



AN INVESTIGATION OF THE MODERATING EFFECT OF IT PERSONNEL CAPABILITY ON THE RELATIONSHIP BETWEEN INTANGIBLE IT RESOURCES AND IT INFRASTRUCTURE FLEXIBILITY ON THE SUSTAINABLE COMPETITIVE ADVANTAGES



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ABSTRACT

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IT personnel capabilities are regarded as the backbone of IS infrastructure and as the main top strategic issues among IT executives. The aim of this research is to explore the direct influence of Intangible IT Resources such as IT Knowledge Resources (ITKR), IT Relationship Resources (ITRR), and IT Governance (ITG) on Sustainable Competitive Advantages (SCA). The main question of this study is whether or not IT personnel capabilities are able to strengthen the relationship between VRIN resources such as (ITKR, ITRR, and ITG) and sustainable competitive advantages. Importantly, no published study has been examined this critical issue on how firms are able to generate VRIN resources that are the main driver of SCA. Thus, the objective of this research is to determine whether IT Personnel Capability has a direct and indirect effect (moderating role) in the relationship between intangible IT resources sustainable competitive advantages. This research will apply quantitative survey for collection data among IT senior managers of Algerian high-tech industry. Implications and suggestions will be discussed.

Contribution/ Originality: This paper is one of the pioneer investigations in IT/IS studies which addressed the effect of IT personnel capability as a dynamic capability for strengthening firms intangible strategic resources (i.e. IT knowledge resources, IT governance, and IT relationship resources) to be valuable, rare, inimitable and non-substitutable (VRIN) for sustainable competitive advantages.

1. INTRODUCTION

Successful leaders are more aware of IT benefits in managing such activities in an effective and efficient way at managerial and operational level. The effective and accurate diffusion of new IT-based business application offers considerable benefits where improve brand reputation to suit increasing customer perceptions, enhance cost flexibility, providing specific and accurate marketing channels, and thereby expanding business market penetration opportunities [1]. Due to the huge development in the era of ICT, a modern business based on IT-applications will enable firm's productivity, cost control, specific products based-customer needs, responsiveness flexibility, time delivery and hence this would lead to empowering an organization to maintain competitive advantages on long-

term among rivals [2]. IT studies indicated that the more successful diffusion of IT-based intangible resources, the more responsiveness to the business changes and customer needs, the more ensuring the survival and growth that resulted from the competitive advantage sustainability [3, 4].

Despite the success of some Algerian electronic firms and considerable progress that has been made in the industry through the high investment in IT projects so far, the high failure rate of IT investment still occurs and exists [5]. This negative image does not bode well for the fate of Algerian manufacturers particularly since Algeria has made several agreements with Union European countries and the Arab Maghreb countries which in turn place this industry to encounter fierce competition of European products that concentrated on quality, price, design, and durability where Algerian products unable to compete with these kinds of high-products services and quality [6]. To this end, the actual earnings that are expected to return from IT investment are unbelievable compared to the achieved earnings of most of the European manufacturing firms.

Importantly, investigation the critical role of IT-based intangible resources on SCA of Algerian electronic manufacturing is utmost important since this study is among with fewer IT research that examine the issue of the under-performance of Algerian manufacturing in line the introduction of new moderating variable in IS studies that deeply explain how the capability of IT staff would influence the existing resources to create new ones that ultimately becomes the main driver of SCA. To note, the relationship between IT/IS studies and SCA have been the focus of strategic scholars concerning the issue of SCA and its related debates such as the contradictory results, methodologies applied, definitions and operationalization of constructs, fragmentation of IT research, and nature of firms [3]. Again, the voice of doubt among scholars has been not stopped. In short, this study seeks to explore the overlooked relationship between intangible IT resources and SCA among strategic scholars which it has a great theoretical significance and serious practical value for assisting Algerian electronic firms to widely diffuse IT to gain sustainable competitive advantages.

Consequently, we proposed a theoretical model to conduct an empirical investigation for addressing what kind of relationship may occur between IT-intangible resources and IT infrastructure flexibility through the influence of IT personnel capability as a moderating factor toward generating SCA. Based on the prior IT/IS research, we argued that electronic firms that possess suitable IT staff would highly influence IT-based intangible resources which eventually lead to create SCA. The reasons behind the importance of IT staff is that they are valuable, rare, inimitable, non-substitutable hence suit VRIO framework of RBV [7] and thereby rivals unable the potential to understand the process of resource creation.

1.1. Problem Statement

This study questions whether flexibility of IT infrastructure and intangible IT resources have an influence on the sustainable competitive advantages (SCA) of Algerian high-tech industry. Is there any role of IT personnel capability as an enabler of these resources toward creating SCA? Measuring IT-based resources value in the modern advanced industry is quite complex and multidimensional issues as evidenced by the variety of results and its contradictory from study to another due to the difference of various contexts and methodologies applied [3, 8] and more recent studies [9-11]. Therefore, this study seek to test again the proposed IT dimensions in the context of developing country and within high-tech industry with introducing new moderating variable that expected to influence these resources and thereby will lead to generate SCA which in turn will provide further support for Resource-based View (RBV) and Dynamic Capability Theory (DCT) as the main theories that demonstrated the issue of sustainable competitive advantages achievement, and hence reduce the doubt among scholars in IT/IS research about the potentiality of RBV and DCT.

In order to measure and identify what kind of the relationship between several IT dimensions and SCA, considerable IT/IS research has been conducted among large firms and SMEs [3]. However, the majority of these studies emphasized the single dimension of SCA whereas other dimensions have overlooked [12]. Hence, this

research will bridge this gap through investigating the effect of these intangible resources on what kind of the sustainable competitive advantage that would be achieved and through what kind of the support that provided by IT personnel capability as a moderating factor (e.g., technical skills, business skills, and interpersonal skills) as an enabler strategic resources on the IT dimensions (e.g., IT knowledge resources, IT relationship resources, IT governance, connectivity, modularity, and compatibility) toward creating SCA?

Due to the huge development in the IT industry, no longer previous assumptions are useful in explaining the process on how these intangible resources would achieve SCA or not? So, prior IT/IS studies assumptions may not be convenient anymore due to the huge advanced in ICT [12]. However, examining how the modern organization achieves SCA is quite important since the dynamic of business operations witnessed huge changes at all levels especially within this new era of Industrial Revolution 4.0 (IR4).

In addition, IT/IS scholars do not agree whether IT personnel capability influence SCA or not since the topic is overlooked to investigate the direct relationship between IT personnel capability and SCA unless with few studies [13, 14] that test the effect of IT personnel on other IT dimensions (e.g., IT infrastructure flexibility, IT-business strategic alignment) where these last dimensions tend to be the main contributor to SCA [15, 16]. Furthermore, a number of IT studies [3, 16] indicates that IT personnel capability has a significant effect on the creation of intangible IT-based resources (e.g., knowledge resources, relationship resources) that become a major contributor of SCA.

The problem debated here is that what is the effect of IT personnel capabilities on the firm's resources and capabilities? In another hand, to what extent IT personnel capability will enable firm's intangible resources such as IT governance, IT knowledge, and IT relationship, IT connectivity, and IT modularity to create SCA? Lu and Ramamurthy [17] recommend scholars to deeply understand what kind of IT skills are needed for enabling IT infrastructure in the subsequent studies. To conclude, IT personnel capability is a strategic enabler resource for tangible and intangible IT-based resources that could be the key driver of SCA and significantly tend to play critical effect as a moderating factor on the empowerment of other organizational capabilities toward creating SCA.

1.2. Significance of the Study

In this new era of IR4.0, IT managers and top management more aware of the critical role of IT personnel within the firm hierarchy. Both RBV and IT executives they considered achievement of sustainable competitive advantages through IT-based resources is one of the major issues that encounter them. Thus, both chief executive officer and chief information officer are interested in enabling the capability of their IT personnel due to its important role in the achieving great alignment between firm strategy and IT-business strategy and empowering the firm IS infrastructure in order to be more flexible thereby suits business needs and customer fast changes, hence achieving the firm agility. The reasons behind the strong intention of IT managers is that they have depth understanding about the potential benefits will be returned from their distinctive IT staff such as flexibility of IT/IS infrastructure hence will directly lead to creating SCA. The more possessing suitable and valuable IT personnel capability, the more flexibility of operational, functional, and managerial levels of the organization and thereby the firm automatically would be distinctive from their rivals in terms of the value offered to the customer "products and services" [18, 19].

Several studies indicate that IT personnel capability have considerable role in the creation and developed new resources to be distinctive and this occurs through interaction with each other which lead to explore new intangible IT-based resources such as developed existing software, strategic IT planning system, CRM, SCM, ERP, and open software development as well as habit and learning among staffs which altogether formulate complex and ambiguous resources, and thereby competitors will never have the chance of duplication or even understand the strategy of capabilities creation. Based on the RBV approach, capabilities of IT personnel seen as distinctive, competency, knowledge and skills needed to supply IT services [20]. Technical skills of IT personnel capability

influence strategic agility to ensure easiness of strategic alignment success particularly since RBV looks to alignment as an internal intangible resource [14, 16].

Most of the prior studies [1, 3] have focused and deeply examined different IT-based resources on firm performance (ROA, growth, productivity, profitability, flexibility, NPD...etc.), yet very few studies if any have particularly emphasized the role of technical, business, and interpersonal skills of IT personnel might contribute to strategic alignment, the creation of intangible IT-resources, and enabling IS infrastructure toward generating SCA.

This research intends to delineate a new path between three intangible IT-based resources and SCA with moderating influence of IT personnel capability as well as assessing the nature of these relationships and their effects on the issue of SCA under investigation. To determine what kind of these skills that may contribute to intangible IT resources and flexibility of IT infrastructure in the context of developing country. Practically for entrepreneurs, this research illustrates the critical role of the distinctive capabilities that possessed by IT personnel on the exploitation and exploration of the firm intangible IT-based resources as well as to achieve better governance between IT leaders and firm strategy in line with the fast-business changes and customer needs.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Intangible IT Resources and Sustainable Competitive Advantage

IT/IS scholars through a variety of empirical investigations have found that IT-based resources as one of the main strategic weapons for successfully creating and maintaining competitive advantages [3, 18]. So far, management scholars still believed that competitive advantages that generated through IT use are short-term because of the availability of tangible IT resources everywhere and the easiness to be possessed by rivals which they will negatively affect corporation advantages and reduces the benefits of the implemented strategy [17]. Yet, very few studies have been examined the critical role of intangible IT resources in the creation and maintaining competitive advantages, hence this research looking to test the effect of these intangible resources that suit VRIN attributes on SCA which prior studies have been overlooked to address this crucial issue.

Scholars such as [3, 19] stressed that only those of IT-based intangible resources such as IT governance, IT relationship resources, and IT knowledge resources are the key driver and enabler for firms to achieve SCA. These intangible IT-based resources that were theoretically identified by prior scholars have been not been explored their effect on SCA and with very few empirical studies. Thus, this study intends to deeply address this critical issue which expected to provide strong evidence on the role and influence of these intangible resources on firm SCA. The reasons behind the importance of these intangible resources are taking a long time to be generated and developed, hence it becomes distinctive competencies where rivals completely unable to understand the process of resource creation which suiting VRIN attributes. Identifying which intangible resources and its influence on SCA would significantly assist managers in better decision making.

Generally speaking, there is a growing awareness among strategic scholars that manufacturers they are able to maintain intangible IT-based resources since suit VRIN attributes hence will lead to developing distinctive capabilities and thereby resulted in effective business operations where ultimately these distinctive competencies become the main driver of SCA. Prior IT/IS studies have explored variety of intangible IT-based resources such as IT governance, IT relationship resources, and IT knowledge resources as a strategic key sources for creating and maintaining competitive advantages [2, 3, 21]. Hence, we propose the following hypothesis:

Hypothesis 1: Intangible IT resources significantly influence firm's sustainable competitive advantage.

2.2. IT Infrastructure Flexibility and Sustainable Competitive Advantage

Several scholars indicated that IS flexibility has a great effect on the business operations and formulating distinctive capabilities that are the key input of SCA [10, 20, 22-24]. An empirical and conceptual IT/IS investigations [22, 23, 25, 26] stated that flexibility of IT/IS system is very crucial for a firm that looking to

generate and sustain their competitive advantages since this key strategic source provides a corporation with wide variety of strategic benefits such as enabling several IT hardware and software within business units, information flows across technological platforms, re-configuring technological devices as needed, upgrading IT applications to suit business changes which in turn lead to support the firm's core competency [27]. In a recent empirical study by Lu and Ramamurthy [17] found that flexibility of IT infrastructure among USA SMEs has a significant positive effect on sustainable advantages that are superior cost leadership, products quality, speed delivery, and design flexibility.

More importantly, one of the critical reasons behind the importance of ITIF as a strategic resource for SCA is that in the case of hardware is unsuitable to be linked with each other, deficiencies in the network, software unable to be upgraded or changed and thereby, rigidity will occur which in turn hinder the business operations at all levels resulting in increased costs, less responsiveness, unable to suit business changes and customer needs. In addition, considerable empirical investigations have addressed the critical role of ITIF on competitive advantages which majority of these studies have examined the effect of ITIF on single competitive advantages whereas investigating how ITIF would affect multidimensional of SCA is overlooked and utmost important for top-management [17]. Therefore, examining the effect of ITIF on SCA that will be measured in this study based on four dimensions will provide significant evidence in IT research. Based on the aforementioned findings on the benefits of IT/IS flexibility, it is simply understood since firms heavily investing on the IT infrastructure as it's expected by top-management decision makers regarding the value that would be generated. Hence, we hypothesize:

Hypothesis 2: IT infrastructure flexibility significantly affects sustainable competitive advantages.

2.3. IT Personnel Capability and Sustainable Competitive Advantage

Modern organizations have acknowledged that IT personnel capability as an important asset for achieving superior business performance. Due to their deep knowledge and strong skills in IT matter, IT professionals continuously solve business problems and absorb opportunities through deploying technological resources in order to suit business changes and ensure survival [3]. Importantly, IT chief deeply recognize that the major barrier to success is mostly related to human resources (employees) rather than to technology, information, and systems. Therefore, IT staff are required to possess suitable technical skills, enough business skills, and valuable interpersonal skills and it is mandatory for technical staff [14, 23].

Intangible IT resources lead to creates strategic benefits for the firms in several ways. So, in this sense, IT personnel that take a long time to acquire knowledge and skills concerning how to exploit and explore business opportunities through three main important skills is utmost significant [10]. So, in this research, the capability of IT personnel is defined as IT staffs that possess technical, business, and interpersonal skills which they are able to explore IT/IS related problems/opportunities, upgrading IT/IS system as needed, re-configuring IS system and exploiting business opportunities that associated with IT.

Critically, the importance behind the need for IT personnel capability to possess these varieties of skills because staff that have only technical skills unable to perform other tasks perfectly, which IT personnel should have a deep vision of business knowledge in order to identify opportunities associated with IT, following and selecting which IT trends need to be deployed, ensuring IT/IS systems are continuously upgrading, and finally seeking for business innovation that based on IT intangible resources [28]. Hence, business and interpersonal skills are important for successful IT personnel which allows them to coordinate and perform multi-faceted tasks associated with the effective diffusion of IT [18]. To conclude, the firms that have IT personnel capability with these three major skills (technical, business and interpersonal skills) is the main sophisticated factor for distinguishing successful sustainable competitive advantages [11].

Hypothesis 3: IT personnel capability is positively influenced sustainable competitive advantages.

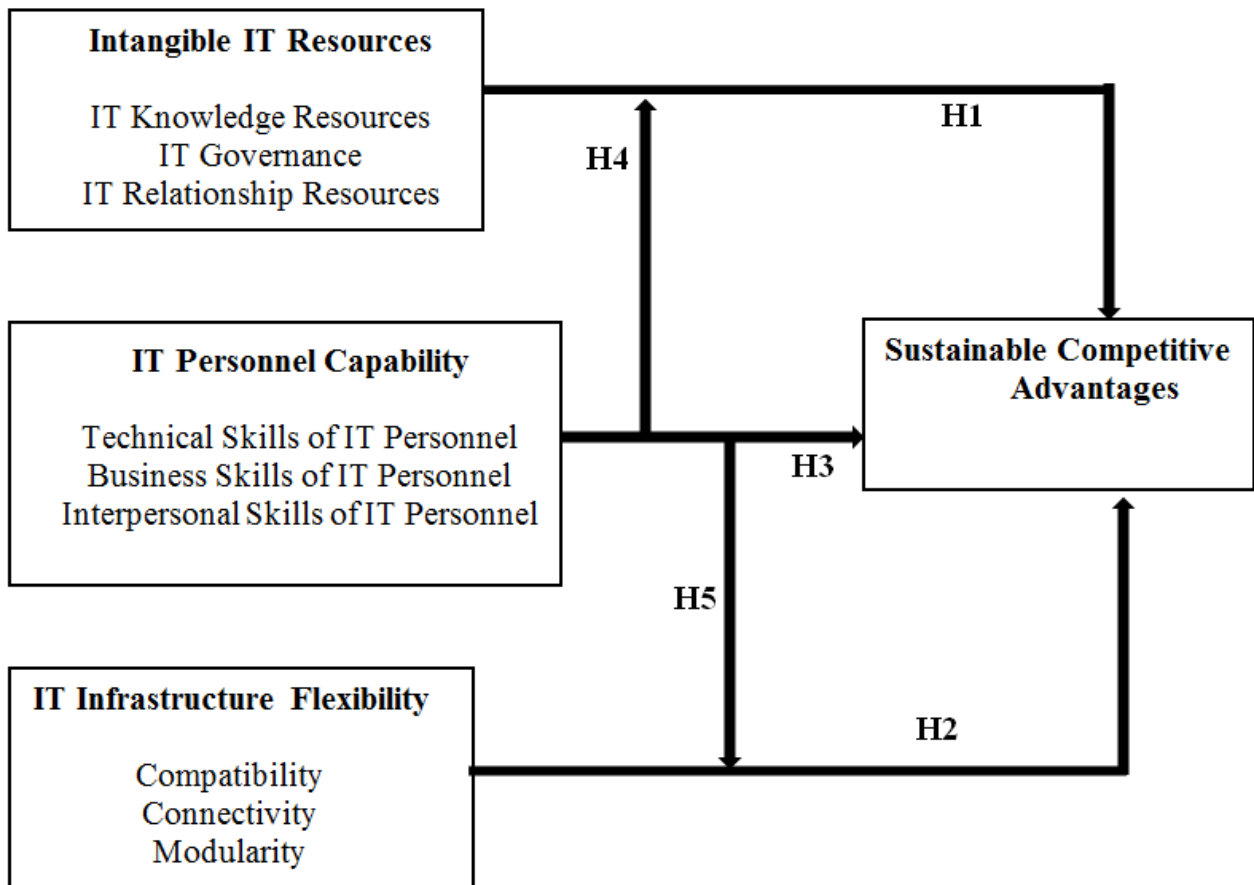


Fig-1. Research Model of the Study

2.4. Moderating Effect of IT Personnel Capability between Intangible IT Resources and Sustainable Competitive Advantage

Indeed, the firms that seeking to get value from IT are considerably relying on the suitable deployment of IT personnel within its business hierarchy. Hence, IT personnel capability is an important strategic input for the development of intangible IT-based resources such as knowledge resources creation, relationships among business units and IT managers, IT leaders and business strategy vision. Thus, to achieve these critical goals, they need to acquire deep technical skills, insightful managerial vision, and strong analytic and interpersonal skills [14].

Effective IT personnel are able to solve business problems in line with addressing opportunities that suit business trends through using inimitable IT intangible resources. The capability of IT personnel is generated through deep academic knowledge, the experience that accumulated over years, formal periodic training concerning IT matter, understanding business strategy and its related problems, ability to acquire new knowledge and creating a habit of learning within the business hierarchy [21]. Due to their long time of expertise, IT personnel they are not easy to be replaced and thereby suit the VRIN attributes of RBV. Thus, we argued that capability of IT personnel is the major contributor of SCA. Furthermore, in order to create SCA, intangible IT resources should be combined with other organizational capabilities and competencies. Following the argument above, examining intangible IT-based resources within the VRIO framework enable firms to discover whether or not these resources are a source of SCA [9] and if so, how to achieve it? Thus, which intangible IT resources create value for firms is not yet clear and understood [3]. Identifying what kind of intangible IT resources and its implications for creating SCA in this new era of industrial revolution 4.0 is utmost important and support top-management decision making. Strategically speaking, scholars and professionals considered intangible IT-based resources such as IT knowledge, IT business relationship, and IT governance as a valuable and inimitable asset which these intangible resources have a significant effect on business performance sustainability [2, 3, 29]. Hence, investigation the relationship

between IT personnel capability and IT knowledge resources, IT business relationship, and IT governance is yet to be explored. Also, knowing the effect of IT personnel capability on the knowledge creation and establishing business relationship is yet to be examined. Therefore, this study will bridge the emerged gaps in the literature by examining the effect of IT personnel on strengthen these three main intangible resources that are the major driver of SCA. Thus, the firms are able to create SCA over their rivals and ensure survival on a long-term. Hence, we proposed the following hypothesis:

Hypothesis 4: IT personnel capability is significantly moderate the relationship between intangible IT resources and sustainable competitive advantages.

2.5. Moderating Effect of IT Personnel Capability between IT Infrastructure Flexibility and Sustainable Competitive Advantage

IT executives have recognized that tracking, developing and training IT personnel as one of the main concern of top-management issues. Significant empirical studies have found that IT personnel plays important role in the successful deployment of IT resources which suggesting them to acquire technical, business and interpersonal skills in order to manage their tasks effectively and efficiently [11, 13]. Duncan stated that IT personnel might hinder or push forward the quality of other IT resources and this depends on the experience and knowledge in IT matter. Also, Duncan [22] argued that IT personnel and IT infrastructure flexibility are closely interrelated. Author [30] indicate that IT personnel capability serves as the backbone of IS infrastructure which links IT tangible resources to interact with other organizational resources to deliver IT services effectively. Therefore, this study hypothesizes that flexibility of IT infrastructure is highly influenced by the quality of IT personnel capability that possesses strong skills and knowledge in IT matter. Thus, we conceptualize IT personnel capability as a transformation mechanism that supports firms to converts its static input resources into a dynamic output of IT services which these capabilities of IT personnel contain deep knowledge and skills in IT for the successful conversion process. The more suitable and valuable IT personnel, the more superior flexibility of IS infrastructure, the more creating and sustaining considerable advantages over rivals.

In addition, one of the critical reasons behind the importance of ITIF as a strategic resource for SCA is that in the case of hardware is unsuitable to be linked with each other, deficiencies in the network, software unable to be upgraded or changed and thereby, rigidity will occur which in turn hinder the business operations at all levels resulting in increased costs, less responsiveness, unable to suit business changes and customer needs. Therefore, technical skills of IT personnel along with the business skills provide a firm to avoid IT infrastructure rigidity through re-configuring, upgrading and re-engineering IT infrastructure to be flexible and suit business changes which in turn leading to reduces cost, enhance responsiveness, and design flexibility [10]. Thus, we hypothesize:

Hypothesis 5: IT personnel capability is significantly moderate the relationship between IT infrastructure flexibility and sustainable competitive advantages.

3. METHODOLOGY

3.1. Sample and Data Collection

Based on the aforementioned IT/IS literature, a survey was designed to examine the critical issue of SCA in strategic management that often created by the strategic deployment of IT intangible resources and its integration with other organizational capabilities [3]. The majority of the measurement scales were adapted from the prior IT/IS literature. The instrument was pre-tested with five MIS academic professors and along with conducting semi-structured interviews with two IT managers which in turn provide respondents with the easiness of understanding and clarity of questions. The final questionnaire was formulated after reviewing and modifying the selected items by both professors and managers. Moreover, the researcher will attach a cover letter with each questionnaire explaining the importance of participation in this study which would increase the awareness of

respondent toward filling the survey properly. Contextually, this study will be held in Algerian context as prior studies [3, 31] strongly recommend for further investigation within developing countries. The population of this study covers Algerian private high-tech manufacturing. Senior IT managers will be targeted for collecting data to test the proposed hypotheses by distributing the questionnaire online and personal self-administered. Senior IT managers as a respondent's contain (directors of IT department and CIOs) which represent a suitable source of information concerning IT intangible resources and capabilities in an organization [15].

4. DISCUSSION AND CONCLUSION

This research seeks to address the relationship between intangible IT resources and IT capabilities toward creating sustainable competitive advantages through the moderating effect of IT personnel among Algerian high-tech industries. In addition, this research examines the causal relationships among IT intangible along with IT infrastructure flexibility on the SCA. In general, studies indicate that intangible IT resources have a significant effect on the firm's competitive advantages, so far what kinds of these intangible resources that would generate SCA is still overlooked. Thus, this study comes out to bridge this gaps as discussed above.

This research also would provide significant evidence to increase the awareness of IT executives about the effect of IT personnel on strengthen the flexibility of IS infrastructure which in turn they will be more engaged in applying IT innovation initiatives. So, the results of this research would assist and push forward IT personnel to continuously master and deploy IT practices, as well as the sustainable competitive advantages that provided by intangible IT resources should be investigated deeply by the theorists. Importantly, firms that seek to possess IT personnel in order to deliver IT solutions without having business strategy background unable to be valuable resources. Hence, exploring the strategic needs of the business along with IT might be the primary task that performed by IT personnel rather than using them to deliver solutions.

Additionally, previous studies have examined the role of intangible IT resources on SCA indirectly and separately from other organizational capabilities and thereby, the question raised here is how these intangible resources affect firms to create SCA is utmost important to understand the creation process. As well as the need to understand if there are factors that push forward these resources to create SCA is more crucial. Understanding the role of IT personnel capability on strengthen other resources and capabilities in order to generate SCA is strategically significant? To what extent the flexibility of IT infrastructure will be increased by the capability of IT personnel is important in order to allow firms to respond to business changes and customer needs as well as markets trends.

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