



The ranking of IT capabilities regard to strategy implementation process: with AHP approach

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Abstract

This paper has investigated all the components and processes of developing IT capabilities based on an analytical and descriptive approach and a profound and systematic theoretical literature to implement strategy in a comprehensive and integrated manner and finally, it develops an operational roadmap for ranking IT capabilities with regard to the implementation of strategy in a systematic structure. In this regard, the IT capabilities related to strategy implementation identified in five areas of IT infrastructure capabilities, IT technical and skill capabilities, IT strategic capabilities, IT communication capabilities, and IT management capabilities. Then, based on the key requirements of the IT capability-based strategies, a roadmap (including 4 steps) is developed for using IT capabilities with regard to the effective implementation of the strategy which includes determining organizational strategies, identifying business processes, identifying and developing IT capabilities, and identifying tools related to IT. For providing a list of essential steps to create IT capability-based strategies, we used opinions of 10 experts. Therefore, by a questionnaire we asked experts to compare steps together. Then, using the AHP technique, weighing and prioritizing the basic steps to create IT capability-based strategies. The results show that designing strategies based on IT capabilities are most important and then the development of the required IT capabilities is important in the second phase. According to the experts, the analysis of the required financial model is in the third place and the definition of IT capabilities is in the fourth place.

Keywords: IT Capabilities, Strategy Implementation, Road Map, AHP.

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worthwhile until prominent strategies are implemented (Toolsee, 2011).

Therefore, the distinction between good and bad strategies is in the strategy implementation, because studies show that only 10 to 30 percent of strategies are implemented successfully in organizations (Raps, 2005; Milller et al., 2004; Yang et al., 2010). There are various tools for implementing the strategy one which that is most commonly used is the balanced scorecard (Siddique & Shadbolt, 2016). Findings show that the use of this tool has many problems and limitations as well

1. Introduction

Today's organizations have chosen strategic planning approach with the awareness of their facilities and constraints to achieve long-term goals in the shade of equipping resources, unity of procedures and processes, and many strategic plans have been formulated in this framework with the thought that the formulation of these programs can make them successful. However, they have neglected the fact that the successful formulation of strategies cannot guarantee their successful implementation, because they will not be



implementation in organizations (Pirayesh & Mousavizadeh, 2017; Hakim, 2011).

Considering the necessity of using IT capabilities in organizations and considering that plenty of the plans and projects of organizations face barriers and challenges during strategy implementation process, in this research, we intend to provide a roadmap for using IT capabilities in strategy implementation through a profound and systematic study of theoretical literature and qualitative analysis. The model presented in this article provides an operational roadmap to the strategic and top managers of the organizations with which they will be able to implement their strategies properly, take the best advantage of IT capabilities, and implement their strategy in a way that leads to strategic supremacy.

2. Literature review

2-1. Strategy implementation and its importance

In most reviewed papers and books, implementation considered one of the multiple stages of strategy but there is no consensus to define the implementation and researchers are disappointed about expressing what really the implementation is. Therefore, different perspectives presented in this regard. According to Miller and Dess (1996), strategy implementation involves a broad range of efforts, which focus on the transformation of strategic intentions into actions. Hill et al have defined the implementation of strategy as "designing appropriate organizational structures and control systems to put the organization's selected strategy into action" (Hill et al., 2007, p. 5). Finally, according to Wheelen and Hunger, strategy implementation is "the sum total of the activities and choices required for the execution of a strategic plan" (Wheelen & Hunger, 2012, p. 320).

(Epstein & Manzoni, 1998; Nooreklit, 2000; Jie & Parton, 2009). Therefore, we can use IT capabilities as a new tool or complement for other strategy implementation tools to remove these limitations and problems, because information technology is critical to the implementation of the strategy in an organization and acts as a vital facilitator (Galbreath, 2003, p.309). Studies show if an organization does not have sufficient organizational capabilities or IT capabilities, implementing its strategy will endure many side factors (Gottschalk, 1999; Salmela & Spil, 2002; McNish, 2002).

One of the challenges that organizations encounter today is the weakness in organizing the existing strategic information or the lack of information in some cases; consequently, it will not be possible to manage and implement strategic plans properly and economically. IT capabilities make it possible that by organizing the data and information during the strategy implementation process to provide the suitable services through the information systems and required technology infrastructure. Thus, by providing the required information platform through IT capabilities in different areas of the organization, strategy formulation is done more accurately and as a result, the effectiveness of the implementation of the program is increased and the implementation process will be carried out more carefully.

In addition, IT capabilities enable managers to have a comprehensive and integrated analysis of the organization's internal and external environments, achieving strategic information, disseminating and sharing information within the organization, increasing the speed of identifying issues; helping strategic decision-making, promoting planning standards, reducing planning risks and increasing the speed and accuracy of planning are of important impacts of using IT capabilities with regard to the strategy



receives less consideration while strategy implementation is more important than its formulation. Strategy implementation is ignored in organizations because it is supposed that everyone can implement it. Lack of information about the elements related to the strategy implementation, the points where it starts and ends as well as causal problems in researches related to middle-level managers are also the factors that lead to ignoring strategy implementation in organizations.

2-2. IT capabilities

The impact of IT on strategy implementation will be studied through the capability concept in RBV. The main term in RBV is "resource" that is used in different meanings and in various structures. Even in management science, there is no agreement on its usages. In literature, terms like capabilities, assets, skills and competencies have been used interchangeably due to the broadness of descriptions and concepts (Nuroğlu, 2016, p. 53).

Barney (1991) simply calls all kinds of an organization's assets resources. The assets of an organization include all properties, capabilities, organizational processes, firm's attributes, information, knowledge, etc. that are controlled by the organization and enable it to perceive and implement strategies that improve its efficiency and effectiveness (Daft 1983)" (Barney 1991).

There is a difference between the resources and capabilities and having some resources does not mean owning all the related capabilities by themselves. Investment in IT hardware and software, hiring IT professionals cannot increase IT capabilities at once. Because these investments must be processed and digested by the firm to create capabilities for the organization (Nuroğlu, 2016, p.54).

However, the formulation and implementation of strategy cannot separate but implementing a strategy is the most complex and time-consuming part of the strategic management. For example, Jasuch & Gluek (1988) in a research showed that managers allocate 23 percent of their time to policy formulation and planning while they spend only 8 percent of their time to establish a management system to implement their made decisions and written programs. Maybe a reason for this is that writing and selecting a strategy takes less time than implementing it (Jasuch & Gluek: 1988). "Classically, where half of all the ideas are described in the strategic plans, we cannot see the light of the day" (Burlton, 2015). "A strategy well defined is but a half of the success. Most strategies, which did not bring the expected outcomes, had deserved their fate not because they were lacking a clear vision, but because they were lacking appropriate implementation. Unfortunately, even the best strategies may fail in being translated into actions" (Rummler and Brache, 2000). "The assumptions concerning the issues encountered while implementing a strategy are confirmed by studies which prove that a decided majority (different authors mention the share of 60 up to 90 per cent) of strategies being created are not implemented at all" (Kaleta, 2013). Therefore, without effective implementation, no business strategy can succeed. Unfortunately, most managers know more about developing strategy than they do about executing it (Epstein & Manzoni, 1998; Hrebiniak, 2006, 2013). Alexander (1991) identified the reasons for the weakness and ignoring the strategy implementation phenomenon both according to researchers and according to managers. Noble (1999) and Aaltonen and Ikavalko (2002) also stated that strategy implementation is a straightforward process; consequently, its formulation and writing



2-3. the study of IT capability conceptual indexes with regard to strategy implementation

In literature, there are various streams for IT capability concepts. In the early researches about IT capabilities, infrastructure capability is considered one of the IT capability variables.

The value of IT infrastructure is not hidden to anyone today (Byrd & Turner, 2000). So that nearly 58% of IT budgets of companies are devoted to this part of the technology (Ross et al., 2004). Allameh et al. (2011) believed that the acquisition of high efficiency and effectiveness in an organization require investment in information technology components such as the Internet, office automation and management information systems. IT infrastructure is used as a basis for computer technology, communications and the basic data system in the technical framework that guides organizational work to meet the management needs (Melville, 2010). Nuroğlu states that the extensive impact of IT cannot be assessed only by technical criteria and IT infrastructures. Rather, soft components like human resources, skills, experience, scope, strategy, internal and external relationships, etc. are the determining tools and should be considered in the assessment of capabilities. In this research, IT Human Resources capabilities and IT Management capabilities are examined under the title of IT technical capabilities separately.

Bharadwaj (2000) argues that two kinds of skills namely technical skills and managerial skills are of critical dimensions of IT Human resources. Technical skills include programming, system analysis, design and competencies in the emerging technologies. Managerial skills include abilities such as the effective management of IS functions, coordination and interaction with the users,

IT capabilities play an important role in a rapidly changing environment (Jiao et al., 2008). IT capabilities are kind of organizational capabilities that can cover work activities and processes by sorting out and gathering other important resources (Lee & Sinofsky, 1999). IT capability is a firm's ability to acquire, deploy, and leverage its IT investment in combination with other resources and capabilities as well as to support and enhance its distinctive competencies and skills in other business functions in order to achieve business objectives through IT implementations (Zhang, 2005, p.14). Aral et al. (2007) define IT capabilities as methods and competencies that support the use of IT.

The advancement in IT capabilities has changed the face of the industry over the past decade quickly. Sharing information will lead to the advancement of companies, improvement of production planning and inventory and distribution management. This collaboration is facilitated by the existence of an effective and efficient information technology system (Sanders & Promus, 2005). In addition, IT capabilities affect the strategy implementation as well. The use of IT capabilities in strategy implementation enables an organization to apply the current resources to dominate the future in a realistic, up-to-date and creative way. The use of IT capabilities in the implementation of the strategy leads to the reduction of risk, a sense of confidence in the implementation process, optimal use of organizational resources, acquisition of competitive advantage, information integrity and improving managers' capabilities in the implementation of programs.

In mainstream of MIS research, IT has been regarded as a 'strategic necessity' (Nuroğlu, 2016, p. 54). Therefore, we also use IT capabilities as a strategic asset that plays an effective role in the strategy implementation.



includes increasing the users' understanding of IT capabilities and the users' feeling of ownership and profound satisfaction as well as fostering mutual confidence, coordination of goals, and successful communication among the stakeholders are of the technical and business objectives of an organization (Feeny & Willcocks, 1998). Therefore, communication capability is also another important variable that has a great impact on the implementation of a strategy.

There are different categories in literature concerning dimensions of IT capabilities. At this stage, considering the study of different texts and considering the common points and aggregation of IT capabilities in different resources, our goal is to use the concept of IT capabilities that helps us analyze the IT capabilities with regard to strategy implementation. In general, these capabilities are listed in five areas including IT Infrastructure capabilities, IT Technical and Skill capabilities, IT Strategic capabilities, IT Communication capabilities, IT Management capabilities each of which has indicators presented in Table 1.

project management and leadership skills (Capon & Glazer, 1987; Copeland & McKenney, 1988).

In addition, technical capabilities may include technical knowledge, the specific knowledge of a company, problem-solving process and or business unit cooperation strategy that allow companies to integrate new technologies efficiently and efficiently. (Ravichandran & Chalermask, 2005).

IT managerial capabilities are the extent to which managers in this field must have technical skills and business intelligence to predict emerging technologies and their effective leverage in the balance of business processes with the organizational goals (Garrison et al., 2015).

The next capability is the "strategic" capabilities. These capabilities consist of variables related to scope, strategy, planning, strategic thinking and organizational learning, etc. Strategic and scope capabilities are strongly related to the strategy implementation.

Creating relationship is one of the IT's valuable interactional resources which

Table 1. Conceptual dimensions of IT Capabilities regard to Implementation of strategy

Capabilities	Variables	Reference
IT infrastructure capabilities	Hardware base Software base Data management Compatibility with other systems IT Standards IT modularity IT architecture	Duncan (1995), Meta et al. (1995), Bharadwaj (2000), Bhatt (2000), Bryd and Turner (2000), Ross et al. (2004), Turban et al. (2008), O'Brien & Mellvile (2010), Mitchell et al. (2012)
IT technical and Skill capabilities	IT technical skills, IT personnel expertise, Design, Programming and System analysis, IT functionalities IT Capacities	Fenny and Willcocks (1998), Bharadwaj (2000), Bryd and Turner (2000), Ross et al. (2004), Ravichandran & Chalermask (2005), Aral & Weill (2007), Chae et al. (2014), Garrison et al. (2015).
IT strategic	Business and IT vision	Kalakota & Robinson (1999),



capabilities	IT Strategy IT strategic planning IT strategic thinking Organizational learning alignment of strategies	Salmela & Spil (2004), Nuroğlu (2016).
IT Communication capabilities	Relationship between IT and business management Interaction btw internal and external functions of the organization Coordination and relationship with Organizational stakeholders Sharing responsibility among employee Communication management Negotiation management	Fenny and Willcocks (1998), Bharadwaj (2000), Nuroğlu (2016).
IT management capabilities	Effective management of IS activities Interacting with users Project Management Leadership Skills Values and norms Risk management performance evaluation IT resources management IT personnel development IT costs management Business intelligence	Capon et al.(1987), Boynton et al. (1994), Mata et al. (1995), Fenny & Willcocks (1998), Bharadwaj (2000), Bryd & Turner (2000), Ravichandran & Chalermask (2005), Chae et al. (2014), Garrison et al., (2015).

processes and activities (with the viewpoint of operating the objectives), then these processes are continuously controlled and evaluated in the form of a coherent system and ultimately their modification and improvement based on a scientific feedback and the possibility of managing the organization, systems and processes at the macro level are provided. The following figure shows how the strategy is operationalized according to what has been explained (Hakim, 2011, p.30).

With regard to the above, in order to implement the strategy correctly, we need to use IT capabilities in business models and executive affairs of organizations so that the strategy implementation process can be changed in an organization. In this regard, a road map is presented to use the IT capabilities in strategy implementation including the following steps:

3. Presenting a roadmap for using IT capabilities in strategy implementation

Information technology and strategy implementation are considered together because their common levels are merged together. So that technology has helped to promote strategy implementation by providing Software Information Platforms. Therefore, the efficient use of information technology capabilities is a competitive advantage and should be considered during the implementation process of the strategy. The strategy cannot be implemented by itself. In order to implement a strategy in an organization, first, strategies (missions, goals) must be translated into processes. Finally, these goals and strategies will be realized through the implementation of processes. Business Process Management (BPM) provides facilities to translate the missions and goals of the organization into various





Figure 1. Strategy operational model

organization properly, and then these capitals are aligned with the organization's strategies (Kaplan & Norton, 2004).

3-2. Step two: Identify business processes

According to Weske (2007), business processes referred to as a set of activities performed in a coordinated/collaborative manner in a multi-purpose organizational and technical environment to achieve a specific business goal. These business processes are typically identified and formalized by using process modeling techniques – semi-formal instructions that express the graphically relevant aspects of business processes – such as the tasks that have to be performed, the actors that are involved in the execution of these tasks, relevant data, and, notably, the control flow logic that describes the logical and temporal instructions in which tasks are to be performed (Mendling et al., 2012). As previously mentioned Business Process Management (BPM) is one of the most widely used tools that provide a facility for translating strategy into various processes and activities.

3-3. Step three: Identify and develop capabilities

At this stage, IT capabilities, IT systems, and specific IT infrastructure that support the implementation for each strategic process must be specified. Therefore, in this part a four-part approach is proposed. By using this approach, the key capability requirements of IT-based strategies can be determined.

3-1. Step one: Identify organizational strategies

A strategy is a method, approach or plan of action which includes how organizational resources, skills, tools and stakeholders across the value chain may be aligned and optimized to achieve the desired result or objective (Nadarajah & Sapkal, 2016). Strategic use of information technology and IT alignment with business needs are important management issues that need to be addressed (Renaud et al., 2016). Conceptually, strategic alignment is known as a bridge that links information technology to other areas of the organization and its environment (Jorfi et al., 2017). Therefore, business strategies must be aligned with IT strategies. Norton and Kaplan (2004) stated that a strategy map of alignment and integration promotes the enterprise strategy by presenting a reference common viewpoint. By using the strategy map, key processes that create the desired outcomes for customers and stakeholders can be identified. Information capital is considered one of the important issues in the strategy implementation which has been addressed in the strategy map formulation as well. According to Norton & Kaplan, information capital is databases, information systems, networks, and IT infrastructure of a company. In implementing a strategy based on the IT capabilities, paying attention to the information capital and alignment of information with the strategies of the organization are essential factors. Therefore, the information capital and its components must be identified and defined in the

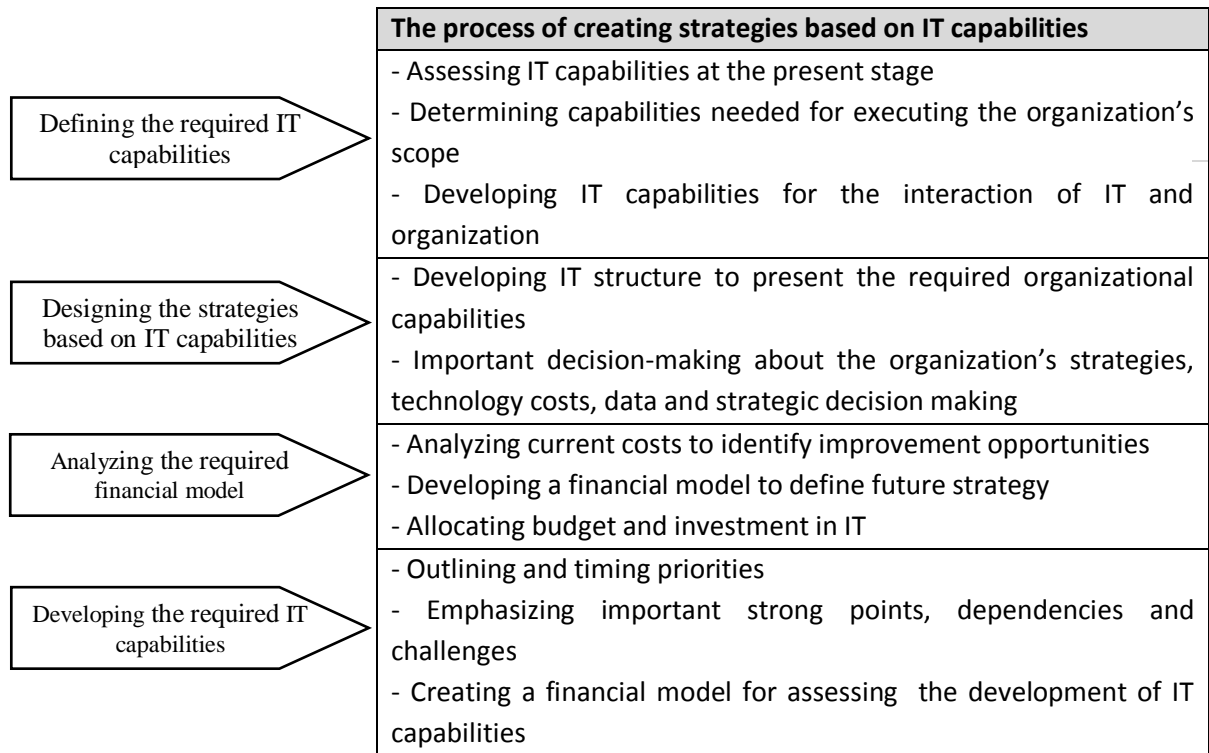


Figure 2. Key requirements of IT capability-based strategies



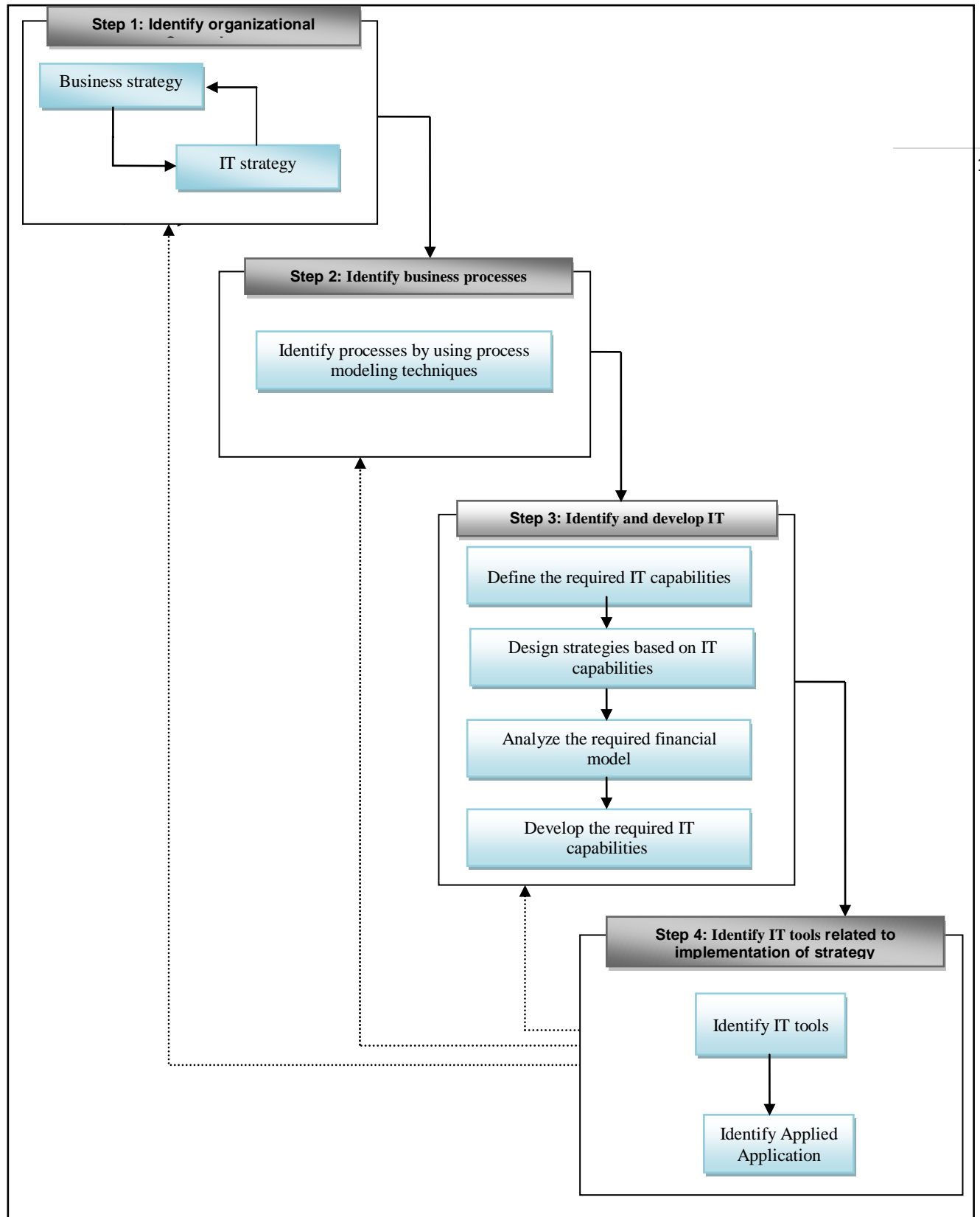


Figure 3. Roadmap offered to use IT capabilities regard to implementation process of strategy

process which is associated with long-term development and company growth. Therefore, it needs specific information and IT

3-4. Step Four: Identify IT tools

The strategy implementation process is the most important strategic management



maker may go back in each of the four steps above and, for example, changes in the pre-made hierarchy (Azar,2012).

AHP Model

Applying this method requires four main steps:

A) Modeling

In this step, the problem and purpose of decision-making are made in a hierarchy of decision elements that are interrelated. Decision elements include "decision indices" and "decision options". The analytical hierarchical process requires breaking a problem with several indicators into a hierarchy of levels. The high level represents the main goal of the decision-making process. The second level represents the major indicators that may be broken down into sub-indicators and more detailed at the next level. The final level offers decision options.

B) Preference judgments (paired comparisons)
Comparisons made between different decision options, based on each indicator, and judgments about the importance of the decision indicator by performing paired comparisons. After designing the decision hierarchy, the decision maker should create a set of matrices that are numerically important or measure the relative priority of the indices relative to each other and each decision option according to the indices relative to other options. This is done by making two-to-two comparisons between decision elements (paired comparisons) and by assigning numerical scores that indicate the priority or importance of the two elements of the decision. In order to do this, it is usually used to compare the options or indices i to the j options or indices. The table below shows how the indicators are valued relative to each other.

tools should be typically used for supporting management processes at this organizational level (Kovacheva, 2003). Therefore, at this stage, various IT tools that are used in strategy implementation and cover the needs of each IT capability are identified. According to what has been mentioned above, the roadmap for using IT capabilities with regard to the implementation of strategy is shown in figure 3.

4. Methodology

In this section, the AHP technique was used to provide a ranking of IT capabilities that was presented in 4 steps. For this purpose, a questionnaire consisting of the main steps and each of the steps presented in each step was sent to the experts and they were asked to do a paired comparison in order to rank steps and IT capabilities in every step.

The community of experts in this research consists of IT experts in the Central Bank of Iran, whose number is 10 people in terms of access to the researcher. These individuals were identified based on their work Experience, related knowledge and related work area at the Central Bank of Iran and in the IT department and were selected based on the access of the researcher to collaborate with them.

AHP technique

Generally, the method of analytical hierarchy process is based on the following four steps to decide on a specific problem:

- 1- Making a decision hierarchy
- 2- Calculation of weights
3. Calculate the adaptation rate
- 4- Choosing the best decision

Of course, it should be noted that the AHP approach in decision making is a dynamic and feedback-based approach and the decision



Table 2. Valuation of indices relative to each other

Preferred value	Comparison status i relative to j	explain
1	Equal importance	The option or index i has equal importance to j or do not have a preference for each other
3	Relatively more important	The i option or index is slightly more important than j
5	More important	The option or index i is more important than j
7	Much more important	The option or index i has a much higher priority than j.
9	Absolutely important	The option or index i is absolutely more important than j and is not comparable with j.
2,4,6,8	Interstitial values	The middle values indicate between preferential values, for example, 8 indicates an importance greater than 7 and lower than 9 for i.

D) The integration of relative weights

In order to rank the decision options, at this stage, we must multiply the relative weights of each element in the weight of the higher elements in order to obtain the final weight. By doing this for each option, the amount of final weight obtained.

5. Results

5-1. ranking the main steps

First, using the AHP technique, we ranked the main steps:

In this study, to determine the importance of the main steps in using IT capabilities, the ranking of these steps addressed so that executives are well aware of which stage is more fundamental to creating and implementing IT-based strategies.

C) Relative weights calculations

At this stage, the weight of the "decision elements" is determined in relation to each other through a set of numerical calculations. The next step in the analysis hierarchical process is to perform the computations necessary to determine the priority of each decision element using the information of the matrix of paired comparisons. The summary of mathematical operations at this stage is as follows.

First, we compute the sum of the numbers of each column of the matrix of paired comparisons. Then we divide each element of the column into the sum of the numbers of that column. The new matrix thus obtained called the "normalized comparison matrix". We compute the average of the numbers of each row from the normalized comparison matrix. This average provides the relative weight of decision elements with matrix rows.

Table 3. Average views of experts on the steps to create strategies based on IT capabilities

Steps to create capability	S ₁	S ₂	S ₃	S ₄
Defining the required IT capabilities	1	0.27419	0.46019	0.32071
Designing the strategies based on IT capabilities	3.647	1	3.237	2.883
Analyzing the required financial model	2.173	0.30892	1	0.45977
Developing the required IT capabilities	3.118	0.34686	2.175	1



The calculated compatibility rate is 0.03, which indicates the high compatibility of the experts' questionnaires. According to the comments, design strategies based on IT capabilities is of the utmost importance. Then the development of the required IT capabilities is important in the second phase. According to the experts, the analysis of the required financial model is in the third place and the definition of IT capabilities is in the fourth place. The ranking of the importance of each of the components is discussed further.

Table 4. The results of the ranking of the main steps using the AHP technique

Steps to create capability	S ₁	S ₂	S ₃	S ₄	Final Weight	Rank
Defining the required IT capabilities	0.101	0.142	0.067	0.069	0.378	4
Designing the strategies based on IT capabilities	0.367	0.518	0.471	0.618	1.974	1
Analyzing the required financial model	0.219	0.160	0.146	0.099	0.623	3
Developing the required IT capabilities	0.314	0.180	0.316	0.214	1.024	2

5-2. ranking the first stage steps

Table 5. Average views of experts in the process of defining IT capabilities

Definition of IT capabilities	S ₁₁	S ₂₁	S ₃₁
Developing IT capabilities for the interaction of IT and organization	1	0.7552	0.9562
Assessing IT capabilities at the present stage	1.324	1	1.027
Determining capabilities needed for executing the organization's scope	1.0457	0.9737	1

The calculated incompatibility rate is 0.002, which indicates the high compatibility of the experts' questionnaires in assessing the steps of this stage. According to the comments, determining capabilities needed for executing the organization's scope is most important and then the development of IT capabilities for the interaction of IT and organization is important in the second phase. According to experts, the assessing IT capabilities at the present stage is in the third place.

Table 6. Final results of the rating stage Definition of IT capabilities using the AHP technique

Definition of IT capabilities	S ₁₁	S ₂₁	S ₃₁	Final Weight	Rank
Developing IT capabilities for the interaction of IT and organization	0.297	0.277	0.321	0.894	3
Assessing IT capabilities at the present stage	0.393	0.366	0.344	1.104	1
Determining capabilities needed for executing the organization's scope	0.310	0.357	0.335	1.002	2

5-3. ranking the second stage steps

The calculated incompatibility rate is 0.00, which reflects the full compatibility of the experts' questionnaires. Based on the findings, developing IT structure to present the required organizational capabilities in the first place and Important decision-making about the organization's strategies, technology costs, data and strategic decision making are ranked second in the ranking of the design phase of strategies based on IT capabilities.



Table 7. Average comments of experts in the evaluation of the steps of design strategies based on IT capabilities

Design strategies based on IT capabilities	S ₂₁	S ₂₂
Developing IT structure to present the required organizational capabilities	1	1.235
Important decision-making about the organization's strategies, technology costs, data and strategic decision making	0.8097	1

Table 8. Results of the rating stage design strategies based on IT capabilities using the AHP technique

Design strategies based on IT capabilities	S ₂₁	S ₂₂	Final Weight	Rank
Developing IT structure to present the required organizational capabilities	0.553	0.553	1.105	1
Important decision-making about the organization's strategies, technology costs, data and strategic decision making	0.447	0.447	0.895	2

5-4. ranking the third stage steps

The calculated inconsistency rate is 0.045, which reflects the high compatibility of the experts' questionnaires. According to the findings, budget allocation and IT investment are the most important, and then the development of financial models to define future strategy in the second phase is important. According to the experts, analyzing current costs to identify improvement opportunities are in the third place.

Table 9. Average experts' opinions in assessing the stages of analysis of required financial models

Analyze the required financial model	S ₃₁	S ₃₂	S ₃₃
Analyzing current costs to identify improvement opportunities	1	0.9727	0.7315
Developing a financial model to define future strategy	1.028	1	0.8361
Allocating budget and investment in IT	1.367	1.196	1

Table 10. Results of the rating stage the analysis of the required financial models using the AHP technique

Analyze the required financial model	S ₃₁	S ₃₂	S ₃₃	Final Weight	Rank
Analyzing current costs to identify improvement opportunities	0.295	0.307	0.285	0.886	3
Developing a financial model to define future strategy	0.303	0.316	0.326	0.944	2
Allocating budget and investment in IT	0.403	0.377	0.389	1.170	1

5-5. ranking the Fourth stage steps

The calculated inconsistency rate is 0.023, which reflects the high compatibility of the experts' questionnaires. According to the comments, outlining and timing priorities are most important, and then creating a financial model for assessing the development of IT capabilities is important in the second phase. From expert's point of view, emphasis on important strong points, dependencies and challenges are in third place.



In this way, all steps taken to create IT capability-based strategies in organizations are weighed and ranked. Subsequent suggestions are presented based on the results.

Table 11. The average views of experts in evaluating the development of IT capabilities in implementing the strategy

the development of IT capabilities in implementing the strategy	S ₄₁	S ₄₂	S ₄₃
Outlining and timing priorities	1	1.382	1.177
Emphasizing important strong points, dependencies and challenges	0.7236	1	0.9470
Creating a financial model for assessing the development of IT capabilities	0.8496	1.056	1

Table 12. Final results of the rating stage the development of IT capabilities in implementing the strategy using the AHP technique

the development of IT capabilities in implementing the strategy	S ₄₁	S ₄₂	S ₄₃	Final Weight	Rank
Outlining and timing priorities	0.389	0.402	0.377	1.167	1
Emphasizing important strong points, dependencies and challenges	0.281	0.291	0.303	0.875	3
Creating a financial model for assessing the development of IT capabilities	0.330	0.307	0.320	0.957	2

answered with the help of IT capabilities, and by using them properly from a strategic point of view, an integrated system for identifying, managing and distributing of information resources can be established that guarantees the organization's future development and dynamism. Since strategic management uses information from all levels of the organization and the organization's environment, it can be said that any kind of IT capability that is available today can be used for the implementation of the strategy.

As already mentioned, in order to implement strategies (missions and goals) in an organization, these strategies must be transformed into processes (manifestations of strategies in processes). In order to implement processes, mechanized or manual systems can be used which show the necessity of using IT capabilities in the strategy implementation process.

Therefore, in this paper, after reviewing the literature and analyzing the indicators profoundly, we addressed the conceptual dimensions of the IT capabilities with regard

6. Conclusion

Using IT capabilities in organizations has had an evolutionary trend. Today, the use of IT capabilities has led to fundamental changes in business models as well as executive affairs in organizations in a way that processes and procedures of an organization are mixed with information technology. Alongside the evolution in IT applications, the process of strategy implementation has experienced transformation in organizations as well. Therefore, the long-term goals of an organization and the achievement of a competitive advantage that are the main objective of strategic management will not be realized unless short-term goals are properly implemented that require proper and timely implementation.

Today, successful managers do not just think about how to access information but they also emphasize the access to relevant, appropriate and distinct information. So, the faster and safer the information reaches the managers, the better the strategy will be implemented in an organization. This requirement can be



- Alexander, L. D. (1991). Strategy implementation: nature of the problem. *International Review of Strategic Management*, 2(1), 73-96.
- Allameh, S., M., Zare, S., M., & Davoodi, R.M. (2011). Examining the Impact of KM Enablers on Knowledge Management Processes, *World Conference on Information Technology*, *Procedia Computer Science* 33, 1211-1223.
- Aral, S. and Weill, P. (2007). 'IT assets, organizational capabilities, and firm performance: How resource allocations and organizational differences explain performance variation'. *Organization Science*, 18, 763–80.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, 17(1), 99-120.
- Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation'. *MIS Quarterly*, 24, 169–96.
- Bhatt, G. D. and Grover, V. (2005). 'Types of information technology capabilities and their role in competitive advantage: An empirical study'. *Journal of Management Information Systems*, 22, 253–77.
- Boynton, A. C., Zmud, R. W. and Jacobs, G. C. (1994). 'The influence of IT management practice on IT use in large organizations'. *MIS Quarterly*, 18, 299–318.
- Burlton, R. (2015), "Delivery business strategy through process management", in vom Brocke, J. and Rosemann, M. (Eds), *Handbook on Business Process Management 2, Strategic Alignment, Governance, People and Culture*, Springer-Verlag Berlin Heidelberg, available at: www.springer.com/978-3-642-45102-7/ (accessed 15 July 2015).
- Byrd, T. & D. Turner. (2000). measuring the flexibility of information technology infrastructure: Exploratory analysis of a

to implementation of the strategy. These dimensions include IT infrastructure capabilities, IT technical and skills capabilities, IT strategic capabilities, IT Communication capabilities and IT management capabilities. Then, with respect to these indicators, a 4-step roadmap was developed to use IT capabilities with regard to implementation of strategy including identifying organizational strategies, identifying business processes, identifying and developing IT capabilities, and identifying IT tools related to strategy implementation.

On the other hand, in this roadmap, the process of creating IT capability-based strategies was presented in four stages. In this regard, firstly, the IT capabilities of the organization are defined and identified. Then the strategies based on IT capabilities are designed, and after analyzing the costs and required financial models, the capabilities related to the implementation of the strategy are identified and developed.

Eventually, by using this presented roadmap, executives can monitor the strategy implementation in the organization and direct it. As a result, organizations will be able to implement their strategies correctly and use capabilities and IT tools efficiently and effectively to achieve the organization's strategic objectives. In addition, supporting the key decision-making processes, accessing strategic information (compatibility, accuracy, speed and accessibility), and investment proportional to the strategic goals and the removal or reduction of strategy implementation barriers will be other major consequences of using this roadmap by the strategic and executive managers.

References

- Aaltonen, P., & Ikävalko, H. (2002). Implementing strategies successfully. *Integrated Manufacturing Systems*, 13(6), 415-418.



- Hakim, A. (2011). Strategic planning and information technology. Tehran: University of Imam Hossein, (1th ed.).
- Hill, C. W. L., Jones, G. R., Galvin, P., & Haidar, A. (2007). Strategic Management: An Integrated Approach (2nd ed.). Australia: John Wiley & Sons.
- Hrebiniak, L. G. (2006). Obstacles to effective strategy implementation. *Organizational dynamics*, 35(1), 12-31.
- Hrebiniak, L. G. (2013). Making strategy work: Leading effective execution and change. Upper Saddle River, New Jersey: Pearson Education, Inc.
- Jauch, L.R. and W.F. Glueck. (1988). Business Policy and Strategic Management. New York: McGraw-Hill.
- Jiao, H. Chang, I. & Lu, Y. (2008). The relationship on information technology capability and performance: An empirical research in the context of China's Yangtze River delta region. In *Industrial Engineering and Engineering Management*. IEEE International Conference on (pp. 872-876).
- Jie, F., & Parton, K. A. (2009). Balanced Scorecard for Australian cattle producers: An Application. *Australasian Farm Business Management Journal*, 6(1), 27-39.
- Jorfi, S., Nor, K.M., & Najjar, L. (2017). An empirical study of the role of IT flexibility and IT capability in IT-business strategic alignment. *Journal of Systems and Information Technology*, <https://doi.org/10.1108/JSIT-10-2016-0067>.
- Kaplan R. & Norton D. (2004). *Strategy maps, converting intangible assets into tangible outcomes*, Harvard Business School Press, Boston, MA USA.
- Kaletka, A. (2013), Realizacja strategii (Strategy Implementation), Polskie Wydawnictwo Ekonomiczne, Wrocław.
- Kovacheva, T. (2003). Information technologies for strategic management. International Book Series "Information Science and Computing".pp.53-56.
- construct. *Journal of Management Information Systems*, 17(1): 167-208.
- Capon, N. & R. Glazer. (1987). Marketing and technology: a strategic co alignment. *Journal of marketing*, 51(3): 1-14.
- Chae, H.-C., Koh, C. E. and Prybutok, V. R. (2014). 'Information technology capability and firm performance: Contradictory findings and their possible causes'. *MIS Quarterly*, 38, 305–26.
- Copeland, Duncan G. & James L. McKenney. (1988). Airline reservations systems: lessons from history. *MIS quarterly*, 12(3): 353-71.
- Daft, R. L. (2008), *the New Era of Management*, Second Edition, Thomson South-Western Corporation, USA.
- Duncan N B. Capturing flexibility of information technology infrastructure: A study of resource characteristics and their measure. *Journal of Management Information Systems*, 1995, 12(2): 37-57.
- Epstein, M., & Manzoni, J.-F. (1998). implementing corporate strategy: From Tableaux de Bord to balanced scorecards. *European Management Journal*, 16(2), 190-203.
- Feeny, David F. & Leslie P. Willcocks. (1998). Re-designing the IS function around core capabilities. *Long Range Planning*, 31(3): 354-67.
- Galbreath, J. (2003). An overview of the role of information technology in strategic management: Part I. *Information Technology Management*, Vol. 2(4), 291-311.
- Garrison, G. Wakefield, R. L. & Kim, S. (2015). The effects of IT capabilities and delivery model on cloud computing success and firm performance for cloud supported processes and operations. *International Journal of Information Management*, 35(4), 377-393.
- Gottschalk, P. (1999), "Strategic information systems planning: IT strategy implementation matrix", *European Journal of Information Systems*, Vol. 8, pp. 108-18.



- <https://www.bptrends.com/the-business-capability-map-a-critical-yet-often-misunderstood-concept-when-moving-from-program-strategy-to-implementation/>
- Noble, C. H. (1999). The eclectic roots of strategy implementation research. *Journal of Business Research*, 45(2), 119-134.
- Nooreklit, H. (2000). The balance score card-a critical analysis of some of its assumption. *Management accounting research*, 11(1), 65-88.
- Nuroglu, H.H. (2016). Business Network Governance Structure and IT Capabilities, *Procedia - Social and Behavioral Sciences*. 229, 50 – 59.
- O'Brien, J. A. & Marakas, G.M. (2008). *Management Information Systems*, (8th Edition). Boston, Mass: McGraw-Hill Irwin, (chapter 1).
- Pirayesh, R., & Mousavizadeh, S.Z. (2017). The role of Strategic Information Systems in the process of organizational decision making. The 5th National Conference of Management, Economics and Accounting.
- Raps, A. (2005). Strategy implementation-an insurmountable obstacle? *Handbook of business strategy*, 6(1), 141-146.
- Ravichandran, T., & Lertwongsatien, C. (2005). Effect of information systems resources and capabilities on firm performance: A resource-based perspective. *Journal of management information systems*, 21(4), 237-276.
- Renaud A., Walsh I. and Kalika M. (2016), "Is SAM still alive? A bibliometric and interpretive mapping of the strategic alignment research field", *The Journal of Strategic Information Systems*, 25(2): 75-103.
- Ross, Jeanne W. & George Westerman. (2004). preparing for utility computing: The role of IT architecture and relationship management. *IBM Systems Journal*, 43(1): 5 19.
- Lee, T. W. Girolami, M. & Sejnowski, T. J. (1999). Independent component analysis using an extended informal algorithm for mixed sub Gaussian and super Gaussian sources. *Neural computation*, 11(2), 417-441.
- McNish, M. (2002), "Guidelines for managing change: a study of their effects on the implementation of new information technology projects in organizations", *Journal of Change Management*, Vol. 2 No. 3, pp. 201-11.
- Melville, N. (2010). Information Systems Innovation for Environmental Sustainability, *MIS Quarterly*, 34(1), 1-21. Ministry of Higher Education and Scientific Research. 2014. Private Universities in Iraq.
- Mendingling, J., Strembeck, M., Recker, J. (2012), "Factors of Process Model Comprehension — Findings from a Series of Experiments". *Journal Decision Support Systems*, volume 53, issue 1, pp.195-206.
- Mata, F. J., Fuerst, W. L. and Barney, J. B. (1995). 'Information technology and sustained competitive advantage: A resource-based analysis'. *MIS Quarterly*, 19, 487–505.
- Miller, A., & Dess, G. G. (1996). *Strategic Management* (2nd ed.): McGraw-Hill Inc.
- Miller, S., Wilson, D., & Hickson, D. (2004). Beyond Planning:: Strategies for Successfully Implementing Strategic Decisions. *Long range planning*, 37(3), 201-218.
- Mitchell, I., J., Gagne, M., Beaudry, A., & Dyer, L. (2012). The Role of Perceived Organizational Support, Distributive Justice and Motivation in Reactions to New Information Technology, *Computers in Human Behaviors*, 28, 729–738.
- Nadarajah, Sh. & Sapkal, A. (2016). The Business Capability Map: A critical yet often misunderstood concept when moving from program strategy to implementation. *BP Trend article*, available in:



- Rummler, A.G. and Brache, A.P. (2000), Podnoszenie efektywności organizacji (Improving Performance of an Organisation), Polskie Wydawnictwo Ekonomiczne, Warsaw.
- Salmela, H. and Spil, T.A.M. (2002), "Dynamic and emergent information systems strategic formulation and implementation", *International Journal of Information Management*, Vol. 22, pp. 441-60.
- Sanders, N. R. & Premus, R. (2005). Modeling the relationship between firm IT capability, collaboration, and performance. *Journal of Business Logistics*, 26(1), 1-23.
- Siddique, I., & Shadbolt, N. (2016). Strategy implementation literature review. Centre of Excellence in Farm Business Management.
- Toolsee, A. (2011). Successful criteria for implementing strategies within the banking industry, Masters Degree in business leadership, university of South Africa.
- Turban, E., & Turban, E, (2008). Information Technology for Management Transforming Organizations in the Digital Economy, (6th Ed). Hoboken, NJ: Wiley & Sons, Inc., (chapter 2).
- Weske, M. (2007), "Business Process Management: Concepts, Languages, Architectures, 1o ed. Springer-Verlag, Berlin Heidelberg.
- Wheelen, T. L., & Hunger, J. D. (2012). Strategic Management and Business Policy: Toward Global Sustainability (13th ed.). Boston, USA: Pearson/Prentice Hall.
- Yang L., Sun G., Eppler M. (2010) Making strategy work: A literature review on the factors influencing strategy implementation, *Handbook of Research on Strategy Process*. Cheltenham, UK: Edward Elgar Publishing.
- Zhang, M. (2005). Information Technology capability, organizational culture, and export performance, A dissertation submitted in partial fulfillment of the requirements for the degree of doctor of philosophy.

