The current issue and full text archive of this journal is available at
www.emeraldinsight.com/1741-0401.htm

Received March 2010
Revised May 2010
Accepted May 2010

IT and non-IT factors influencing the adoption of BSC systems: a Delphi study from Bahrain

Emad M. Kamhawi
Department of Business Administration, Efficient Productivity Institute, Zagazig University, Zagazig, Egypt

Abstract

Purpose – This study aims to underline the role of information technology (IT) in adopting Balanced Scorecard (BSC) systems/initiatives in Bahrain. It seeks to highlight this role through comparing the IT-related factors/requirements against the non-IT-related ones that contribute to the implementation of such systems. Moreover, it provides a better understanding for the adoption of such systems through investigating the availability of such factors in Bahraini organisations.

Design/methodology/approach – A Delphi method was utilised relying on a panel of 67 BSC experts from 34 Bahraini organisations.

Findings – The results indicated that IT requirements for adopting BSC initiatives had the same level of importance compared to non-IT requirements. From the non-IT-related requirements, management factors such as "clear strategic management" and "top management support", and implementation factors such as "preparing implementation plans" and "proper training and guidelines" came on the top of the requirements list. On the other hand, the study suggests software interface characteristics such as "graphical user interface" and "easy to use application", and data quality factors such as "standard data formats" and "data accuracy" as the top IT-related requirements.

Originality/value – This study extends current research efforts related to the adoption of BSC systems. It provides insights for understanding how organisations get ready to implement such initiatives in both IT and non-IT-related areas. Moreover, it equips practitioners with an initial checklist of pre-requisites for undertaking such performance management systems.

Keywords Balanced Scorecard, Performance management systems, Delphi method, Information technology, Business strategy, Strategic information systems, Bahrain

Paper type Research paper

Introduction

Strategy implementation and control systems have attracted much attention recently. Academics have realised that far more research has been carried out regarding strategy formulation than strategy implementation (Atkinson, 2006). Practitioners, on the other side, have become convinced that the immense efforts they put into preparing lengthy and detailed strategic plans may be in vain if proper performance management systems (PMS) capable of translating such plans into actions, are not used. This is why, as asserted by Mintzberg (1994), more than half of the strategies devised by organisations are never actually implemented!

Classically, many management tools have been employed for strategy implementation, such as budgets, forecasts, measures of profitability and economic value added, and focused incentives and reward systems (Chapman, 1997; Marginson, 1999; Nørreklit, 2000; Otley, 1999).

International Journal of Productivity and Performance Management
Vol. 60 No. 5, 2011
pp. 474-492

1741-0401
DOI 10.1108/17410401111140392

However, the dramatic changes in over the last few decades from an industrial environment to an information environment, accompanied by increasingly radical management practices, prevalent globalisation, sophisticated customers, and subtle product differentiation, have challenged classical financially oriented tools for strategy implementation (Brander Brown and Atkinson, 2001). Therefore, much more progress has been made in establishing new performance management frameworks, which include a portfolio of measures aimed at providing more balanced approaches for strategy implementation processes. The best known frameworks developed to meet the new challenges for strategy implementations are the Balanced Scorecard (BSC (Kaplan and Norton, 1992)), the performance pyramid (Cross and Lynch, 1992), the theory of constraints (Goldratt, 1990), the performance prism (Neely *et al.*, 2001), and Medori and Steeple's (2000) framework. Also, some related management frameworks emanating from the total quality management (TQM) movement – such as the Baldrige, Six Sigma, ISO 9000 and European Quality models (Evans, 2007) – have been used as PMSs. A brief review of these frameworks is introduced in Tangen's (2004) study.

It is widely agreed that BSC is the dominant framework in strategy implementation and performance management (Atkinson, 2006; Marr and Schiuma, 2003; Smith, 2005). It has been offered by its inventors as "the cornerstone of a new strategic management system" (Kaplan and Norton, 1996), positively linking an organization's long-term strategic intentions with its short-term operational actions. The use of the BSC is increasing. For example, more than 60 per cent of *Fortune* 1,000 companies have already experimented with the BSC (Silk, 1998) and 57 per cent of businesses in the UK are reported to use it (Speckbacher *et al.*, 2003). Moreover, recent research indicates that a number of organisations are beginning to utilise BSCs actively to link their strategy and operations (Atkinson, 2006).

However, despite the clear acceptance of BSC, many companies are still primarily relying on traditional financial performance measures (Tangen, 2004). This suggests that not all organisations have enough capabilities to properly implement such systems. One type of these capabilities or requirements is related to information technology (IT). Dedicated information systems tools have been introduced by major IT players, such as SAP, Oracle, and Microsoft, to assist companies in using those management techniques and metrics, required for strategy implementation and control (Marr and Neely, 2003; Turban *et al.*, 2007). This group of IS applications is classified as business intelligence (BI) and/or decision support systems (DSS) type of applications (Turban *et al.*, 2007).

This study aims to underline the role of IT in adopting BSC systems in Bahrain. It highlights this role through comparing the IT-related requirements or factors against the non-IT-related ones that contribute to the implementation of such systems. Moreover it provides a better understanding for the adoption of such systems through investigating the availability of such factors in Bahraini organisations.

Literature review

The Balanced Scorecard is a performance measurement system. It translates an organisation's mission and strategy into a set of performance measures, with a view to providing a comprehensive and balanced framework for strategic measurement and management. The BSC clearly overcomes the deficiencies of the traditional financial performance measures (Eccles, 1991; Kaplan and Norton, 1992), as it balances between

financial and non-financial measures, short- and long-term objectives, lagging and leading indicators, and external and internal performance perspectives (Kaplan and Norton, 1996).

The BSC framework, as shown in Figure 1, views an organisation's performance from four key perspectives, with regard to which organisations should articulate their core vision, strategy and goals before translating them into specific initiatives, targets and measures. Typical examples observed in companies that have adopted the Balanced Scorecard approach include (Atkinson, 2006; Kaplan and Norton, 1996):

- *financial* – emphasising shareholder satisfaction, key goals and measures here generally involve (gross and/or net) profitability, return on capital employed, residual income, economic value added, sales growth, market position and share, cash flow, etc.;
- *customer* – focusing on "real" customer satisfaction, key goals and indicators here typically stress common customer concerns such as delivery time, quality, service and cost, etc.;
- *internal business* – key goals and measures here should highlight critical skills and competencies, processes and technologies that will deliver current and future organizational (customer/financial) success; and
- *learning/growth* – underpinning the other three perspectives, key long-term goals and indicators in this regard typically relate to improving flexibility and investing for future development and new opportunities.

Moreover, important relationships are present between the four perspectives with innovation and learning being the driving force to deliver success in the internal processes, which then in turn will meet customer and consequently, shareholder needs.

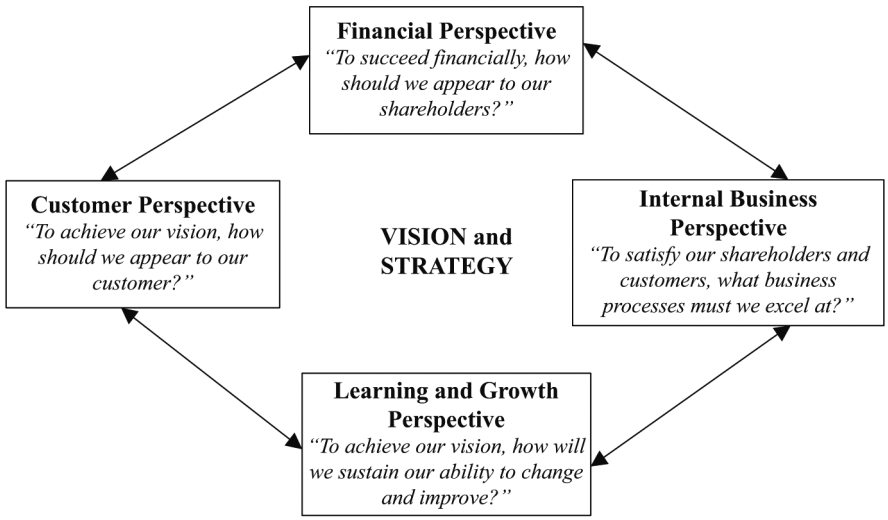

Figure 1.
Balanced Scorecard approach

Source: Kaplan and Norton (1992)

Previous studies on BSC have not directly investigated the factors that influence BSC adoption. Academics mainly rely on the factors that facilitate better strategy implementation in general, not specifically for BSC. Related studies have identified important factors related to management, organisational, strategy measurement, and general implementation issues.

Management factors are concerned with the extent to which the organisation is committed to strategic management and it is requirements. A clear emphasis has been given to issues related to this category of requirements as compared to other types of factors. Beer and Eisenstat (2000) introduced what they termed "the killers of strategy implementation" such as unclear strategic intentions and conflicting priorities, inadequate down-the-line leadership skills development, inability to communicate strategies to build shared vision and consensus, lack of competence, coordination, a top-down/*laissez-faire* senior management style and commitment to strategy implementation. However, these killers did not include some classical issues such as lack of top management backing (Aaltonen and Ikavålko, 2002) and inability to fully win over customers and staff to appreciating the strategy (Corboy and O'Corrbui, 1999). In addition (Franco and Bourne, 2003) claimed that cultural and behavioural issues such as the impact of poor communication and diminished feelings of ownership and commitment are also important inhibitors for effective strategy implementation.

Organisational factors are those related to the structure that the organisation uses to implement its strategies, such as the appropriateness of the organisational structure to its strategy (Aaltonen and Ikavålko, 2002), the effectiveness of the team responsible for the implementation process (Beer and Eisenstat, 2000), the role played by middle managers (Beer and Eisenstat, 2000), individual responsibilities in the change process (Corboy and O'Corrbui, 1999), and co-ordination across functions, businesses or borders (Beer and Eisenstat, 2000).

Strategy measurement mainly considers how the strategy will be put into reality. It emphasises the issues related to building a proper strategic control system in which the organization identifies relevant performance indicators. Corboy and O'Corrbui (1999) showed how executives suffer from a lack of understanding of how the strategy should be implemented. Goals setting and controls are recognised as one of the most important group of issues related to building such systems. Identifying coordinated targets at various levels in the organisation is difficult and the need for control is heightened as uncertainty and change provide a volatile environment (Tavakoli and Perks, 2001). Also, Al Ghamdi (1998) supported this claim and showed, in his empirical study, that the main problems of strategy implementation are that key tasks were not defined in enough detail, information systems were inadequate, and coordination of activities was not effective.

Finally, other general implementation factors can be identified as well, such as an absence of implementation plans, underestimating the time needed for implementation, the inability to address uncontrollable factors in the external environment, difficulties and obstacles not being acknowledged, recognised or acted on, ignoring day-to-day business imperatives, and improper training and instruction being given to lower level employees (Alexander, 1985; Corboy and O'Corrbui, 1999).

On the other hand another background related to the role of IT in implementing BSC systems is needed as well for this study. This role has basically started from the IT industry side. When BSC concept had been introduced, software developers have responded with suggested solutions for automating its processes. The first systems

were presented as simple dashboards to manage strategy execution processes. Consequently the market for BSC software has evolved and functional standards for BSC applications were even established at the end of the 1990s (Miyake, 2002). From the beginning, IT was viewed as an automation tool and several researchers "drew attention to the fact that software is only a tool and not a substitute for the initial hard work of strategic analysis" (Marr and Neely, 2003).

A survey by Assiri *et al.* (2006), which elicited opinions from 103 organizations in 25 countries, showed that automation is crucial for the success of BSC implementation. The survey results showed that automation assists in facilitating a rapid culture change, gives visibility to the BSC processes, and enables the contribution of a wide variety of employees.

However with the advances in IT, especially in BI technology, effective BSC systems became inconceivable without sophisticated IT. BSC processes need data from different internal/external and manual/electronic sources. These electronic sources most probably use different technologies, and/or systems with different data models and formats. Also, most of these data come from transactions processing systems (TPS) or operations support systems, which have limited capabilities for management support. Therefore organisations may need proper architectures, which could be different and/or separate from those dedicated for TPSs, to support management practices related to BSC processes.

Architectures for TPSs cannot be easily used for management support purposes, similar to BSC activities. For example, TPSs' databases are designed for specific, detailed, day-to-day and routine transactions, while management support systems (MSS) need data warehouses designed for non-routine, time-variant, aggregated and varying managerial decision-making processes. Also, processing could be much more complicated for MSSs as compared to TPSs. They may require sophisticated modelling, search algorithms, simulation tools, and graphical and animation facilities to deal with wide arrays of management problems. Similarly, interface capabilities may be much more sophisticated in the case of MSSs.

Kettunen and Kantola (2005) explained how the role of IT for BSC processes is not merely automation, but involves appropriate utilisation as well. IT provides data integration, collaboration facilities, data-warehouses, sophisticated analysis capabilities, and easy-to-use environments that are customised for decision-makers (Missroon, 1998; Silk, 1998; Turban *et al.*, 2007).

Previous studies on the IT capabilities required for BSC are lacking. The knowledge available currently available is mostly derived from other well-established disciplines in IS. For example, Assiri *et al.* (2006) and Marr and Neely (2003) provided criteria for developing an IT solution for BSC. Their work was mainly derived from previous knowledge on building IS infrastructures for organisations. Niven (2003) extended these criteria, concentrating on how we can choose a BSC software application. Emphasis was given to the importance of the software interface.

Overall, previous BSC studies have not clearly introduced enough knowledge about what capabilities, whether IT or non-IT-related, should be present in order for organisations to implement such initiatives. In this paper, we therefore explore the different types of factors required for successful BSC implementation. We argue that management should be aware of these types of requirements, the factors related to each type, and the level of importance for each of them for better implementations for such systems.

Research hypotheses

Our literature review showed how the IT role in BSC became critical. Consequently, we expect that current implementations of such initiatives consider IT and non-IT factors with the same levels of importance. Therefore, we hypothesise the following:

H1. IT and non-IT factors have the same levels of importance in adopting BSC systems in Bahraini organisations.

Although previous studies showed different types of non-IT factors influencing strategy implementation, more emphasis has was given in these studies to classical management factors (Aaltonen and Ikavålko, 2002; Beer and Eisenstat, 2000). Therefore we expect that:

H2. The most important non-IT factors in adopting BSC systems in Bahraini organisations are mainly related to management drivers such as strategic management and top management support.

On the other side, no groups of IT factors have been identified in the literature in relation to BSC implementation. The literature has concentrated on the criteria for choosing a proper IT solution, in which an emphasis on how easy the software in such systems is to use has been noted (Assiri *et al.*, 2006; Marr and Neely, 2003; Niven, 2003). Thus, we hypothesize that:

H3. The most important IT factors in adopting BSC systems in Bahraini organisations are mainly related to BSC software interface characteristics.

Based on our previous arguments related to the importance of both IT and non-IT factors in *H1*, we expect that Bahraini organisations implementing such systems will have capabilities for both IT and non-IT factors as follows:

H4. Capabilities related to IT and non-IT factors have the same levels of availability in Bahraini organisations adopting BSC systems.

Developing *H5*, we relied on the studies of Al Ghamdi (1998), Corboy and O'Corrbui (1999) and Tavakoli and Perks (2001), which explained that a common problem – or "drama" as Al Ghamdi (1998) described it – in implementing such initiatives is the lack of competences and skills in building an implementation control system. Thus, we expect:

H5. In the case of Bahraini organisations adopting BSC systems, the least available non-IT type of capabilities are mainly related to how BSC systems could be built.

Finally, the classical significant challenges that IT staff have in supporting these types of systems may stem from the fact that these systems require some management and strategy background as well as an IT background (Turban *et al.*, 2007). Therefore we hypothesize:

H6. In the case of Bahraini organisations adopting BSC systems, the least available type of IT capabilities are mainly related to IT support.

Method

The methodology used for this study was based on the Delphi method. Delphi is a structured technique that simply helps exchange information between the members of a pre-selected group of experts through two or more rounds of a data collection process. In each round, each expert is sent one or more questions related to his/her specific area of expertise to answer. After the first round, usually called the discovery round, the administrator builds another questionnaire for the following round based on the responses of the previous round. This process may continue until final accepted results are reached (Delbecq *et al.*, 1975). Some of the advantages of the using Delphi method are that it enriches studies through eliciting different opinions from different experts; it helps to discover, crystallise, and elaborate ideas and theories through the group work used, it follows a flexible methodology, and it is simple to execute.

In this study, Delphi method was designed to explore the factors required for implementing BSC systems in Bahraini organisations as well as the levels of availability of the capabilities related to these factors in these organisations. In the first round, participants were asked to list and describe their views of the most important factors that contribute to effective implementation of BSC in organisations. The questionnaire used in this discovery phase had two questions – one for IT-related factors and the second for non-IT-related or general factors. At the end of this phase a consolidated list of factors with two sections – one for IT-related factors and the other for non-IT-related factors – was compiled. In the second phase, another questionnaire was used in which we presented the list brought from the first phase. Two questions were posed to elicit BSC experts' opinions about the degree of importance of each of those factors in the list and the degree of availability of such capabilities related to each factor in the list.

Respondent profile

For the first round of the survey, the researchers sought participation of experienced managers who were directly involved in their organisation's BSC initiatives. We thought that well-chosen participants for this study could be those managers, whether top-level or mid-level, in large Bahraini organisations, who are responsible for their organisation's current BSC systems or processes. Therefore a list of the top 100 Bahraini businesses, prepared by the Bahraini Chamber of Commerce and Industry was used as our initial source of the study population.

In order to prepare a list of potential participants, we visited these companies, with the help of four research assistants. We contacted the IS managers of these organizations for this purpose. Obviously, the right sampling unit for this survey does not have to be an IS manager. However, we contacted IS mangers as we have some connections to many of those organisations' IT staff. Moreover, many such initiatives are IT-dependent. Also, when we approached the selected potential participants, we asked them to recommend other experts in this field from their organisation or from other organisations. In the end we relied on a panel of 67 BSC experts from 34 Bahraini organisations for both rounds of the study.

Regarding the issue of determining an optimum number of survey respondents, Delbecq *et al.* (1975) suggest that few new ideas are generated within a homogeneous group once the size exceeds 30 well-chosen participants, for decision-making purposes. However, if confident research findings are sought, a larger group would be more appropriate.

Findings

Delphi first round results

Having come up with a list of target participants, we contacted everyone in the list by telephone, following Schmidt's (1995) procedures, to invite each expert to participate in the study, to introduce the idea of the study, to explain how the Delphi rounds would work, and to encourage them to participate by demonstrating the contribution of such explorative studies to research and practice. The majority of the experts preferred to use e-mail for communications and data collection in both rounds, and few preferred to use faxes. As recommended by Schmidt (1995), we avoided providing the experts with any examples of the factors expected in their responses, even those available in previous studies, in order to avoid directing them towards any specific biases.

Respondents were given a limited amount of time to respond to the questionnaire. We collated the results, and used personal judgment when different respondents appeared to be mentioning the same issue using different vocabularies. We also grouped the factors into 11 groups – six IT-related groups and five non-IT-related groups.

This judgmental process was then validated by sending the consolidated list back to all the respondents, requesting their confirmation for the validity of the consolidated list along its groups. Table I shows the final list of factors and groups for the IT-related factors. Table II shows the non-IT-related factors and groups.

	Code
Strategic IT	ITSTR
Alignment between IT and business strategy	
System integration	
BSC software interface characteristics	ITNFC
Graphical user interface	
Easy-to-use application	
Supports multidimensional view	
BSC software functions' characteristics	ITFUN
Offers quantitative and qualitative analysis	
Adequate customisation capabilities	
Using business intelligence tools	
Support automated assessment and feedback loops	
IT support	ITSPT
Backup system	
Continues system monitoring	
System security	
Understanding of BSC concept by IT people	
Facilitating user enrolment and privileges	
Infrastructure factors	ITNFR
Adequate IT infrastructure	
Dynamic communication support	
Existence of data warehouse	
Data quality factors	ITDQL
Standard data format	
Data availability	
Data accuracy	

Table I.
IT-related factors identified from the first round

	Code
Management factors	GNGMT
Clear strategic management	
Willingness to change	
Monitoring performance	
Top management commitment	
Sufficient resources	
Organisational factors	GNORG
Functional unit to handle BSC responsibility	
Regular team meetings	
Involvement of employees	
Implementation factors	GNMPL
Implementation plan	
Gradual BSC implementation	
Proper training and guidelines for BSC	
Trusted data source	
Evaluating BSC initiatives	GNEVL
Continuous BSC assessment	
Automating the BSC	
Benchmarking	
Building BSC system	GNBSC
Adequate KPIs	
Adequate BSC perspectives	
Proper measures, objectives and initiatives	
Updating BSC measures	
Cascading the objectives	
Cause and effect linkages	

Table II.
Non-IT-related factors identified from the first round

Delphi final round results

In the final round, participants were sent the final questionnaire, by either e-mail or fax, inviting them to contribute to the final round. Two five-point Likert scale questions were used to allow participants assign the level of importance of each factor in question 1, and the level of availability of the capabilities related each factor, in question 2.

Table III shows the means and standard deviations of the importance of each factor, and the levels of significance of the differences between these means with the neutral value of the scale of the Likert question, i.e. 3, using a one-sample *t*-test.

Table IV shows the means, standard deviations, and the level of significance for the *t*-test, but for the degree of availability for each factor. In addition, Table IV shows the gap between the level of importance and level of availability for each factor.

Hypotheses testing and analysis

A list of 41 factors have been identified and grouped into 11 groups, where six are IT-related factors and five are non-IT-related ones. To test *H1*, which compares IT factors with non-IT-related ones, respondents indicated the importance of these 41 different factors in adopting BSC systems on a five-point Likert scale. The points of the scale ranged from "not important at all" (1) to "very important" (5). A variable with a mean significantly larger than 3, the midpoint of the scale, was regarded as important

	Group[a]		Mean[b]	SD
First level of importance				
1	GNGMT	Clear strategic management	4.80	0.45
2	GNGMT	Sufficient resources	4.74	0.53
3	GNGMT	Monitoring performance	4.74	0.53
4	ITNFC	Easy to use application	4.74	0.63
5	ITNFC	Graphical User interface	4.70	0.58
6	GNBSC	Proper measures, objectives and initiatives	4.68	0.68
7	GNMPL	Proper training and guidelines for BSC	4.66	0.63
8	GNORG	Involvement of employees	4.66	0.66
9	GNMPL	Trusted data source	4.64	0.66
10	ITDQL	Data accuracy	4.62	0.70
11	GNGMT	Top management commitment	4.62	0.73
Second level of importance				
12	GNMPL	Implementation plan	4.58	0.64
13	GNBSC	Adequate KPIs	4.56	0.67
14	ITDQL	Data availability	4.56	0.67
15	GNBSC	Updating BSC measures	4.56	0.73
16	ITSPT	System security	4.50	0.79
17	GNGMT	Willingness to change	4.48	0.79
18	ITFUN	Offers quantitative and qualitative analysis	4.46	0.68
19	GNBSC	Cascading the objectives	4.46	0.76
20	ITNFR	Dynamic communication support	4.42	0.76
21	ITSPT	Continues system monitoring	4.40	0.76
22	ITSPT	Understanding of BSC concept by IT people	4.40	0.76
23	ITSTR	Alignment between IT and business strategy	4.40	0.81
24	ITSPT	Backup system	4.40	0.83
Third level of importance				
25	GNEVL	Continuous BSC assessment	4.38	0.75
26	GNBSC	Adequate BSC perspectives	4.36	0.6
27	ITSPT	Facilitating user enrollment and privileges	4.36	0.69
28	GNMPL	Gradual BSC implementation	4.36	0.72
29	ITNFR	Adequate IT infrastructure	4.36	0.80
30	ITFUN	Support automated assessment and feedback loops	4.34	0.77
31	GNBSC	Cause and effect linkages	4.34	0.8
32	ITDQL	Standard data format	4.30	0.76
33	GNORG	Regular team meetings	4.3	0.81
34	ITFUN	Adequate customization capabilities	4.30	0.81
35	ITSTR	System integration	4.28	0.76
36	ITFUN	Using Business Intelligence tools	4.26	0.85
37	GNEVL	Benchmarking	4.2	0.78
38	ITNFR	Existence of data warehouse	4.20	0.86
Fourth level of importance				
39	ITNFC	Supports multidimensional view	4.12	0.85
40	GNEVL	Automating the BSC	4.08	0.97
41	GNORG	Functional unit to handle BSC responsibility	3.88	1.15

Notes: One-sample *t*-test: test value = 3. [a]Group symbols are shown in Tables I and II. [b]All means were higher than 3 at $p < 0.001$

Table III.
Statistics for the factors required for implementing BSC

Group			Mean[a]	SD	Gap[b]
First level of availability					
1	GNGMT	Top management commitment	4.38	0.76	0.24
2	GNGMT	Clear strategic management	4.35	0.59	0.45
3	ITSPT	System security	4.27	0.80	0.23
4	ITNFC	Graphical user interface	4.19	0.88	0.51
5	GNGMT	Monitoring performance	4.14	0.82	0.6
6	ITNFC	Easy to use application	4.14	0.86	0.6
7	GNGMT	Sufficient resources	4.11	0.88	0.63
8	GNBSC	Cascading the objectives	4.11	0.81	0.35
9	GNBSC	Proper measures, objectives and initiatives	4.08	0.80	0.6
Second level of availability					
10	ITSPT	Backup system	4.05	0.85	0.35
11	ITNFR	Adequate IT infrastructure	4.05	0.91	0.31
12	GNORG	Regular team meetings	4.03	1.07	0.27
13	GNGMT	Willingness to change	4.00	0.88	0.48
14	ITSPT	Continues system monitoring	4.00	0.85	0.4
15	ITSPT	Facilitating user enrollment and privileges	4.00	0.75	0.36
16	GNMPL	Proper training and guidelines for BSC	3.97	1.01	0.69
17	GNMPL	Trusted data source	3.97	0.90	0.67
18	GNMPL	Implementation plan	3.97	0.99	0.61
19	ITDQL	Data availability	3.97	0.93	0.59
20	GNBSC	Adequate BSC perspectives	3.95	1.08	0.41
21	GNMPL	Gradual BSC implementation	3.95	1.03	0.41
22	ITDQL	Data accuracy	3.92	0.83	0.7
23	GNBSC	Adequate KPIs	3.92	0.98	0.64
24	GNBSC	Updating BSC measures	3.92	0.95	0.64
25	GNEVL	Continuous BSC assessment	3.92	0.98	0.46
26	ITDQL	Standard data format	3.92	0.80	0.38
27	ITFUN	Adequate customisation capabilities	3.92	0.86	0.38
28	GNORG	Involvement of employees	3.89	0.97	0.77
Third level of availability					
29	GNBSC	Cause and effect linkages	3.84	0.83	0.5
30	ITFUN	Support automated assessment and feedback loops	3.81	0.94	0.53
31	ITNFR	Dynamic communication support	3.78	1.00	0.64
32	ITSTR	System integration	3.78	0.95	0.5
33	ITNFR	Existence of data warehouse	3.78	1.08	0.42
34	GNEVL	Automating the BSC	3.78	1.03	0.3
35	ITFUN	Offers quantitative and qualitative analysis	3.76	0.76	0.7
36	ITSTR	Alignment between IT and business strategy	3.76	0.89	0.64
37	GNORG	Functional unit to handle BSC responsibility	3.76	1.16	0.12
38	GNEVL	Benchmarking	3.70	1.00	0.5
Fourth level of availability					
39	ITNFC	Supports multidimensional view	3.62	0.86	0.5
40	ITFUN	Using business intelligence tools	3.59	1.01	0.67
41	ITSPT	Understanding of BSC concept by IT people	3.57	0.93	0.83

Notes: [a]All means were higher than 3 at $p < 0.001$. [b]The factor gap is the extent to which the factor is required minus the extent to which it is available. One sample t-test: test value = 3

Table IV.
Statistics for the factors availability for implementing BSC

factor. A one-sample *t*-test was used to investigate whether one or more of the factors identified had a mean significantly different from 3.

Table III shows the means (M) and standard deviations (SD) of the levels of importance placed for the 41 factors. They are ordered according to their means. An independent-samples *t*-test was also used to classify these factors into four levels of importance. Based on these statistical tests and comparisons, each level included those factors whose means did not have statistical significant differences to the first factor in that level. Moreover, Table III shows which group each factor belongs to from the 11 groups investigated in this study.

Our survey indicated that all the 41 items/factors had means significantly greater than 3. "Clear strategic management" ($M = 4.8$, $p < 0.001$) seemed to be the prime prerequisite or factor required for undertaking BSC systems among Bahraini organizations. However, no statistical differences were found between the mean of this prime factor and the other 11 factors located in the first level of importance factors in Table III. Also, Table III shows that three of these prime factors were IT factors.

Examining the importance of the groups of factors, Table V shows that "management" ($M = 4.68$, $p < 0.001$) came top of the prime groups of factors. These five prime groups, in Table V, came in the first level of importance as the independent-sample *t*-test showed no significant differences between their means. "BSC software interface characteristics" ($M = 4.52$, $p < 0.001$), and "data quality" ($M = 4.49$, $p < 0.001$) are two IT groups of factors perceived as prime groups of factors for adopting BSC systems. Also, Table V shows that the remaining four groups of IT factors came in the second level of importance, while the last level of groups had the last two non-IT groups of factors. These results support *H1*, which expected no significant differences between IT and non-IT-related factors. This is because they both shared the first level of importance in Tables III and V, i.e. on the individual and group ways of presentation for these factors. Also, both IT and non-IT individual factors were present in all the levels of importance in Table III.

Group			Items	Mean[a]	SD
First level of importance					
1	GNGMT	Management factors	5	4.68	0.60
2	GNMPL	Implementation factors	4	4.56	0.66
3	ITNFC	BSC Software interface characteristics	3	4.52	0.68
4	GNBSC	Building BSC system	6	4.49	0.71
5	ITDQL	Data quality factors	3	4.49	0.71
Second level of importance					
6	ITSPT	IT support	5	4.42	0.78
7	ITSTR	Strategic IT	2	4.34	0.75
8	ITFUN	BSC Software functions characteristics	4	4.34	0.78
9	ITNFR	Infrastructure factors	3	4.32	0.8
Third level of importance					
10	GNORG	Organisational factors	3	4.28	0.87
11	GNEVL	Evaluating BSC initiatives	3	4.22	0.83

Notes: [a]All means were higher than 3 at $p < 0.001$. One-sample *t*-test: test value = 3

Table V.
Factor groups required for implementing BSC

These results also moderately support *H2*, as Table V shows that the "management" group of factors comes top of the table. Moreover, Table III shows three "management" individual items or factors at the top of the first level of factors. However, "management" is not the only prime non-IT group of factors: "implementation" ($M = 4.56$, $p < 0.001$) and "building BSC systems" ($M = 4.49$, $p < 0.001$) come after management groups of factors in the first level of importance as in Table V and Table AI in Appendix 2 as well. On the other end, Table V shows that "evaluating BSC initiatives" ($M = 4.22$, $p < 0.001$) and "organizational" factors ($M = 4.28$, $p < 0.001$) come at the bottom of the list with significant differences with those in the prime groups, using the independent samples *t*-test.

Similarly, the results in Table V moderately support *H3* which expected that "BSC software interface" ($M = 4.52$, $p < 0.001$) group of factors will have the highest rank comparing to the other IT-related groups of factors. The individual factors "easy to use application" and "graphical user interface", which are related to this group, were ranked the highest IT factors in the first level of importance in Table III. However, BSC software interface was not the only prime IT group, data quality ($M = 4.49$, $p < 0.001$) had this prime position as well.

Having highlighted the different factors required for adopting BSC systems in Bahraini firms, we now need to look at the extent to which the capabilities related to these factors are available in these firms. The results of our survey indicated that Bahraini firms adopting BSC systems enjoy enough capabilities related to all the factors required for adopting BSC. As shown in Table IV, all the 41 factors had means statistically above the mid-point of the scale. "Top management commitment" ($M = 4.38$, $p < 0.001$) has been perceived by interviewees as the most available factor in these organisations. However, Table IV shows that eight more factors, of which three were IT-related, were in the highest level of availability as well.

On the other hand, "understanding of BSC concept by IT people", "using BI tools" and "support multidimensional view" were perceived as the least available capabilities, with means significantly lower than the factors in the higher level of order using independent samples *t*-test.

Comparing IT with non-IT-related groups of factors, Table VI shows that although the first group of factors is the "management" group, its mean does not statistically differ from the following four groups. Two of these prime groups of factors are IT-related. These results moderately support *H4*, as they do not show any higher positions for the capabilities related to IT factors comparing to non-IT-related factors or vice versa.

The results fail to support *H5*, which expected that capabilities related to "how BSC systems could be built" would be the least non-IT-related group available in Bahraini firms. Table VI shows that "evaluating BSC initiatives" ($M = 3.8$, $p < 0.001$) and the "organisational" ($M = 3.84$, $p < 0.001$) groups of factors are the non-IT ones with the least means with significant differences from the higher levels of importance. "Building BSC systems" ($M = 3.97$, $p < 0.001$), came in the middle of the list. In addition, Table IV shows that no single individual factor related to "building BSC systems" is present in the bottom level of the table. They are scattered in many levels in the table.

Similarly, *H6* could not be supported, as the "IT support" ($M = 3.97$, $p < 0.001$) group of factors was not the least available as compared to the other IT-related groups of factors, as shown in Table VI. This group came in the middle of the table, with

Group			Mean[a]	SD	Gap
First level of availability					
1	GNGMT	Management factors	4.19	0.78	0.48
2	ITNFC	BSC software interface characteristics	3.98	0.86	0.53
3	ITSPT	IT support	3.97	0.86	0.45
4	GNBSC	Building BSC system	3.97	0.9	0.52
5	GNMPL	Implementation factors	3.96	0.98	0.59
6	ITDQL	Data quality factors	3.93	0.85	0.55
7	GNORG	Organisational factors	3.89	1.06	0.38
Second level of availability					
8	ITNFR	Infrastructure factors	3.87	0.99	0.45
9	ITSTR	Strategic IT	3.84	0.86	0.5
10	GNEVL	Evaluating BSC initiatives	3.8	1	0.42
11	ITFUN	BSC software functions' characteristics	3.77	0.89	0.57

Notes: [a]All means were higher than 3 at $p < 0.001$. One-sample t-test: test value = 3

Table VI.
All factor groups' availability for implementing BSC

significant differences from the other bottom IT groups of factors. Also, its individual factors came scattered in many levels of order in Table IV.

Implications and discussions

This research has tried to introduce an understanding of the requirements for implementing BSC initiatives in Bahrain. This understanding is delivered in a specific list of factors organised in groups with suggestions, supported with statistical evidence, as to the levels of importance for each factor and group. We believe this main outcome represents a significant contribution to research and practice in BSC and performance evaluation systems. This is because little knowledge exists concerning what capabilities should be present to implement such initiatives.

Moreover, the focus on comparing IT with non-IT-related requirements provides another contribution to research and practice related to locating the role IT plays in such systems. This comparison may guide future research to strengthen our understanding of the role that each factor or group of factors plays in such implementations. Also, it may help enlighten IT professionals to set their priorities and visions properly for the role that IT may play in such systems.

It is clear that two main groups of implications may be discussed at the end of this study – one for IT-related factors and one for non-IT-related factors. For the IT-related side, the study provided implications for the strong role played by IT in such initiatives. The results clearly suggest that BSC initiatives could be IT-dependent systems. "Interface characteristics" and "data quality" factors were at the first level of importance. Moreover, the rest of the IT-related groups of factors were in the second level of importance. No IT-related groups of requirements were at the bottom of the list.

The system interface is usually considered a success factor for information systems (Hong *et al.*, 2002) or an important driver for user acceptance of systems (Kamhawi, 2008b). Clearly, the results support previous studies related to this issue. It is known that the system interface is that part of the system that users see or deal with. Its importance becomes even higher when users are not IT specialists and/or are not mainly using the system for performing routine transactions for the organisation (Turban *et al.*, 2007). This may explain why the BSC interface came on the top of the list.

Data quality, the other IT-related group of factors that came on the top of list, could be seen as another driver for user acceptance of such systems. Data quality is related to the ability of the system to provide users with relevant, timely, and accurate information. Decision and management support systems consider data quality as a critical success factor, as it directly influences system reliability (Fisher *et al.*, 2003). Overall, it seems that user acceptance is an important issue for BSC implementation. Future studies could investigate this issue further.

The remaining IT-related groups of factors, which came in the second level of importance in the list, were "strategic orientation of IT", "IT infrastructure", "IT support", and "BSC software function characteristics". These factors seem to be long-term oriented capabilities. Organisations may need more time to build reliable IT infrastructures, align their IT capabilities to their corporate or business strategies, and maintain competent IT staff. We think that such capabilities may play two important roles in BSC implementation – i.e. enabler and stimulus roles. IT can play an enabler role when it is used to support business initiatives related to implementing such performance evaluation, business intelligence, and/or management support systems. Such systems require network capabilities, data centres and warehouses, and IT support staff who are able to make such challenging systems fruitful. On the other hand, the existence of such capabilities in an organisation, especially the presence of competent IT staff, may stimulate its management initiate and implement such systems as IT-led strategies.

The other implications that this study introduces are related to non-IT factors. Obviously, regardless of the strong role IT may play in implementing such initiatives, BSC is basically a managerial approach. Non-IT factors are always expected to have a significant influence on BSC success. However, previous studies have not yet provided a clear understanding concerning the different managerial and organisational requirements for implementing such systems. "Management", "implementation", and "building BSC systems" groups of factors came in the first level of importance. In fact, the "management" and "implementation" groups were the first and second groups in that level, respectively. Management factors highlight those classical requirements that show how ready an organisation is to make a significant management change in the organisation, such as top management support, clear strategic management, and willingness to change, etc. Previous studies have introduced such factors for implementing other similar initiatives such as enterprise resource planning systems (ERP) (Kamhawi, 2007; Nah *et al.*, 2001), BI systems (Edwards, 2003; Wixom and Watson, 2001), and business process re-engineering projects (BPR) (Kamhawi, 2008a), etc. The study, accordingly, suggest that BSC should be treated as a big initiative or project that has a deep influence on the organisation, similar to that of ERP systems or BPR projects.

The other two groups of factors, present in the first level of importance in the list, are related to implementation and building BSC systems. They highlight the requirements for managing the BSC project as an undertaking. Also, they introduce those capabilities that help put the system into reality. Finally, the study results located "organisational factors" and "evaluating BSC initiatives" at the last level of importance in the list.

This study has several limitations. First, we did not measure the influence of such factors on specific metrics for BSC implementation success. We expect future research efforts investigate the relationships between such factors and success. Second, the study was limited to BSC implementation in Bahrain, which limits our abilities to

generalise results to other countries in the world. However, this provides another opportunity for future research, to investigate the extent of generalisability of such results on other business environments. Also, we suggest that future research may have a narrower scope, focusing on one or few of the groups of factors introduced in this study, with a view to bring deeper understanding to specific capabilities and their role in BSC implementation success.

References

Aaltonen, P. and Ikavålko, H. (2002), "Implementing strategies successfully", *Integrated Manufacturing Systems*, Vol. 13 No. 6, pp. 415-8.

Al Ghamdi, S.M. (1998), "Obstacles to successful implementation of strategic decisions: the British experience", *European Business Review*, Vol. 98 No. 6, pp. 322-7.

Alexander, L.D. (1985), "Successfully implementing strategic decisions", *Long Range Planning*, Vol. 18 No. 3, pp. 91-7.

Assiri, A., Zairi, M. and Eid, R. (2006), "How to profit from the balanced scorecard: an implementation roadmap", *Journal of Industrial Management & Data Systems*, Vol. 106 No. 7, pp. 937-52.

Atkinson, H. (2006), "Strategy implementation: a role for the Balanced Scorecard?", *Management Decision*, Vol. 44 No. 10, pp. 1141-6.

Beer, M. and Eisenstat, R. (2000), "The silent killers of strategy implementation and learning", *Sloan Management Review*, Vol. 41 No. 4, pp. 29-40.

Brander Brown, J. and Atkinson, H. (2001), "Budgeting in the information age: a fresh approach", *International Journal of Contemporary Hospitality Management*, Vol. 13 No. 3, pp. 136-43.

Chapman, C.S. (1997), "Reflections on a contingent view of accounting", *Accounting Organisations and Society*, Vol. 22 No. 2, pp. 189-205.

Corboy, M. and O'Corrbui, D. (1999), "The seven deadly sins of strategy", *Management Accounting*, November, pp. 29-30.

Cross, K.F. and Lynch, R.L. (1992), "For good measure", *CMA – The Management Accounting Magazine*, Vol. 66 No. 3, pp. 20-4.

Delbecq, A.L., van de Ven, A.H. and Gustafson, D.H. (1975), *Group Techniques for Program Planning*, Scott Foresman, Glenview, IL.

Eccles, R.G. (1991), "The performance measurement manifesto", *Harvard Business Review*, Vol. 69, pp. 131-6.

Edwards, M. (2003), "2003 Best Practices Awards Winners: innovators in business intelligence and data warehousing", *Business Intelligence Journal*, Vol. 8 No. 4, pp. 17-24.

Evans, J.R. (2007), "Impacts of information management on business performance", *Benchmarking: An International Journal*, Vol. 14 No. 4, pp. 517-33.

Fisher, C.W., Chengular-Smith, I. and Ballou, D.P. (2003), "The impact of experience and time on the use of data quality information in decision making", *Information Systems Research*, Vol. 14 No. 2, pp. 170-88.

Franco, M. and Bourne, M. (2003), "Factors that play a role in 'managing through measures'", *Management Decision*, Vol. 41 No. 8, pp. 698-710.

Goldratt, E. (1990), *Theory of Constraints*, North River Press, Croton-on-Hudson, NY.

Hong, W., Thong, J., Wong, W. and Tam, K. (2002), "Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics", *Journal of Management Information Systems*, Vol. 18 No. 3, pp. 97-124.

Kamhawi, E.M. (2007), "Critical factors for implementation success of ERP systems: an empirical investigation from Bahrain", *International Journal of Enterprise Information Systems*, Vol. 3 No. 2, pp. 34-49.

Kamhawi, E.M. (2008a), "Determinants of Bahraini managers' acceptance of business process reengineering", *Business Process Management Journal*, Vol. 14 No. 2, pp. 166-87.

Kamhawi, E.M. (2008b), "System characteristics, perceived benefits, individual differences and use intentions: a survey of decision support tools of ERP systems", *Information Resources Management Journal*, Vol. 21 No. 4, pp. 66-83.

Kaplan, R.S. and Norton, D.P. (1992), "The Balanced Scorecard – measures that drive performance", *Harvard Business Review*, Vol. 70 No. 1, pp. 71-9.

Kaplan, R.S. and Norton, D.P. (1996), "Using the Balanced Scorecard as a strategic management system", *Harvard Business Review*, Vol. 74 No. 1, pp. 75-85.

Kettunen, J. and Kantola, I. (2005), "Management information system based on the balanced scorecard", *Journal of Campus-Wide Information Systems*, Vol. 22 No. 5, pp. 263-74.

Marginson, D.E.W. (1999), "Beyond the budgetary control system: towards a two-tiered process of management control", *Management Accounting Research*, Vol. 10, pp. 203-30.

Marr, B. and Neely, A. (2003), "Automating the Balanced Scorecard – selection criteria to identify appropriate software applications", *Measuring Business Excellence*, Vol. 7 No. 3, pp. 29-39.

Marr, B. and Schiuma, G. (2003), "Business performance – past, present and future", *Management Decision*, Vol. 41 No. 8, pp. 680-7.

Medori, D. and Steeple, D. (2000), "A framework for auditing and enhancing performance measurement systems", *International Journal of Operations & Production Management*, Vol. 20 No. 5, pp. 520-33.

Mintzberg, H. (1994), "The fall and rise of strategic planning", *Harvard Business Review*, Vol. 72 No. 1, pp. 107-14.

Missroon, A.M. (1998), "Automating the balanced scorecard methodology", *Midrange Systems*, November, pp. 30-44.

Miyake, D. (2002), "Implementing strategy with the Balanced Scorecard: an introduction to the strategy-focused organization", *Information Management Magazine*, October.

Nah, F.-H., Lau, J. and Kuang, J. (2001), "Critical factors for successful implementation of enterprise systems", *Business Process Management Journal*, Vol. 7 No. 3, pp. 285-96.

Neely, A., Adams, C. and Crowe, P. (2001), "The performance prism in practice", *Measuring Business Excellence*, Vol. 5 No. 2, pp. 6-12.

Niven, P.R. (2003), *Balanced Scorecard: Step-by-step for Government and Nonprofit Agencies*, Wiley, Hoboken, NJ.

Nørreklit, H. (2000), "The balance on the Balanced Scorecard: a critical analysis of its assumptions", *Management Accounting Research*, Vol. 11 No. 1, pp. 65-88.

Otley, D. (1999), "Performance management: a framework for management control systems research", *Management Accounting Research*, Vol. 10, pp. 363-82.

Schmidt, V.V. (1995), "Awakening intuition: a Delphi study", *Digital Abstracts International*, Vol. 56 No. 09, p. 3498, (UMI No. 9543808).

Silk, S. (1998), "Automating the Balanced Scorecard", *Management Accounting Research*, Vol. 79 No. 11, pp. 38-42.

Smith, M. (2005), "The Balanced Scorecard", *Financial Management*, February, pp. 27-8.

Speckbacher, G., Bischof, J. and Pfeiffer, T. (2003), "A descriptive analysis on the implementation of balanced scorecards in German-speaking countries", *Management Accounting Research*, Vol. 14, pp. 361-87.

Tangen, S. (2004), "Performance measurement: from philosophy to practice", *International Journal of Productivity and Performance Management*, Vol. 53 No. 8, pp. 726-37.

Tavakoli, I. and Perks, K.J. (2001), "The development of a strategic control system for the management of strategic change", *Strategic Change*, Vol. 10, pp. 297-305.

Turban, E., Aronson, J.E., Liang, T.-P. and Sharda, R. (2007), *Decision Support and Business Intelligence Systems*, Pearson Prentice-Hall, Englewood Cliffs, NJ.

Wixom, B. and Watson, H. (2001), "An empirical investigation of the factors affecting data warehousing success", *MIS Quarterly*, Vol. 25 No. 1, pp. 17-24.

Appendix 1. Delphi questionnaires

First-round instrument

After an opening paragraph inviting the expert to participate, the following two open questions were introduced:

(1) What are the IT-related factors that contribute to effective implementation of Balanced Scorecard in your organisation? (Please list at least six elements.)

(2) What could be the general (other than IT-related) factors that contribute to effective implementation of Balanced Scorecard in an/your organisation? (Please list at least six factors.)

Participants were asked to provide enough description for their factors because different respondents may use different terminologies for the same issue.

Second round instrument

After the invitation opening, the 41 factors identified in the first round have been presented with two scale and a few demographic questions. The list of factors (see Tables I and II) was presented twice, one for each question. The rating system for the first scaled question ranged from "not important at all" (1) to "very important" of (5). The rating for the second scaled question ranged from "not available at all" (1) to "highly available" (5). The questions were as follows:

(1) To what extent do you agree that this factor contributes to effective BSC implementation in general?

(2) To what extent do you agree that the capabilities related to this factor are available in your organisation?

Appendix 2. IT and non-IT-related groups of factors

Group		Items	Mean[a]	SD
1 GNGMT	Management factors	5	4.68	0.60
2 GNMPL	Implementation factors	4	4.56	0.66
3 GNBSC	Building BSC system	6	4.49	0.71
4 GNORG	Organisational factors	3	4.28	0.87
5 GNEVL	Evaluating BSC initiatives	3	4.22	0.83
Average of non-IT factors		21	4.48	0.71

Notes: [a]All means were higher than 3 at $p < 0.001$. One-sample t-test: test value = 3

Table AI. Non-IT-related factors' groups required for implementing BSC

Table AII.
IT factor groups required for implementing BSC

Group			Items	Mean[a]	SD
1	ITNFC	BSC software interface characteristics	3	4.52	0.68
2	ITDQL	Data quality factors	3	4.49	0.71
3	ITSPT	IT support	5	4.42	0.78
4	ITSTR	Strategic IT	2	4.34	0.75
5	ITFUN	BSC software functions' characteristics	4	4.34	0.78
6	ITNFR	Infrastructure factors	3	4.32	0.8
Average of IT factors			20	4.4	0.75

Notes: [a]All means were higher than 3 at $p < 0.001$. One-sample t-test: test value = 3

Table AIII.
General factor groups' availability for implementing BSC

Group			Mean[a]	SD	Gap
1	GNGMT	Management factors	4.19	0.78	0.48
2	GNMPL	Implementation factors	3.96	0.98	0.59
3	GNBSC	Building BSC system	3.97	0.9	0.52
4	GNORG	Organisational factors	3.89	1.06	0.38
5	GNEVL	Evaluating BSC initiatives	3.8	1	0.42

Notes: [a]All means were higher than 3 at $p < 0.001$. One-sample t-test: test value = 3

Table AIV.
IT factor groups' availability for implementing BSC

Group			Mean[a]	SD	Gap
1	ITNFC	BSC Software interface characteristics	3.98	0.86	0.53
2	ITDQL	Data quality factors	3.93	0.85	0.55
3	ITSPT	IT Support	3.97	0.86	0.45
4	ITSTR	Strategic IT	3.84	0.86	0.5
5	ITFUN	BSC software functions' characteristics	3.77	0.89	0.57
6	ITNFR	Infrastructure factors	3.87	0.99	0.45

Notes: [a]All means were higher than 3 at $p < 0.001$. One-sample t-test: test value = 3

About the author
Emad M. Kamhawi is an Associate Professor at Zagazig University, Egypt. He received his PhD in Management Information Systems from the University of North London. His previous research articles have been published in international journals such as *Information Resources Management Journal*, *Business Process Management Journal*, *International Journal of Enterprise Information Systems* and *Journal of Enterprise Information Management*, on subjects concerning business process re-engineering, ERP systems, the adoption of e-commerce systems in Arab countries, requisite IS skills, and risk factors for IT projects in the Gulf area. His current research interests are in BPR, ERP systems, knowledge management and IT infrastructures management. Emad M. Kamhawi can be contacted at: e.kamhawi@gmail.com