The Effects of Quality of Web-Based Applications on Competitive Advantage: An Empirical Study in Commercial Banks in Jordan

Faisal Asad Aburub

Abstract—Many organizations are investing in web applications and technologies in order to be competitive, some of them could not achieve its goals. The quality of web-based applications could play an important role for organizations to be competitive. So the aim of this study is to investigate the impact of quality of web-based applications to achieve a competitive advantage. A new model has been developed. An empirical investigation was performed on a banking sector in Jordan to test the new model. The results show that impact of web-based applications on competitive advantage is significant. Finally, further work is planned to validate and evaluate the proposed model using several domains.

Keywords—Competitive advantage, web-based applications, empirical investigation.

I. Introduction

DUE to the significant increasing of using web-based applications in the market place, the electronic aspect has become integrated with the business strategy and is an essential part of the new business model to replace the traditional modes employed in B2B transactions [1].

With the propagation of the Internet, the e-business market is flourishing in the Middle-East and competition is fierce, corporations are starting to take their products and services through the internet, this does not only take business away from traditional delivery systems but also introduces a new business model, thus developing a new competitive strategy.

Due to technological advances the world we live in today is changing at a rapid speed, the economic sectors witness a fast-paced technological revolution specifically in the finance and banking sectors. Since technology is the cornerstone of survival for corporations, this leaves room for vast areas of growth and unlimited continuity; however this leads to an intensive competition between banks in the global arena including Jordanian banks. Industries are improving fast and the Jordanian banking industry is catching up.

The banking institutions live in an atmosphere of intense competition, the bank's survival in the marketplace depends on its ability to respond to all the technological, economic and social variables and interact with them in order to increase its market share. As the relationship between the bank and the client changes, commercial banks are developing banking services in order to adapt to the needs of the clients.

Faisal Asad Aburub is with the University of Petra, Faculty of Administrative and Financial Sciences, Amman, Jordan (e-mail: faburub@uop.edu.jo).

According to [2] an organization should direct major attention towards customer needs and wants and transform them into target propensities called "competitive dimensions", these are dimensions that organizations should focus on to help achieve competitive advantage.

In spite of many banks and organizations are investing in web applications and technologies in order to be competitive, some of them could not achieve its goals. According to [3], the quality of web-based applications could play an important role for organizations to be competitive. So the aim of this study is to investigate the impact of quality of web-based applications in Jordanian banks to achieve a competitive advantage.

The rest of the paper is organized as follows. Section II presents literature review, while Section III presents our research model and hypotheses. Section IV proposes the measurement method and scales. We present the discussion in Section V, followed by conclusion and future work in Section VI.

II. Literature Review

A web-based application could be defined as the software package that can be accessed by web browser. Moreover, web-based applications can deliver products and services through the web [4]. Web-based applications can be accessed by many users and they are in complexity from simple operations such as checking balance online of bank account, to complex processes running enterprise resource planning ERP or supply chain management (SCM).

The revolution of web technologies has led to develop and implementation of web services to deal with massive distributed web applications. Web services are seen as the solution to the limitations of previous web technologies and infrastructures including integration, standardization and homogeneous implementation. The basic concept of web services is to simulate everything as services by assuming available functionality from providers as a service [5].

The advancement of web services has reflected the way humans and applications apply web technology these days especially in the business and technical contexts [6].

According to [7], quality is "universally recognizable, a mark of uncompromising standards and high achievement". From a product based view (outcome of result); where quality is defined as fitness for use, performance, safety and dependability. Sometimes this view is called quality of design [8]. In terms of value; this view defines quality as "the degree of excellence at an acceptable price". It makes a trade-off

between cost and quality, that is, it concerns about providing as much quality as the customer is willing to pay for. The quality thing is one that performs or conforms at an acceptable cost or price [9]. In relation to web-based applications, the value-based view can be described by relationship of cost versus functionality versus time to deliver [10].

Many frameworks and methods have been developed to describe and study web-based applications in organizations [11]-[13] argued that quality of web-based applications can described in terms of Information Quality, System Quality and Service Quality. They defined system quality as the degree of quality, "which essentially translates to system performance", which indicates how the system can help to increase job performance and productivity. Also, they defined information quality as "the level of information appropriate to the objectives of the organization". Reference [14] defines Information Quality "as fitness for use by information users". In later studies they concluded that information quality is the characteristic of information to meet or exceed customer expectations [15]. According to [16] service quality for web-based applications is "the ability of their services to provide added value to the best solution for requesters' enquiries, taking into account their specific requirements". Moreover, service quality is a measure of how well the service delivered meets customer expectations [17]. Delivering quality service means conforming to customer expectations on a consistent basis. Moreover, [18] argued that information security is one of the most important factors to adopt web-applications by users. They defined information security as the ability of organization to keep its information and transactions safe and secure.

Reference [19] proposed a model to examine the relationships between service quality, customer satisfaction, customer trust, and loyalty to Taiwanese e-banks. They found that e-banks must focus on service quality to increase customer satisfaction and trust and to obtain customer loyalty. Reference [20] investigated the relationships between electronic service quality, total service quality and total client satisfaction. The results of the research showed that a high level positive correlation was identified between total service quality and total satisfaction. The variables responsiveness, ease of use, product portfolio and security, which were the dimensions of e-service quality, highly affected total service quality and total satisfaction. Responsiveness and security were the dimensions which had the highest effect on e-service quality perception. The results also showed that total service quality highly affects client satisfaction. Reference [21] identified factors that affect the continuous usage intention of a firm that has utilized web-based applications and the relationship between identified factors. The results demonstrated that the clients continuous usage intention was influenced by both satisfaction with web-based applications provider and dependence on the WAS provider. Results also showed that information quality and system quality was significantly associated to client satisfaction. Moreover, [22] investigated the relationship between trust and internet environment to the commitment of customer in web-based

applications. Reference [23] argued the user acceptance of Internet banking through the adoption of a "technology acceptance" model taking into account the self-ability for the user to deal with the implementation of Internet banking services. The study concluded that the computer self-efficacy, usefulness, ease of use and creditability was proposed to have a significant influence on the intention to use an Internet banking system. So the authorities and departments of banks must encourage customers through awareness and educational sessions to increase awareness to deal with the Internet to perform operations electronically. Furthermore, [24] examines clients' perceptions in Bosnia towards IT security of e-banking. They conclude that banks need to give more effort when it comes to implementation of IT security in online banking. They definitely need to find more effective ways to inform and educate clients about IT security of using online service, and in that way create additional value. Reference [25] investigated the extent of usage of internet banking service by customers of Oceanic Bank in Nigeria. Research findings showed that the ATM was the main use of preference due to customer lack of trust in the Bank's information security. Recommendations suggest the internet bank security should be improved through the use of appropriate technology like strong firewalls filters just the way it is done in developed countries. This will allow customers to have confidence in using the web-based applications and increase its adoption. Moreover, [26] investigated e-service quality of Pakistani banks. Data was analyzed using exploratory and conformity factor analysis. Result findings identified five dimensions of e-service quality: responsiveness, web interface, web quality, reliability and connectivity. Reference [27] explored service quality in a retail bank setting in Slovenia and its influence on customer satisfaction. They identified four dimensions of service quality.

Many studies have developed to investigate the impact of different technologies on competitive advantage. Reference [28] conducted an empirical investigation between information technology and competitive advantage within Japanese manufacturing companies. The results indicated that IT improves competitive advantage through labor empowerment and strategic alliances rather than directly. Reference [29] developed a conceptual framework that describes how IT applications can lead to competitive advantage in hotel companies. Reference [30] investigated the role of e-business and competitive advantage in the UK SMEs. They identified the requirements needed to change SMEs from old traditional business strategy to a new electronic business strategy. Reference [31] investigated the impact of IT on the competitive advantage within logistic firms in China. They found that IT may significantly influence a firm's competitive advantage, and the effects are nonlinear. Reference [32] clarified the role of electronic business applications in large company and discusses similarities and differences that exist between Swedish and American companies. Reference [33] investigated the effects of customer and supplier involvement on competitive advantage in China. The hypothesis was tested on the relationship between customer involvement, supplier

involvement and competitive advantage. The results showed that customer involvement has a positive impact on product quality, delivery, reliability, process flexibility and customer service. Also, the results showed that supplier involvement leads to decreased cost. Furthermore, [33] defined competitive advantage as "the extent to which a firm is able to gain and retain a dominant position over its competitors through creating value for its customers". They stated that product quality, cost leadership, delivery reliability, process flexibility and customer service are important competitive capabilities. These capabilities can be defined as:

- Product quality -"The ability of an organization to offer product quality and performance that creates higher value for customers" [34].
- Cost leadership - "The ability of an organization to compete against major competitors based on low price" [35].
- Delivery reliability - "The ability of an organization to provide on time, the type and volume of product required by customer(s)" [35].
- Process flexibility – "the capacity to quickly change direction and deviate from a predetermined course of actions" [36].
- Customer service – the ability to provide after services to customers better than competitors, [33].

Based on the review of the literature, there are many models have been developed to study the impact of technologies on competitive advantage in different domains. Furthermore, quality of web-based applications has become a main concern for different organizations [3]. More investigations are required to study the relation between quality of web-based applications and competitive advantage. Moreover, most banks in Jordan have web-based applications but may they do not have the same quality. Quality of web-based applications could be an important factor for banks to be competitive in very competitive business environment. Therefore, this study aims to explore the effect of quality of web-based applications on corporate competitive advantage.

III. RESEARCH MODEL

A. Main Study Variables

In this study, a research model is presented and examined empirically in the context of the Middle East's banking sector. Fig. 1 shows the model, which includes six constructs, namely quality of web-based applications, product quality, cost leadership, delivery reliability, process flexibility, and customer service. The model shows that the accomplishment of quality web-based applications may lead to achieve competitive advantage. Therefore, the following hypothesis can be asserted:

H1: The quality web-based applications will have a significant and positive effect on a competitive advantage

Further hypotheses can be derived from this, as follows:

- H1.1: The quality of web-based applications (service quality, information quality, system quality, and

information security) will have a significant and positive effect on a product quality.
- H1.2: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on a cost leadership.
- H1.3: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on delivery reliability.
- H1.4: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on process flexibility.
- H1.5: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on customer service.

IV. RESEARCH METHODS

A. Data Sources

The data was collected through a self-administered survey from commercial banks operating in Jordan, such as Housing Bank and Arab Bank. The questionnaire was validated by five experts in the field, targeted managers in the banks. We believe that those managers have deep and wide knowledge about both web-based applications and competitive advantage. We distributed 230 questionnaires to different banks in the Jordan; 149 questionnaires were returned, a response rate of 65%. The characteristics of the surveyed sample are reported in Table I.
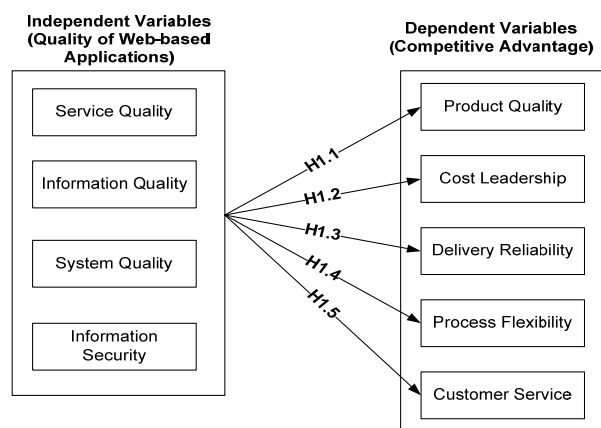

Fig. 1 Research model

B. Measurements Development

The research constructs and item-based measurements were developed based on an intensive literature survey. Measures tested in prior studies were adopted, with changes made in order to suit the banking context. The measures for quality of web-based applications were adopted from [13] and [18]. Measures of quality of web-based applications include four factors – service quality, information quality, system quality,

and information security – and 21 items were used to measure the quality of web-based applications' variables. The measures of competitive advantage were developed based on [33]. Measures of competitive advantage include five factors – product quality, cost leadership, delivery reliability, process flexibility, and customer service – and 15 items were used to measure the competitive advantage's variables. Appendix 1 shows the items used to measure quality of web-based applications and Appendix 2 shows the items used to measure competitive advantage variables.

V. DATA ANALYSIS AND HYPOTHESES TESTING

A. Reliability

Cronbach's alpha was used to measure the internal consistency of the research constructs. The lowest recommended acceptable value of alpha should be ≥0.70 for this type of study. The Cronbach's alpha of most items included in this study ranged between 0.782 and 0.86, which indicated good reliabilities for the scales of [37], as shown in Table II. The results indicate that the reliability condition was met.

TABLE I
DESCRIPTIVE ANALYSIS

Measures	Class	Frequency	Percentage
Gender	Male	89	59.7
	Female	60	40.3
	Total	**149**	**100.00**
Age	Less than 30	58	38.9
	30-40	73	48.9
	40-50	18	12.2
	Total	**149**	**100.00**
Education	BSc	123	82.5
	Master	26	17.5
	Total	**149**	**100.00**
Work experience	3-5 years	43	28.8
	5-10 years	51	34.3
	10-15 years	39	26.2
	15-20 years	16	10.7
	Total	**149**	**100.00**

TABLE II
VALUES OF CRONBACH'S ALPHA OF THE RESEARCH CONSTRUCTS

Construct	α- value
System Quality	0.897
Information Quality	0.871
Service Quality	0.804
Information Security	0.799
Product Quality	0.823
Cost Leadership	0.785
Delivery Reliability	0.782
Process Flexibility	0.800
Customer Service	0.899

B. Normality Test

In order to run regression analysis successfully, data should be distributed normally. So, both Kolmogorov-Smirnov and Jarque-Bera (i.e. Skewness-Kurtosis) tests were employed. For Kolmogorov-Smirnov test, constructs need to show

significance at (p≤0.05) so as to be normally distributed. However, a value that is ranged between ±2.54 at (p≤0.01) for each of Skewness and Kurtosis is considered acceptable to ensure that data is normally distributed using Jarque-Bera test [37]. According to the results obtained from Kolmogorov Smirnov test (see Table III), all factors showed significance at (p≤0.05) and thus are considered normally distributed. The results of Jarque-Bera test (see Table III) confirmed that all constructs are normally distributed as Skewness-Kurtosis values were all found to be ranged within the acceptable limits (i.e. ±2.54). Hence, normality is assured as a prerequisite for regression analyses.

TABLE III
NORMALITY TEST

Variable	Kolmogorov-Smirnov	Skewness	Kurtosis
System Quality	0.00	-0.68	-0.03
Information Quality	0.00	-0.59	0.05
Service Quality	0.00	-0.97	0.61
Information Security	0.00	-1.00	0.70
Product Quality	0.00	-1.08	1.40
Cost Leadership	0.00	-0.90	0.75
Delivery	0.00	-1.25	2.26
Process Flexibility	0.00	-0.84	0.56
Customer Service	0.00	-0.47	-0.11

TABLE IV
MULTIPLE REGRESSION ANALYSIS OF QUALITY WEB-BASED APPLICATIONS FACTORS ON PRODUCT QUALITY

R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig
.627	.394	.377	.53921	23.372	.000
Constructs	B	Std. Error	Beta	T Value	P Value
SysQuality	-.011-	.068	-.013-	-.161	.872
InfoQuality	.105	.085	.110	1.229	.221
SerQuality	.009	.090	.009	.105	.917
InfoSecurity	.601	.095	.558	6.352	.000

TABLE V
MULTIPLE REGRESSION ANALYSIS OF QUALITY WEB-BASED APPLICATIONS FACTORS ON COST LEADERSHIP

R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig
.468	.219	.197	.69502	10.075	.000
Constructs	B	Std. Error	Beta	T Value	P Value
SysQuality	.131	.448	.138	2.970	.138
InfoQuality	.036	.088	.033	1.492	.743
SerQuality	.167	.110	.134	.329	.152
InfoSecurity	.327	.116	.267	1.442	.008

VI. HYPOTHESES TESTING

Based on the results of the above analyses, multiple regression analysis can be run successfully and there is no need to carry out non-parametric tests.

Multiple regression analysis was carried out to test the relationships between the research constructs. It shows how much of the variance in the dependent variables can be

explained by independent variables. Therefore, it looks like the multiple regressions is the most suitable method to test research hypothesizes.

TABLE VI
MULTIPLE REGRESSION ANALYSIS OF QUALITY WEB-BASED APPLICATIONS FACTORS ON DELIVERY RELIABILITY

R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig
.433	.188	.165	.58648	8.312	.000
Constructs	B	Std. Error	Beta	T Value	P Value
SysQuality	.082	.074	.105	1.111	.268
InfoQuality	.056	.093	.063	.605	.546
SerQuality	.177	.098	.171	1.803	.073
InfoSecurity	.200	.103	.198	1.947	.054

TABLE VII
MULTIPLE REGRESSION ANALYSIS OF QUALITY WEB-BASED APPLICATIONS FACTORS ON PROCESS FLEXIBILITY

R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig
.328	.108	.083	.74388	4.347	.000
Constructs	B	Std. Error	Beta	T Value	P Value
SysQuality	-.047	.094	-.050	-.503	.615
InfoQuality	.182	.117	.169	1.549	.124
SerQuality	.103	.124	.083	.833	.406
InfoSecurity	.207	.131	.169	1.583	.116

Table IV shows that quality of web-based applications explains about 39.4% of the variance in the product quality construct in competitive advantage. The F Value is equal to (23.372) and hence is significant at ($p \leq 0.05$) and this assures that there is a relationship between the web-based applications' variables and the product quality construct. Thus, the hypothesis H1.1 is accepted. Moreover, the t values in Table IV indicate that information security has positive impact on the product quality at ($p \leq 0.05$).

Table V shows that quality of web-based applications explains about 21.9% of the variance in the cost leadership construct in competitive advantage. The F Value is equal to (10.075) and hence is significant at ($p \leq 0.05$) and this assures that there is a relationship between the web-based applications' variables and the cost leadership construct. Thus, the hypothesis H1.2 is accepted. Moreover, the t values in Table V indicate that information security has positive impact on the cost leadership at ($p \leq 0.05$).

Table VI shows that quality of web-based applications explains about 18.8% of the variance in the delivery reliability construct in competitive advantage. The F Value is equal to (8.312) and hence is significant at ($p \leq 0.05$) and this assures that there is a relationship between the web-based applications' variables and the delivery reliability construct. Thus, the hypothesis H1.3 is accepted. Moreover, the t values in Table VI indicate that information security and information quality have approximately positive impact on the delivery reliability at ($p \leq 0.05$).

Table VII shows that quality of web-based applications explains about 10.8% of the variance in the process flexibility construct in competitive advantage. The F Value is equal to (4.347) and hence is significant at ($p \leq 0.05$) and this assures that there is a relationship between the web-based applications' variables and the process flexibility construct. Thus, the hypothesis H1.4 is accepted. Moreover, the t values in Table VII indicate that there is no any constructs individually has positive impact on the process flexibility at ($p \leq 0.05$).

Table VIII shows that quality of web-based applications explains about 11.5% of the variance in the customer service construct in competitive advantage. The F Value is equal to (4.683) and hence is significant at ($p \leq 0.05$) and this assures that there is a relationship between the web-based applications' variables and the customer service construct. Thus, the hypothesis H1.5 is accepted. Moreover, the t values in Table VIII indicate that information quality has positive impact on the customer service at ($p \leq 0.05$).

Table VIIII shows summary of hypotheses decisions.

TABLE VIII
MULTIPLE REGRESSION ANALYSIS OF QUALITY WEB-BASED APPLICATIONS FACTORS ON CUSTOMER SERVICE

R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig
.339	.115	.091	.67548	4.683	.000
Constructs	B	Std. Error	Beta	T Value	P Value
SysQuality	-.013	.085	-.015	-.156	.877
InfoQuality	.217	.107	.221	2.039	.043
SerQuality	-.005	.113	-.004	-.042	.967
InfoSecurity	.192	.119	.172	1.624	.107

TABLE IX
SUMMARY OF HYPOTHESES DECISIONS

Hypothesis	Decision
H1.1: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on a product quality.	Accepted
H1.2: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on a cost leadership.	Accepted
H1.3: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on delivery reliability.	Accepted
H1.4: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on process flexibility.	Accepted
H1.5: The quality of web-based applications (service quality, information quality, system quality, and information security) will have a significant and positive effect on customer service.	Accepted

VII. DISCUSSION

The research investigated the impact of quality of web-based applications on competitive advantage. A new model has been developed based on [13], [18], and [33]. This model has been tested using banking sector in Jordan. The main contribution of this research is developing a new model to relate between quality of web-based applications and competitive advantage in banking sector. This research

extends the precedent literature by confirming that if the organizations need to be competitive within changeable business environment have to give more attention and focus on quality of web-based applications. The study will enrich competitive advantage literature and shed light on the importance of quality of web-based applications.

Despite the results showing that the impact of quality of web-based applications on competitive advantage is significant, the variance in competitive advantage that is explained by quality of web-based applications is weak, as quality of web-based applications explains about 39.4% of the variance in the product quality, 21.9% of the variance in the cost leadership, 18.8% of the variance in the delivery reliability, 10.8% of the variance in the process flexibility, and 11.5% of the variance in the customer service. The influence of quality of web-based application on competitive advantage can be summarized as follows: quality of web-based applications especially information security can improve product quality, cost leadership, and delivery reliability items in competitive advantage. Furthermore, quality of web-based applications can improve delivery reliability and customer service.

The results show that achieving competitive advantage is not dependent only on technology, but also could be on other factors such as customer involvement, supplier involvement, environments, structures, routines and business processes. This result is consistent with the recent research [30] as they indicated that in addition to technology, there are other factors such as people management, technology management, innovation, and marketing efficiency improvements.

In order to expand the role of IT in enhancing the bank's competitive advantage, the management should ensure that an 'anticipated software system will be in line with business processes. According to [38], "investments in technology should have the objective of improving current business models and not merely replacing an existing process or operation, but to employ the application to improve the way in which business is done".

Despite the variance of competitive advantage that is explained by the quality of web-based applications in Jordanian commercial banks is weak, the importance of IT/IS in banking sector is expected to continue grow in the coming years. According to [38], [39], the utilization of IT is expected to increase particularly with emergent and huge development of ERP systems, e-commerce, e-business, and web services. These technologies will create opportunities for banks to efficiently work with suppliers, customers, and partners. Furthermore, these technologies may enable banks to build alliances with other banks and organizations.

VIII. Conclusion and Future Work

Due to the rapid grow of internet and its influence on all aspects of our life. Banks and other industries have invested in web technologies and applications in order to be competitive. Moreover, quality of web technologies and application could be a main factor to achieve competitive advantage. Therefore, this research aims to study the impact of web-based applications on competitive advantage in commercial banks in Jordan.

A new model has been developed based on the work of [13], [18], and [33]. This model includes two parts. First part includes independent variable namely web-based applications which consist of system quality, information quality, service quality, and information security. Second part includes dependent variable namely: competitive advantage which consists of product quality, cost leadership, delivery reliability, process flexibility, and customer service. This model has been tested using banking sector in Jordan. The results show that there is significant relationship between web-based applications and competitive advantage in commercial banks. Furthermore, the results show that the quality of web-based applications explains about 39.4% of the variance in the product quality, 21.9% of the variance in the cost leadership, 18.8% of the variance in the delivery reliability, 10.8% of the variance in the process flexibility, and 11.5% of the variance in the customer service constructs.

This study concludes that achieving competitive advantage is not fully dependent on technology, specifically web-based applications, but that it could also be dependent on other factors such as customer involvement, supplier involvement, environments, structures, routines, business processes, people management, technology management, innovation, and marketing efficiency improvements.

Future research can apply the same research model to another geographical area, such as the West, in order to investigate whether quality of web-based applications has a significant effect on competitive advantage in the banking sector within that region, or whether it has no effect on competitive advantage, regardless of the region. Furthermore, new research could be conducted to study the impact of using other technologies and ISs such as ERP systems and e-commerce on achieving competitive advantage.

Appendix 1

Items used in measuring quality of web-based applications:

(1) System Quality
- Our web-based applications quickly loads all the text and graphics
- Our web-based applications are easy to use
- Our web-based applications are visually attractive
- Our web-based applications are well designed for users
- Our web-based applications are easy to navigate

(2) Information Quality
- Our web-based applications provide information which is relevant to our company
- Our web-based applications provide information which is understandable to our company
- Our web-based applications provide information which is reliable to our company
- Our web-based applications provide information which is sufficient to our company
- Our web-based applications provide information which is useful to our company

(3) Service Quality

- Our web-based applications have error- free records
- Our web-based applications give us prompt service
- Our web-based applications operate 24 hours per day
- Our web-based applications process all transactions efficiently (no long waiting period ex: busy server, lagging)
- Our web-based applications provide all banking needs by menu option
- Our web-based applications provide online directions for new users.

(4) Information Security

- Our web-based applications provide secure services
- Our web-based applications provide a written guarantee that transactions have taken place.
- Our web-based applications use secure means through which to send sensitive information
- Clients feel secure to manage their personal finances with our web-based applications
- Our web-based applications are trustworthy to client's sensitive information

APPENDIX 2

Items used in measuring competitive advantage:

(1) Product Quality

- Our bank is able to compete based on quality
- Our bank offers products that are highly reliable
- Our bank offers products that are very durable
- Our bank offers high quality products to our customer

(2) Cost Leadership

- Our bank offers competitive prices
- Our bank is able to offer prices as low or lower than our competitors

(3) Delivery Reliability

- Our bank delivers the kind of products/services needed.
- Our bank delivers customer service on time

(4) Process Flexibility

- Our bank delivers product/service to market quickly
- Our bank is first in the market in introducing new products/services
- Our bank has fast product/service development

(5) Customers Service

- Our bank is able to offer satisfactory follow-up service to our customers
- Our bank has an excellent attention to customer follow-up service
- Customer follow-up service is one of our prominent competitive advantages

REFERENCES

[1] R.Y.K. Lau, "Towards a web services and intelligent agents based negotiation system for b2b ecommerce", Electronic Commerce Research and Applications, Elsevier Limited, vol. 6, 3, pp. 260-273, 2007.
[2] L.I. Krajewski, and L.P. Ritzman, "Operations management: strategy and analysis". (4th ed.).Addison-Wesley Co., Inc., U.S.A, 1996.
[3] K. Worwa, "Quality of Web-based information systems", Journal of Internet Banking and Commerce, vol 15, 3, 2010.
[4] B. Vatanasombut, M. Igbaria, A. Stylianou, and W. Rodgers, "Information systems continuance intention of web-based applications customers: The case of online banking". Information & Management, vol. 45, pp. 419–428, 2008.
[5] G. Alonso, F. Casati, H. Kuno, and V. Machiraju, "Web Services: Concepts, Architectures and Applications". Springer-Verlag Berlin Heidelberg. Germany, 2004, ISBN 3-540-44008-9.
[6] H. Bequet, M. Kunnumpurath, S. Rhody, and A. Tost, "Beginning Java Web Services". Wrox Press. Birmingham, United Kingdom, 2002, ISBN 1-86100- 753-1.
[7] D. Garvin, "What does product quality really mean?". Sloan Management Review, vol 26, 1, pp. 25-43, 1984.
[8] J. Juran, and M. Frank, and J. Gryna, "Quality planning and analysis: from product development through use". New York: McGraw-Hill, 1980.
[9] S. Akinyele, "Customer satisfaction and service quality: customer's re-patronage perspectives", Global Journal of Management and Business Research, vol 10, 6, pp. 83-90, 2010.
[10] N. Baddoo, CS2 Software Quality module, Curse notes, University of Hertfordshire, Faculty of Science, Technology and Creative Arts, 1999 (cited 2012 February 25). Available from: http://homepages.feis.herts.ac.uk/~2com0047/Lecture2WhatisQuality.PDF.
[11] R. Edwards, G. Olsen, and R. Maloy, "Comparative genomics of closely related salmonellae". Trends in Microbiology, vol. 10, 2, pp. 94–99, 2002.
[12] W. DeLone, and E. McLean, "Information system success: the quest for the dependent variable". Information Systems Research, vol. 3, 1, pp. 60–95, 1992.
[13] J. Park, J. Kim, J. Koh, "Determinants of continuous usage intention in web analytics services". Electronic Commerce Research and Application, vol.9, pp. 61-72, 2009.
[14] Y. Wang, Y. Wang, H. Lin, and T. Tang, "Determinants of user acceptance of internet banking: an Empirical study". International Journal of Service Industry Management, vol. 14, 5, pp. 501-19, 1996.
[15] B. Kahn, D. Strong, R. Wang, "Information Quality Benchmarks: Product and Service Performance". Communications of the ACM, April, pp. 184–192, 2002.
[16] Wan, and W. Rahman, "A Quality of Service Prediction Model to Support Web Services Interoperability in Electronic Commerce", Interim Assessment Report, School of Computing, Science and Engineering, the University of Salford, Manchester, UK, 2008.
[17] Lewis, C. Robert, and H. Bernard, "The Marketing Aspects of Service Quality," in Emerging Perspectives on Services Marketing, L Berry, G. Shostak, and G. Upah, eds., Chicago: American Marketing Association, pp. 99-107, 1983.
[18] B. Vatanasombut, M. Igbaria, A. Stylianou, W. Rodgers, "Information system continuance intention of web-based applications customers: the case of online banking" Information and Management, vol.45, pp.419-428, 2008.
[19] P. Chu, G. Lee, Y. Chao, "Service Quality, Customer Satisfaction, Customer Trust, and Loyalty in an E-Banking Context", Scientific Journal Publishers, vol. 40, 8, pp. 1271-1283, 2012.
[20] A. Kayabaş, B. Çelik, and A. Büyükarslan, "The analysis of the relationship among perceived electronic service quality, total service quality and total satisfaction in Banking sector", International Journal of Human Sciences, vol. 10, 2, 2013.
[21] Park, Kim, and Koh, "Determinants of continuous usage intention in web analytics services", Electronic Commerce Research and Applications, Elsevier Limited, vol. 9, pp. 61-72, 2009.
[22] B. Vatanasombut, M. Igbaria, A. Stylianou, and W. Rodgers, "Information system continuance intention of web-based applications customers: the case of online banking", Information and Management, vol.45, pp.419-428, 2008.
[23] Y. Wang, Y. Wang, H. Lin, and T. Tang, "Determinants of user acceptance of Internet banking: an empirical study", International Journal of Service Industry Management, Vol. 14, 5, pp.501 – 519, 2003.
[24] N. Makarević, S. Hikmet, "Clients' Perceptions Towards IT Security of e-banking in Bosnia and Herzegovina", European Researcher, vol.59, 9-2, pp. 2284-2294, 2013.
[25] S. Adepoju , G. Babalola, G. Onyeabor, "Customers' adoption and usage of the internet banking and other web services in banking", International Journal of Management and Business Studies, vol. 1, 4, pp. 48-52, 2010.
[26] R. Tahira, M. Mohsin, E. Cyril, and I. Ramay, "Measuring the e-service quality of Pakistani banks", International Journal of Economics and Business Research, vol. 4, 2012.

[27] B. Culiberg, I. Rojšek, "Identifying service quality dimensions as antecedents to customer satisfaction in retail banking", Economic and Business Review, vol. 12, 3, pp. 151-166, 2010.

[28] T. Makido, S. Kimura, and P. Mourdoukoutas, "IT Competitive Advantage: the case of Japans manufacturing companies", European Business Review. vol 15, 5, pp. 307-311, 2003.

[29] A. Bilgihan, F. Okumus, K. Nusair, and D. Kwun, "Information technology applications and competitive advantage in hotel companies", Journal of Hospitality and Tourism Technology, vol. 2, 2, pp.139 – 153, 2011.

[30] S. Pavic, S. Koh, M. Simpson, and J. Padmore, "Could e-business create a competitive advantage in UK SMEs?", Benchmarking: An International Journal, vol. 14, 3, pp. 320-351, 2007.

[31] F. Lai, X. Zhao, and Q. Wang, "The impact of information technology on the competitive advantage of logistics firms in China", Industrial Management & Data Systems, vol. 106, 9, pp. 1249-1271, 2006.

[32] Hooshang, M. Beheshti, S. Esmail, E. Anne, "Competitive advantage with e-business: a survey of large American and Swedish firms", Competitiveness Review: An International Business Journal, vol. 16, 2, pp.150 – 157, 2006.

[33] T. Feng, L. Sun, and Y. Shang, "Building, implementing, and managing brand equity in business markets", Industrial Marketing Management, vol. 39, 8, pp.1384–1394, 2010.

[34] X. Koufteros, "Time-based manufacturing: developing a nomological network of constructs and instrument development", Doctoral Dissertation, University of Toledo, Toledo, OH., 1995.

[35] S. Li, B. Ragu-Nathan, T. Ragu-Nathan, and S. Rao, "The impact of supply chain management practices on competitive advantage and organizational performance'", Omega, vol. 34, 2, pp. 107-124, 2006.

[36] A. Eardley, D. Avison, and P. Powell, "Strategic information systems: an analysis of development techniques which seek to incorporate strategic flexibility", Journal of Organizational Computing, vol. 7, 1, pp.57–77, 1997.

[37] J. Hair, W. Black, B. Babin, R. Anderson, and L. Tatham, "Multivariant data analysis", New Jersey: Pearson International Edition, 2006.

[38] E. Adrian, M. Coronado, M. Sarhadi, and C. Millar, "Defining a framework for information systems requirements for agile manufacturing", Int J. Production Economics, vol 75, pp 57–68, 2002.

[39] R. Seethamraju, and D. Sundar," Influence of ERP systems on business process agility", IIMB Management Review, vol 25, pp 137-149, 2013.