164		Valuing staff and work commitment among staff.	
165		Support and aid of senior managers.	
166		Friendly interaction with competitors.	
167		Security	Maintaining security and strengthening security infrastructure by investigating future attacks and assaults.
168			Enhancing security by use of the continuous development of security infrastructure.
169		Support	Continuous and 24-hour support.
170			Having a support unit for efficient equipment and qualified technicians.



171			Maintaining and keeping satisfied customers with efficient support.
172			Utilizing intelligent support system.
173			Not being limited support domain of service.
174		strategies Business	Annual analysis of business and marketing strategies.
175			Applying product development and marketing strategies.
176			Applying product pricing strategies.
177		Management and development of requirements	Enjoying a comprehensive and integrated system in all branches.
178			Homogenization of data in all branches by software.
179			Strengthen hardware and software to dominate on competitors.
180			Integration and merging of information.
181			Providing backup of human resources and hardware equipment.
182			Use of shared resources and virtual.
183			Providing required software by the company software team.
184			Providing automatic backup software of server information.
185			Increase of quality by use equipment change.
186			Utilizing the hardware equipment and suitable infrastructure for the utilization of new technology.
187			Using speed test software.
188		Business Performance Management	Implementation of research and development team recommendations in the level of organization and country.
189			Applying crisis management in contact with dissatisfied customers.
190			Creating a balance in losing and attracting new customers.
191			The existence of a true financial management perspective.
192			Focus on profitable customers.
193		Making policy	Compilation of the annual outlook.
194			Moving toward goals based on perspective.
195			Efforts in the transfer area of many-visited site servers to the country in line with the ordained policies of the radio regulatory organization.
196			Taking into account the necessities and requirements of the information technology industry in the design and development of services.
197		Cost- benefit	Execution of ideas under the condition of capital return.
198			Estimate cost, profit and loss of projects before implementation.



199	Level 5: Optimized maturity	Predictive analysis	Discovering the behavior pattern of users and providing strategies based on periodic reports.
200			Forecasting the future market by using personnel reporting and holding periodic meetings with other companies.
201			Providing new designs with market analysis and market necessity.
202			Anticipating customer behavior before becoming pervasive TD-LTE technology.
203			Anticipating the replacement of ADSL technology with TD-LTE technology.
204			Estimated sales.
205		Dashboard	Adding dashboards to all company systems.
206			Increasing speed and easier access for users by graphical dashboards and visualization.
207		knowledge management	Advice to business partners and competitors in order to share knowledge.
208			Existence of knowledge management and organizational knowledge in the company.
209			Developing the organization level knowledge through participation in seminars.
210			Marketing and market leadership using the knowledge of the day.
211			Simplifying knowledge transfer by defining processes.
212			Mouth-to-mouth knowledge transfer in the company.
213		Innovation	Attention to the idea and creativity and don't ignore weak ideas.
214			The formation of a thought room to cultivate created ideas.
215			Providing a chain of service to customers by using startup launches.
216			Innovation in providing customer service.
217		Competitive advantage	Having expert human resources.
218			Making-model of the leading countries in the IT field.
219			Having experienced technical and managerial managers.
220			Moving to cultivate people with multiple specializations.
221			Hosting services and website design alongside providing Internet services.
222			Topic mastery, sophistication and understanding of unit managers from current activities.
223		Development of technology	Optical fiber and microwave development across the country.
224			Development of TD-LTE technology across the country.
225	Development of sending and receiving satellite stations.		
226	Extending facilities and cloud services.		



227		Development of investment	Investing in the rural Internet network and trunking network project.
228			Investing in the service of residential towers.
229			Investing in services related to IT and Internet of shopping centers and organizations.
230		Data mining	Use of data mining tools for more accurate market analysis and customer behavior recognition.
231			Market analysis based on statistical methods.
232			Using artificial intelligence in data analysis.

2. What is the assessment of the level of business intelligence maturity in electronic businesses? (quantitative part)

Friedman test is used in order to determine the level of business intelligence maturity (initial maturity, repeatable maturity, defined maturity, managed maturity, optimized maturity) in companies (1), (2), (3), (4), (5). The results are reported in Tables (4) and (5).

H₀: The rank mean of the levels of business intelligence maturity is equal.

H₁: The rank mean of the levels of business intelligence maturity is not equal.

Table 4. Friedman test results (significance result)

Name of company	Chi square (x ²)	Degree of freedom	Level of significance	Result of test
Company 1	80.000	4	0.000	H ₀ is rejected
Company 2	76.040	4	0.000	H ₀ is rejected
Company 3	76.081	4	0.000	H ₀ is rejected
Company 4	51.637	4	0.000	H ₀ is rejected
Company 5	77.126	4	0.000	H ₀ is rejected

The results of Table 4 show that the significance level is less than the threshold of 0.05 (P<0.05); therefore, it can be concluded that there is a significant difference between the scores set of the levels of business intelligence maturity in companies (1), (2), (3), (4), (5).

Table 5. Friedman test results, the rank mean of the level of business intelligence maturity

Name of company	The level of business intelligence maturity	The rank mean
Company 1	Level 1 (Initial maturity)	1.00
	Level 2 (Repeatable maturity)	2.00
	Level 3 (Defined maturity)	3.00
	Level 4 (Managed maturity)	5.00
	Level 5 (Optimized maturity)	4.00
Company 2	Level 1 (Initial maturity)	1.00
	Level 2 (Repeatable maturity)	2.00
	Level 3 (Defined maturity)	3.55
	Level 4 (Managed maturity)	5.00
	Level 5 (Optimized maturity)	3.45
Company 3	Level 1 (Initial maturity)	1.00
	Level 2 (Repeatable maturity)	3.30
	Level 3 (Defined maturity)	5.00
	Level 4 (Managed maturity)	3.65
	Level 5 (Optimized maturity)	2.05

Company 4	Level 1 (Initial maturity)	1.05
	Level 2 (Repeatable maturity)	3.03
	Level 3 (Defined maturity)	4.25
	Level 4 (Managed maturity)	3.98
	Level 5 (Optimized maturity)	2.70
Company 5	Level 1 (Initial maturity)	1.00
	Level 2 (Repeatable maturity)	2.17
	Level 3 (Defined maturity)	3.15
	Level 4 (Managed maturity)	3.68
	Level 5 (Optimized maturity)	5.00

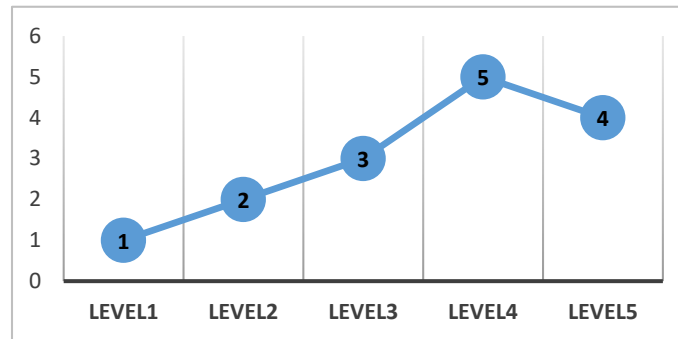


Fig. 2. The evaluation results of the business intelligence maturity level of Company (1)

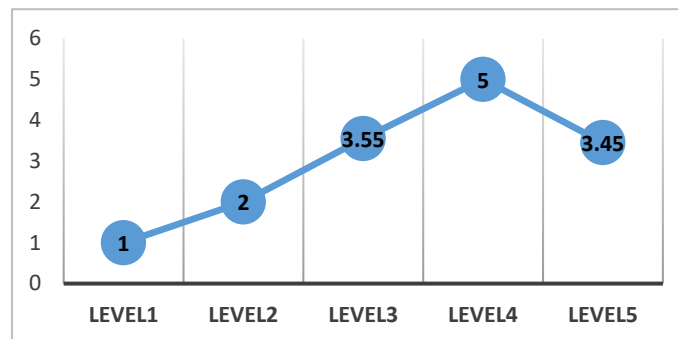


Fig. 3. The evaluation results of the business intelligence maturity level of Company (2)

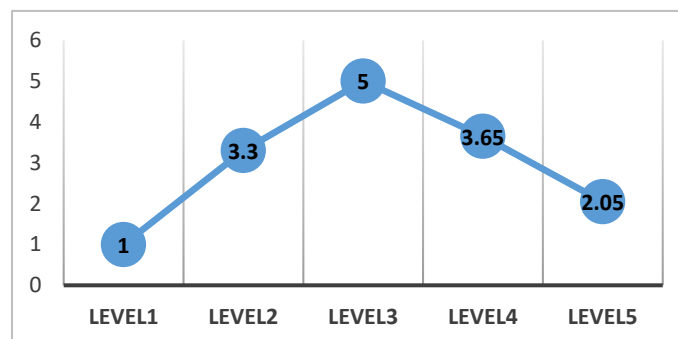


Fig. 4. The evaluation results of the business intelligence maturity level of Company (3)



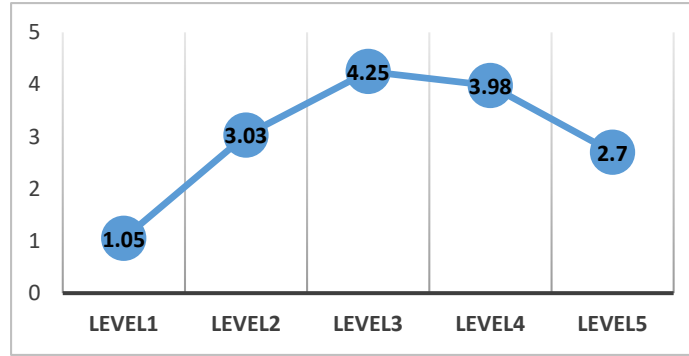


Fig. 5. The evaluation results of the business intelligence maturity level of Company (4)

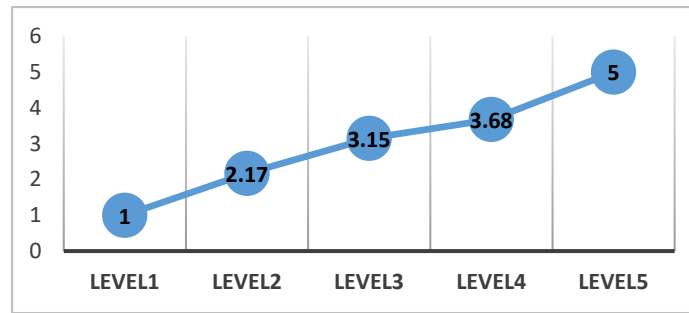


Fig. 6. The evaluation results of the business intelligence maturity level of Company (5)

The results of Table 5 show that in assessing the level of business intelligence maturity, company (1) is in the fourth level of business intelligence maturity (managed maturity) with the rank mean of (5.00), company (2) is in the fourth level of business intelligence maturity (managed maturity) with the rank mean of (5), company (3) is in the third level of business intelligence maturity (defined maturity) with the rank mean of (5), company (4) is in the third level of business intelligence maturity (defined maturity) with the rank mean of (4.25) and company (5) is in the fifth level of business intelligence maturity (optimized maturity) with the mean rank of (5). In general, in evaluating the business intelligence maturity of five selected companies, two companies are in the third level of business intelligence maturity (defined maturity); two companies are in the fourth level of business intelligence maturity (managed maturity) and a company is in the fifth level of business intelligence maturity (optimized maturity).

DISCUSSION AND CONCLUSION

The design model in this study is consisted of 5 levels; the first level is dedicated to the initial maturity. Companies that have begun their movement recently to implement the concepts of business intelligence are in this level of maturity. At this stage, they have not made any significant progress. In addition, personnel efficiency is contradictory. Even managers have not trained necessary trainings about how to carry out most of their responsibilities associated with personnel and business, and the ability of managers in managing subordinate and business is only based on their past experiences and individual skills and reporting that provided by the personnel. In general, companies cannot systematically develop their competitive capabilities in

this level. The second level is the business intelligence maturity (repeatable maturity). The main objective of this level is to eliminate the barriers and obstacles which prevent employees from effectively performing their duties, and also to establish a bed in which business-related activities are continuously developed. Because of the turbulence of the work environment and the unspecified performance goals in maturity to the repeatable level, the organization establishes policies for control and environmental uncertainty in order to remove problems that hinder the business efficiency and provide an access bed to a sustainable success. In addition, at this level, the organizational documentation also promotes the development and promotion of key personnel activities in different organizational units. The main objective in the repeatable level is to provide the process order in the workspace in the line with making the bed for the steady and repeatable performances. In the third level of business intelligence maturity (defined maturity), the organization steps on the direction of adaptation and compatibility of the personnel activities with the nature of its business and develops its services in line with client orientedness by analyzing customers' needs and analyzing business processes. Additionally, due to the focus of organization on standards and processes management, not only measurement, monitoring, control and analysis of business processes improve, but also the value of sustainability for customers is made in this level of maturity. This level focuses on gaining obligation ability to commitments for customer and business development and maintenance activities, and considering the processes as a capital that work best in the main center of business intelligence maturity. While at the fourth level of business intelligence maturity (managed maturity), the organization builds the infrastructure needed for continuous business development and wants to achieve higher efficiency by focusing on the merits and orientation capabilities of business and human resources. In addition, at this level, the organization seeks to increase human resource knowledge and skills, and takes advantage of its human resource experiences, competitors and advisers to performed good activities for developing its business, and registers and keeps the obtained experiences for future use as successful experiences. The goal of the managed level is reduction of the changes in processes in order to achieve business goals, and finally, in the fifth level, the business intelligence maturity (optimized maturity), the organization tries to optimize business processes by improving the capabilities of the future market analysis of the business and finding innovative and creative solutions to provide new services to customers. In addition, in this level, the organization begins to use modern technologies that can continuously improve the performance and competition position of the organization. The causes of existing deficiencies are systematically resolved and the organization focuses on continuous improvement of all factors that are effective in achieving its business goals. In the present study, the companies that are put in fourth level of managed maturity and fifth level of optimized maturity are considered as one of the companies that the proses focus and attention to all the indicators of business intelligence in all aspects of business are rooted and resistance in their business has been lost and perspectives of their organization have been changed and the scope for implementation of the management and optimization in wider versions of the entire business processes have been developed. In addition, the role of new technologies in reaching the summit in these companies has not been ignored, as they have realized that they need to confront with the dynamics of the market in real time to improve and modernize. Hence, they are helped by new technologies to advance their business goals in order to respond to business goals in the best way and move towards optimization.



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