

# Management Principles for the Appraisal and Diffusion of Information Systems: Case of SMEs in Ghana

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## ABSTRACT

In this paper, the authors bring to light the issue of appraising and diffusing information systems by small and medium-scale enterprises (SMEs) in Ghana. The empirical data was gathered through an online questionnaire-based survey from 312 SMEs in Ghana. All these enterprises are registered members of the Association of Ghanaian Industries (AGI) and are confirmed users of information systems. The framework of the study is developed based on the approaches found in technology management literature: management principles for disruptive technology, information system strategy, technological decision making, and the technology acceptance models. The aim of the paper is to unearth management principles that allow SMEs in Ghana to appraise and diffuse information system successfully. They defined these principles through the comparison of known principles with the practiced principles of management of the small enterprises in Ghana and distilling the best management practices in information system appraisal and diffusion.

## KEYWORDS

Appraisal, Diffusion, Information System, Management Principles, SMEs

## INTRODUCTION

The popularity of information technology (IT) diffusion amongst Ghanaian small and medium scale enterprises (SMEs) has improved as a result of competition, globalization, and advancements in information technology (IT) (Coffie, Hongjiang, Mensah, Kiconco, & Simon, 2021; Pathan, Jianqiu, Akram, Khan, Latif, & Tunio, 2017). Following the initiative of Ghana as the first country in the

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Sub-Saharan region to introduce a cellular network in 1992, the world first biometric payment and settlement card (E-zwich) in 2008, and among the earliest countries to be connected to the internet with the introduction of ADSL broadband services, enterprises in the country irrespective of size, nature, and location have taken advantage of these developments to survive in their respective highly competitive markets. Statistically, more than 90% of all enterprises in Ghana operating across the different industries as of 2012 were classified either as small or medium scale in size (Amoah & Amoah, 2018). Synonymous with the critical role of SMEs in economic development globally (Acheampong & Hinson, 2019; Selase, Selase, Ayishetu, Comfort, Stanley & Ebenezer, 2019). Since these businesses play a crucial role in the economic development of the country, successive governments continually initiate technology policy reforms that aid these enterprises in competing locally and beyond. Nevertheless, questions yet persist concerning the ability of these SMEs to successfully diffuse information systems economically. The integration of information systems into the daily operations of SMEs promises operational excellence (Selase et al., 2019). However, the diffusion of IT by Ghanaian SMEs remains relatively low compared to SMEs in developed countries (Coffie et al., 2021; Yermack, 2018). This is occasionally attributed to the lack of technology education (Kubuga, Ayong & Bekoe, 2021; Boateng, Tetteh & Boateng, 2015), the perceived cost of diffusing IT (Oduro, 2020; Ocloo, Xuhua, Akaba, Addai, Worwui-Brown & Spio-Kwofie, 2018), and other infrastructural challenges owing to the rural location nature of SMEs in developing countries (Twi-Brempong, Gu, Oppong-Baah, Owusu, Gyamfi, Pinas & Owusu, 2019; Issahaku, 2012). Further, insufficient financial resources, lack of management expertise (Oduro, 2020; Quartey, Turkson, Abor, & Iddrisu, 2017), and uninformed capital investments decisions also contribute to the inability of these businesses to diffuse information systems (Kalane, 2015; Emezie, 2017). Therefore, given the fact that the diffusion of information systems is strategic in nature and begs the commitment of huge financial resources (Coffie et al., 2021; Oduro, 2020), proper appraisal and diffusion processes are required to reap the full benefits of any proposed system. Nevertheless, managerial inefficiencies, the lack of technology education, underwhelming human resources practices, and cost-cutting schemes inhibit the proper appraisal and diffusion of information systems in these SMEs (Al Busaidi, Bhuiyan & Zulkifli, 2019; Isensee, Teuteberg, Griese & Topi, 2020). This results in the diffusion of the wrong information system, bad user experiences, and difficulties in integrating existing business models. Therefore, to close this gap, the study proposes management principles and practices for the proper appraisal and diffusion of information systems in SMEs.

Several studies in Ghana concerning the diffusion of information systems in SMEs either focuses on; the benefits of diffusing information systems (Oduro, 2020; Selase et al., 2019; Ocloo et al., 2018), the challenges of diffusing information systems (Twi-Brempong et al., 2019; Issahaku, 2012), or the determinants of information system diffusion (Boateng, Ampong, Adam, Ofori & Hinson, 2020; Amoako, Sheng, Dogbe & Pomegbe, 2020). Thus, no studies are focusing on the development of a framework to help these SMEs properly appraise and diffuse information systems in the country. Consequently, this current study contributes uniquely to the literature by filling this significant research gap. To achieve this result, the study seeks answers to; what are the existing management practices of Ghanaian SMEs in the appraisal and diffusion of Information systems? And what is the best management practices required for the successful appraisal and diffusion of information system in SMEs? Using an online survey questionnaire, data is collected from 312 accidentally sampled SMEs in Ghana. The study results reveal that bigger SMEs are likely to follow proper management principles in the appraisal and diffusion of information systems. This suggests that the availability of sufficient resources plays a significant role in the decisions of these SMEs. Consequently, this study is significant to policymakers, industry practitioners and scholars because; (i) it assesses how the management of SMEs appraise and diffuse IS by looking at the connection between these separate but intertwined processes, (ii) proposes a framework for the successful appraisal and diffusion of IS in SMEs, and contributes theoretically to the diffusion of information systems in SMEs globally by challenging further inquiries into this framework. The diffusion of information system in enterprises

affect and changes the trajectory of the entire internal operations (Slim, Sarah, Kadhim, Ali, Hammood & Othman, 2021; Spanos, Prastacos & Poulymenakou, 2002). However, The cost of acquiring hardware, software, providing adequate security, communication as well as the training of personnel demands that management fully understands what they are doing in terms of technology management.

The remainder of the paper is organized as follows; first, the elaboration of the research framework employed for the conduct of the study. Next, the proposal of the framework for the management principles required in the successful appraisal and diffusion of information systems in SMEs. Then, the appraisal and diffusion methods employed by Ghanaian SMEs. Further, the management principles for the appraisal and diffusion of information systems in SMEs are discussed. Finally, the conclusion, limitations, and recommendations for future studies.

## **ELABORATION OF RESEARCH FRAMEWORK**

The age of technology is fast advanced and the ensuing results are evident for all to see. Enterprises thrive on the availability of accurate and timely information to support the successful integration of information systems to provide cutting-edge solutions in areas like supply chain, customer relations, and production management. Although information system diffusion provides numerous opportunities, different environmental factors affect the success of information system diffusion. For example, different countries have diverse technology diffusion levels because of the disparities in technology expertise. Again, enterprises belong to varied industries, have different levels of resources, and have management with dissimilar levels of qualifications. Consequently, these factors are pivotal to the successful appraisal and diffusion of information systems in enterprises. This study probes the existing management principles for the appraisal and diffusion of information systems in Ghanaian SMEs by using evidence from literature supported by empirical evidence from 312 surveyed SMEs and proposes a novel framework for the successful appraisal and diffusion of information systems in SMEs. Following, literature is examined from information system, information system strategy for SMEs, and drivers of information technology.

### **Information System Strategy for SMEs**

The diffusion of information systems by SMEs is a strategic issue requiring a set of intentionally planned activities that deliver expected results. These decisions demand the commitment of resources, and therefore must not be taken without proper deliberation. Enterprises exist with the primary purpose of profit-making and any capital investment undertaken by the enterprise requiring a substantial amount of funding should be categorized as strategic in nature. Current studies consider information system strategy pivotal in the enterprise planning process (Bai, Gao & Yin, 2021; Camagni, 2018; Puklavec, Oliveira & Popovič, 2018). Decisions taken by an enterprise not conforming to the mission and vision of that enterprise could be detrimental to performance in the long run. However, most SMEs by nature have strategic apprehensions concerning direction or purpose because the ownership structure of these enterprises does not allow for information sharing amongst stakeholders. This results in a negative response to the development of information system strategy by SMEs (Cruz-Jesus, Pinheiro & Oliveira, 2019; Camagni, 2018). The proper planning of information system diffusion in SMEs is critical because it is at the helm of products, processes, and customer satisfaction and there is the need for proper information system and enterprise strategy integration (Steiber, Alänge, Ghosh & Goncalves, 2020; Ntwoku, Negash & Meso, 2017). As reported by Zahra and Pearce (1990), Miles and Snow in 1978 propose four major enterprise typologies determinant to an enterprise willingness to adopt information system and the extent of diffusion. Enterprise with the prospector strategy tend to be first movers and are always willing to introduce new products (Wardoyo, Iriani & Kautsar, 2018), defenders prefer to be efficient in serving their current market, analyzers have a combination of prospector and defender traits and may be comfortable with their current market (Ngo, 2021). However, enterprises adopting the reactor strategy may ignore an opportunity and only act when there

is a critical concern (Skafi, Yunis & Zekri, 2020). While prospectors, defenders, and analyzers tend to favor technology initiation, reactors do not (Skafi et al., 2020; Wardoyo et al., 2018). Following this, Levy and Powell (2000) developed a refined trilogy of information system strategy framework after considering Walsham's (1993), themes for information system strategy. See figure 1.

- **Enterprise Context:** Information system strategy should be viewed from the perspective of enterprise strategy, enterprise objectives, and enterprise environment. The enterprise strategy aims at achieving competitive advantage and an information system strategy identifies specific information systems required to make an organization competitive (Lu, Pishdad-Bozorgi, Wang, Xue & Tan, 2019; Al Busaidi et al., 2019; Neirotti, Raguseo & Paolucci, 2018). Enterprise objectives are specific targets that an enterprise seeks to achieve and this also drives the type of information system that can deliver results (Budiarto, Prabowo & Herawan, 2017). Finally, the enterprise environment is dynamic, competitive, and ever-changing and management must consider the nature of the environment in which the enterprise exists to decide on the best information system that can cope with changing demands of the environment (Neirotti et al., 2018).
- **Enterprise process:** The enterprise process is a set of value-adding activities bundled to produce products or provide services. Thus, the identification of key value-adding processes within the enterprise with the help of value chain analysis is crucial to the achievement of organizational objectives (Neirotti et al., 2018). This determines the specific type of information system to be acquired in support of specified activities. A decision on what type of information technology, when to acquire the technology, and whom to operate the technology can be made after the identification of the key value-adding processes (Moh'd Anwer, 2019). However, there should be a continual review of an information system to determine the ability to support key activities within the organization Paré, Trudel, Jaan & Kitsiou, 2015).
- **Strategic Content:** Growth and performance is the key motivation behind many enterprise decisions (Cruz-Jesus et al., 2019). Thus, analyzing the role of information system diffusion in the long-term growth and performance of the enterprise helps in diffusion decision. Although, the role of information systems in major enterprise activities delivering the final products or services of the enterprise should be analyzed, significantly, the expected financial returns from the diffusion should also be considered together with any bottlenecks which may arise with the implementation of the information system (Skafi et al., 2020).

Figure 1. Information system strategy for small enterprises (Source: Levy & Powell, 2000)



## Drivers of Information Technology Diffusion

Technology investments predominantly favor bigger firms given the total resource commitment required (Cho & Linderman, 2020). Although the diffusion rate of information technology in small and medium-sized enterprises has gained much popularity over the past decade because of the age of globalization and competition (Coffie et al., 2021), information systems diffusion amongst SMEs still lags behind bigger firms (Stoneman & Karshenas, 2018). Theoretically, individual-level diffusion of technology is supported by the technology acceptance model (TAM), the Theory of reasoned action (TRA), and the theory of planned behavior (Ajzen, 2020).). However, at the firm level, the Technological-Organizational-Environmental (TOE) Framework propounded by (Depietro, Wiarda & Fleischer, 1990), provides a theoretical background to the factors affecting diffusion of technology in enterprises. The theory provides that the diffusion of technology in an enterprise should be observed from technological context, organizational context, and environmental context (Cruz-Jesus et al., 2019). Following, Thong (1999), provides an integrated model for the diffusion of information systems in SMEs and identified the following as major drivers; CEO's characteristics like knowledge level of technology, level of innovativeness, and level of education (organizational context) (Ramdani, Raja & Kayumova, 2021; Usman, Ahmad & Zakaria, 2019). The relative advantage, compatibility, and complexity of the information system (technological context) (Abed, 2020). Enterprise size, the skill level of employees, and environmental issues like competition (Environmental context) (Ramdani, Raja & Kayumova, 2021). Further, Giotopoulos, Kontolaimou, Korra, and Tsakanikas (2017), advances the integrated model and provide that; *technology competence*- the ability of an organization to scan and monitor the environment to take advantage of ongoing technology developments play a critical role in the diffusion of technology (Ramdani et al., 2021). Therefore, the skills of the research and development (R&D) team, the innovativeness of CEOs, and employees influence an enterprise's ability to adopt the technology. Further, consistent with Thong's (1999) innovativeness of CEOs and knowledge on technology, the more formalized the organization in terms of research and development, the higher the likelihood of technology diffusion (Sağlam, 2018). *Human Capital*-the quality of employees in an organization influences both technology diffusion and the extent of diffusion. The unavailability of qualified personnel inhibits technology diffusion or increases the cost of technology implementation due to the cost of recruiting and training new personnel (Thong, 2001). *Internal Organization*- organizational structure and culture affect technology diffusion. Change opposing and centralized systems hamper the extent of technology diffusion. Therefore, organizations operating decentralized systems are likely to diffuse technology because knowledge sharing and creation are central to technology diffusion (Kiil, Hvolby, Trienekens, Behdani & Strandhagen, 2019; Podrug, Filipović & Kovač, 2017). *Environmental and Firm*-the operating environment of an enterprise is key to technology diffusion, less competition amongst rival firms affects the extent of technology diffusion. The size of the enterprise together with the location also influences the magnitude of technology diffusion. Bigger firms have the resources to acquire new technology compared to smaller firms. See figure 2.

## A FRAMEWORK TO INVESTIGATE THE APPRAISAL AND DIFFUSION OF INFORMATION SYSTEMS IN SMES

Illustrated by (Bucher, Birkenmeier, Brodbeck & Escher, 2003), in their framework for the evaluation of disruptive technology; technology evaluation comprises initiation, scanning, valuation, and implementation. The study develops a novel four-stage framework following literature on information system strategy and drivers of information technology. The expansive framework is depicted in figure 4.

Figure 2. Drivers of IT adoption (Source: Giotopoulos et al. 2017)

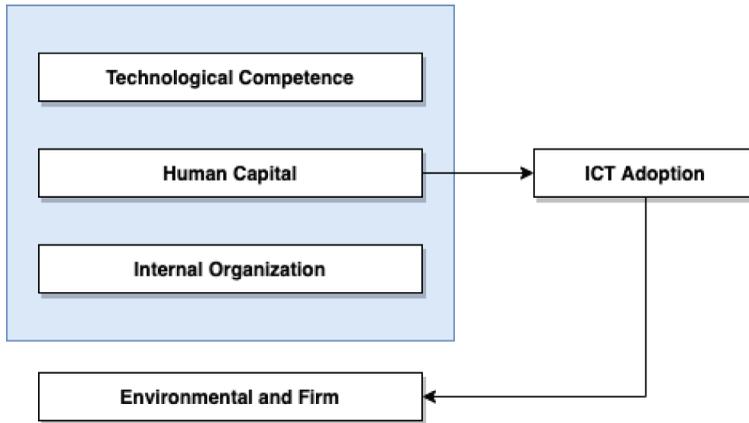


Figure 3. Framework for evaluating disruptive technologies (Source: Bucher et al., 2003)

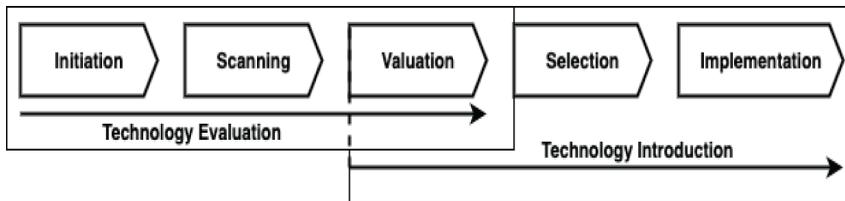
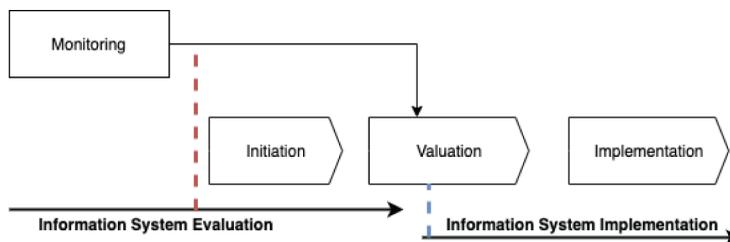


Figure 4. A framework for the appraisal and adoption of information systems in SMEs (Source: Authors Construction)



## Monitoring

This stage is where information is gathered on the potential areas where information should employ to benefit the firm. Information system planning is strategic in nature, thus, the availability of adequate information is key to the selection of the perfect system. Consequently, enterprises need to gather sufficient information on both the internal and external environment (Amoako et al., 2020; Spanos et al., 2002). *First*, an enterprise should be aware of its internal strengths and weaknesses (internal environment) and the opportunities and threats (external environment). As pointed by Earl (1993) information systems should respond to changes in the enterprise environment. *Secondly*, the availability of information on new and emerging technologies is vital in supporting the technology diffusion decisions of firms (Neirotti et al., 2018). Thus, SMEs should employ appropriate tools to constantly scan the environment for these key clues.

## Initiation

This is where a conscious decision is made to acquire an information system to address an organizational challenge. The ability to deduce meaning from available information to propose an appropriate strategic solution is essential for enterprises. Management's decision to acquire an information system could be triggered under two scenarios, the availability of information or a constitutive provocation which is organized and intentionally programmed to generate ideas on the information system requirements of the organization (Vargo, Akaka & Wieland, 2020). Thus, motivated employees can participate, create and share knowledge to stimulate discussions on technology diffusion (Kiil et al., 2019; Podrug, et al, 2017). However, management can also decide randomly on acquiring information systems without any underlying information. SMEs favor the centralized system where the CEO is responsible for most of the decisions so the CEO's level of knowledge on technology and level of education can be pivotal to the initiation process (Coffie et al.,2021).

## Valuation

This stage focuses on the cost-benefit analysis of the proposed information system. The comparison of the proposed and existing systems is fundamental to the diffusion of information systems (Ramdani et al., 2021). Matching the proposed system with the enterprise strategy, identification of key enterprise processes and efficiency of the system in achieving stated objectives should be critically considered (Usman et al., 2019). The question of whether to buy off the shelf or build in-house arises at this stage and management need to make the right call. This stage is seen as a critical stage because the inaccurate evaluation of the system could result in financial loss to the enterprise (Al Busaidi et al., 2019). Valuation considers the long-term benefit of the information system to the organization's survival, performance, and profitability. There should be a fit between the enterprise strategy and the information system to deliver the expected results.

## Implementation

Implementation is the final stage required to integrate the information system into the enterprise processes (Lu et al., 2019; Usman et al., 2019). This could take a radical or an incremental approach. Choosing any of these approaches is subject to the skill level of employees in the enterprise. Firms with unskilled labor require training or hiring of new qualified personnel to be able to introduce new technology. Thus, incremental diffusion is preferable under such circumstances. However, enterprises with skilled labor can integrate information systems into enterprise processes faster and further (Dilu, Gebreslassie & Kebede, 2017; Almalki, Al-fleit & Zafar, 2017). However, beyond implementation, there is a need for evaluation. This process of evaluation ensures that the implemented system functions according to required standards.

## THE APPRAISAL AND DIFFUSION OF INFORMATION SYSTEM BY SMES IN GHANA

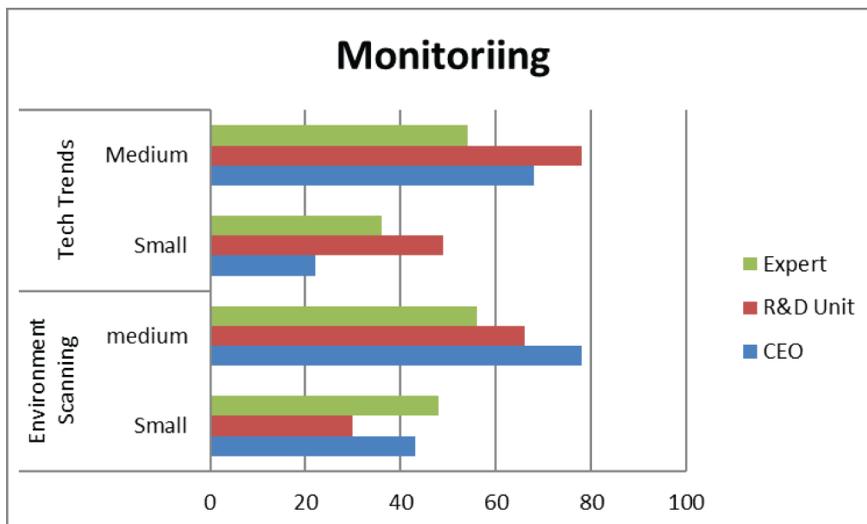
The study employs the descriptive approach to understand the existing management practices in Ghanaian SMEs. Therefore, the framework in figure 4 is applied to 312 accidentally sampled SMEs registered with the Association of Ghanaian Industries. These are SMEs using information systems in their daily operations and are willing to partake in the survey. First, the survey instrument is designed into four distinct sections covering monitoring, initiation, valuation, and implementation. Second, the survey is pretested with 10 randomly selected SMEs to ensure that the instrument is free from errors. The final revised instrument is administered online via email. The chief executive officers (CEOs) of the SMEs were the chosen respondents for the study. This decision is as a result of the fact that most SMEs in the country depends solely on the CEOs for major decision. In all, a total of 312 duly completed survey responses were generated between December 2019-March 2020. Although

we made follow-up calls to generate more responses, most of the SMEs were unwilling to participate and some email IDs were inactive. The data collected was cleaned to eliminate incomplete surveys, coded, and analyzed into graphical visualization with excel to provide insight into the practices of appraisal and implementation of information systems by SMEs in Ghana. The aim is to find the existing practices of these SMEs concerning information system diffusion. This helps to understand the gaps existing between the proposed framework and the practices of these SMEs For consistency, the graphical evidence is classified as per our adopted framework.

### Monitoring

The decision to invest in an information system per literature requires extensive analysis of the enterprise and other external factors (Bai et al., 2021; Ngo, 2021; Abed, 2020; Ocloo et al., 2018). The result depicted in figure 5 shows that; monitoring of the environment is undertaken by three key groups, CEOs, R&D, and experts. This is consistent with the findings of (Giotopoulos et al., 2017), to suggest the significance of these groups in monitoring the business environment in SMEs. However, medium-size SMEs in Ghana are likely to undertake environmental scanning and technology trend monitoring. This affirms the result of (Thong, 1999). Specifically, technology trend monitoring is mostly undertaken by the R&D group followed by CEOs and experts. Undeniably, because R&D is responsible for the development of new products and services, it explains their active involvement in the monitoring of technology trends (Kyakulumbye & Pather, 2021; Yoo, Lee & Jun, 2018). Empirically, Ghanaian SMEs’ management structure will power to CEOs (Quartey, Turkson, Abor, & Iddrisu, 2017), and this explains why they rank higher behind R&D concerning technology trend monitoring. However, the least involvement of experts in the monitoring of technology trends is explained by resource inadequacy (Gbandi & Amissah, 2014). Further, CEOs are found to be actively involved in general environmental scanning compared to the R&D and experts. The gap between their involvement in technology trend monitoring and environmental scanning could be explained by the fact that CEOs have more knowledge about general business management than the management of technology. The active involvement of CEOs, experts, and R&D in the monitoring of technology trends and environmental scanning signify the practicality attached to the running of SMEs in Ghana.

Figure 5. The monitoring practices of SMEs in Ghana (Source: Survey data, 2020)



## Initiation

The acquisition of information systems in Ghanaian SMEs depends either on the availability of information or a random act. Per the results in figure 6, medium-size enterprises in Ghana are likely to initiate the acquisition of information systems based on information acquired from the environmental scanning and technology trend monitoring. This is consistent with the resource based-view of innovation diffusion (Quartey et al., 2017). Further, medium-size enterprises, rely more on information provided by experts than R&D and the CEO. This reliance on experts in decisions relating to the initiation to acquire information systems could be explained by possibly the lack of expertise within the enterprises (Slim et al., 2021; Fatoki, 2014). In smaller enterprises, management relies mostly on R&D and CEOs to initiate the decision to acquire information systems because of the lack of resources. On the other hand, results prove that management initiating the acquisition of information systems randomly is usually led by CEOs. Remarkably, medium-size enterprises have a higher possibility of initiating the acquisition of information systems randomly than smaller enterprises. This could be explained by the high dependency on CEOs in the decision-making processes of SMEs in Ghana. This is rooted in the fear of delegation, competition, or the potential loss of trade secrets.

## Valuation

The valuation of the proposed information system in Ghanaian SMEs as per figure 7 revolves around the cost of acquiring the information system and the expected returns from the system integration. Although all the attributes of valuation are not considered by these Ghanaian SMEs, the result is consistent with the findings of (Wardoyo et al., 2018) to surmise that SMEs are particular about the cost of acquisition when it comes to valuation. SMEs of all sizes have a high tendency of valuing information systems on the cost of acquisition due to the need to minimize expenses. Like Quartey et al. (2017) point, SMEs have limited resources unlike bigger firms, and therefore, the cost associated with information systems becomes paramount in decision making. Further, the result indicates that CEOs play a critical role in the valuation of information systems based on the cost of acquisition. Again, this explains that the management structure of SMEs in Ghana favors autonomy in decision-making. On the other hand, the data provides that, SMEs consider the valuation of information systems on the cost of acquisition before the expected returns from the system. While the cost and expected

Figure 6. The initiation practices of SMEs in Ghana (Source: Survey data, 2020)

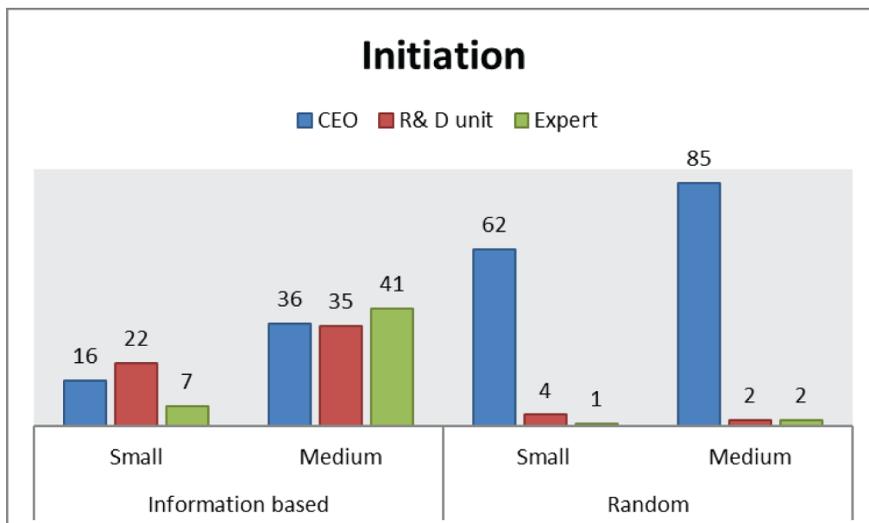
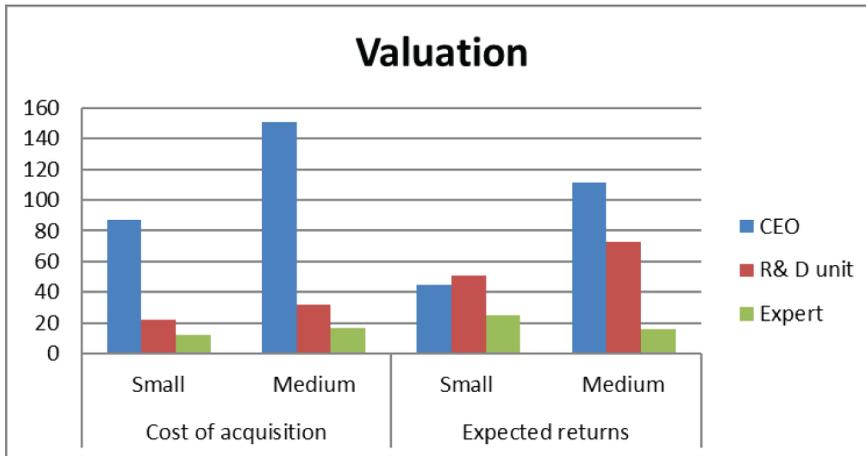


Figure 7. The valuation practices of SMEs in Ghana (Source: Survey data, 2020)

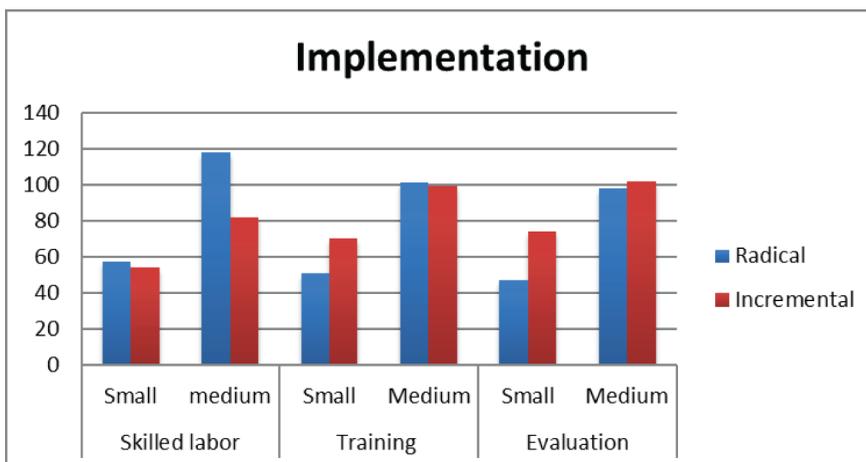


returns must be considered simultaneously, the valuation of the information system on expected returns involves the participation of the R&D and experts more than CEOs. This could be explained by the fact that the valuation of the information system on the expected returns requires relatively higher skills than the evaluation of the cost of acquisition.

### Implementation

Integrating the acquired information system into the processes of the Ghanaian SMEs as per the results in figure 8 could take two forms; radical or incremental implementation (Bai et al., 2021; Nguyen, Lei, Vu & Le, 2019). Both smaller and bigger SMEs are likely to use any of these two methods depending on existing conditions. This is consistent with the implementation of information systems (Le, Lei, Le, Gong & Ha, 2020; Nguyen et al., 2019) in businesses of all sizes. The result shows that SMEs with skilled labor prefer the radical approach in integrating information systems into the business processes. This is evidence in the findings of Dilu et al. (2017). Contrary to the outcome of Dilu et al. (2017), enterprises with employees requiring training show little distinction between the radical

Figure 8. The implementation practices of SMEs in Ghana (Source: Survey data, 2020)



and incremental approaches to the implementation of information systems. Ghanaian SMEs prefer the radical approach of integrating information systems because of the need to minimize the cost of recruiting new employees with the required skills or training existing employees. However, smaller SMEs are likely to use the incremental implementation method compared to relatively bigger firms.

## **MANAGEMENT PRINCIPLES FOR THE APPRAISAL AND DIFFUSION OF INFORMATION SYSTEMS BY SMES IN GHANA**

Management principles proven significant for the successful appraisal and diffusion of information systems in Ghanaian SMEs are proposed based on the literature, the developed framework, and the empirical evidence analyzed from the 312 surveyed SMEs. Therefore, these principles have a broader theoretical basis applicable beyond SMEs located in Ghana.

### **Monitoring**

SMEs operate within a specific environment. This means that the actions of SMEs are affected by elements of the environment. Per the survey outcome, although environmental scanning and technology trend monitoring is undertaken by SMEs in Ghana, smaller enterprises are less active in this process, however, experts play a more active role in this process. This reveals managerial inefficiencies in these SMEs. Therefore, per our framework and management perspective, environmental scanning should be a systematic collation and interpretation of both internal and external data significant to the identification of opportunities and threats crucial to the survival of an enterprise. While SMEs are resource-constrained, compromising on environmental scanning renders an enterprise uninformed leading to misguided policies. SMEs with environmental awareness respond well to changes in the environment by making strategic decisions dependent on facts. The diffusion of information systems in SMEs involves a substantial commitment of funds, therefore, SMEs with much information can prevent investment in white elephants. Deciding to diffuse customer relationship management system (CRM), supply chain management system (SCM), accounting information system (AIS), and or an enterprise resource planning (ERP) greatly depends on the opportunities available for the enterprise to exploit or pending threats which could be neutralized with the diffusion of a specific information system (Bai et al., 2021; Ramdani et al., 2021; Neirotti et al., 2018; Budiarto et al., 2017). Thus, irrespective of the size of the SMEs and resource availability, management should prioritize both internal and external environmental factors in decisions concerning information system diffusion.

### **Initiation**

The decision to acquire an information system should be related to an opportunity to solve a challenge in the business. Therefore, the initiation to acquire an information system to support the activities of an enterprise should be strategic in nature. Per the result, SMEs in Ghana initiate the acquisition of information systems based randomly or based on information availability. However, the decision of some SMEs to initiate the acquisition of information systems randomly reveals managerial inefficiencies and the lack of environmental scanning activities. This suggests that if the monitoring stage of the framework is not fulfilled, there is a high likelihood that these SMEs would initiate decisions randomly. Although the result proves that some SMEs depend on experts, from the managerial perspective, this decision is strategic in nature and should go through all the strategic processes required in arriving at the best alternative. This presupposes that randomly made initiations to acquire information systems by SMEs fail to meet the criteria of strategic decision making. Practically, top management is responsible for strategic decisions, and although experts and motivated employees can be drafted to provide support occasionally, management should be central to this decision-making process (Isensee et al., 2020; Lu et al., 2019; Bucher et al., 2003). Consequently, there must be a constitutive provocation that is organized and intentionally programmed to generate

ideas on the information system requirements of the organization. This process should be directly linked to the monitoring stage to ensure that the initiation is feasibly warranted.

## **Valuation**

All types of decisions are resource-constrained. Every enterprise exists primarily for profit or wealth maximization, therefore, capital investments should yield positive returns on investment. The results from the study depict that SMEs in Ghana consider the total cost to be invested in the proposed information system more than the expected return. This proves that managers are unable to estimate the strategic importance of information systems concerning return on investment. While this seems normal for SMEs because of their resource constraints, from the managerial perspective, return on investment is key to the valuation of any capital investment. While the initial cost of acquisition could be higher, the expected output of the system could surpass this figure in several ways. Therefore, aside from estimating the appropriateness of the information system in meeting the objectives of the enterprise, SMEs can adopt the internal rate of returns (IRR) to ascertain the rate of returns excluding the risk of inflation, the cost of capital, and other forms of financial risk or the net present value (NPV) to determine the series of cash flow which can be generated from the information system. This can influence the decision to buy off-shelf or develop in-house to avoid the financial burden on the enterprise (Kyakulumbye & Pather, 2021; Shahzad, Abdullatif, Ikram & Mashkoor, 2017). Management of SMEs should consider other aspects of valuation like the compatibility of the information system and the overall long-run expected returns. The initial capital outlay should not be the only deciding factor in choosing an information system, therefore, experts should be engaged to estimate the system's potential.

## **Implementation**

The inability to successfully implement an information system after acquisition could lead to heavy financial loss to SMEs. Thus, the final integration of an information system into an enterprise is crucial to the success of the said system. Consequently, ineffective integration leads to extra costs to the enterprise. Per the result of the study, SMEs in Ghana use both the radical and incremental approaches in integrating information systems. Randomly deciding to use radical or the incremental approach of implementing information systems reveals managerial inefficiencies in Ghanaian SMEs. From a management perspective, the integration of information systems is strategic in nature requiring proper human resource planning. SMEs should assess the skill levels of their employees to determine the level of training required to successfully integrate the information system. Further, the human resource planning of SMEs can be designed to recruit and select employees with basic or adequate knowledge in the use of information systems. This reaffirms the significance of the monitoring stage to assess the internal strength and weaknesses of the organization concerning human capital. The four stages of the framework are heavily interrelated and skipping any of these could be detrimental. Finally, irrespective of the mode of integration and the skill level of employees, management should undertake a constant evaluation of the implemented information system to ensure the effectiveness of operations.

## **CONCLUSION**

The study proposes a framework of management principles for the successful appraisal and diffusion of information systems in Ghanaian SMEs. Although the study focuses on Ghanaian SMEs, the theoretical basis of the study places the findings in a wider perspective and thus challenges future studies in different geographical locations. Most of the SMEs in Ghana follow specific guidelines in the appraisal and diffusion of information systems, however, the over-reliance on CEOs could be catastrophic. Management, experts, and committed employees are key players in the successful appraisal and diffusion of information systems. Therefore, theoretically, this framework provides

detailed guidelines to support future information system decisions. The four-stage framework is developed around SMEs' strategy, resources, environment, and technology trends.

Environmental scanning is crucial to the successful appraisal and diffusion of information systems in Ghanaian SMEs. However, the framework proposes that SMEs in Ghana desist from overlying on CEOs to perform environmental scanning duties. Management should involve committed employees, experts, and the research and development department in the execution of this task. Further, the recruitment and selection policies of SMEs should focus on attracting and hiring employees with expertise in this area. Finally, management should attend seminars and training programs to acquire knowledge on the industry trend.

The successful initiation to acquire an information system in Ghanaian SMEs is highly dependent on the outcome of the environmental scanning stage (monitoring). The framework proposes that the decision to acquire any information system should be information-based. First, the financial and human resource capacity of the SMEs should be considered (strengths and weaknesses). Second, the position of the SMEs concerning the external environment should be evaluated (opportunities and threats). This decision should be made consciously by CEOs, management, committed employees, or experts. Management of these SMEs should avoid uninformed information system acquisition decisions.

Valuation of an information system is linked to the monitoring and initiation stages. Irrespective of the cost of acquisition, the purpose of the information system should fit into the business strategy. Although most SMEs in Ghana focus only on the cost element of valuation, management should value an information system on three critical premises; First, the compatibility of the information system with the overall business strategy. Second, the initial cost of acquisition and maintenance, and third, the expected return on investment. Experts or employees with expertise in this area should be involved by the SMEs to provide an accurate valuation.

Finally, the successful execution of the implementation depends on the other stages. Better environmental scanning, initiation, and valuation would prepare the SMEs for a seamless implementation. The framework recommends incremental implementation for SMEs requiring training and retraining of employees. However, SMEs with highly skilled employees can opt for the radical approach. Nonetheless, aside from human resources, adequate investment should be made to acquire the right infrastructure to support the implementation and future maintenance. For example, a standby generator should be acquired to address the unstable power supply issues in the country.

## **LIMITATIONS AND RECOMMENDATIONS FOR FUTURE STUDIES**

The study addresses a significant issue crucial to the success of SMEs in Ghana. It provides a framework outlining management principles needed for the successful appraisal and diffusion of information systems in Ghanaian SMEs. While is novel, the study acknowledges a limitation that could be addressed in future studies to validate the study outcome or provide a different perspective. First, the study employs an online survey questionnaire to gather data from 312 SMEs. This limited the study because most of the emails went unanswered. Thus, future studies could employ observation or face-to-face interview methods of data collection. Second, Future studies should assess the success or failure of post information system diffusion based on our proposed framework. Again, the analysis of the data is descriptive (visualiazation). Although this provides evidence of the views of the respondents, further studies should explore this phenomenon with methods like structural equation modelling (SEM), or binary logistic regression.

## REFERENCES

- Abed, S. S. (2020). Social commerce adoption using TOE framework: An empirical investigation of Saudi Arabian SMEs. *International Journal of Information Management*, 53, 102–118. doi:10.1016/j.ijinfomgt.2020.102118
- Acheampong, G., & Hinson, R. E. (2019). Benefitting from alter resources: Network diffusion and SME survival. *Journal of Small Business and Entrepreneurship*, 31(2), 141–158. doi:10.1080/08276331.2018.1462620
- Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, 2(4), 314–324. doi:10.1002/hbe2.195
- Al Busaidi, N. S., Bhuiyan, A. B., & Zulkifli, N. (2019). The Critical Review on the Adoption of ICTs in the Small and Medium Enterprises (SMEs) in the Developing Countries. *International Journal of Small and Medium Enterprises*, 2(2), 33–40. doi:10.46281/ijsmes.v2i2.437
- Almalki, M., Al-fleit, S., & Zafar, A. (2017). Challenges in Implementation of Information System Strategies in Saudi Business Environment: A Case Study of a Bank. *International Journal of Computer Trends and Technology*, 43(1), 56–64. doi:10.14445/22312803/IJCTT-V43P108
- Amoah, S. K., & Amoah, A. K. (2018). The role of small and medium enterprises (SMEs) to employment in Ghana. *International Journal of Business and Economics Research*, 7(5), 151–157. doi:10.11648/j.ijber.20180705.14
- Amoako, T., Sheng, Z. H., Dogbe, C. S. K., & Pomegbe, W. W. K. (2020). Effect of internal integration on SMEs' performance: The role of external integration and ICT. *International Journal of Productivity and Performance Management*. Advance online publication. doi:10.1108/IJPPM-03-2020-0120
- Bai, B., Gao, J., & Yin, W. (2021). Demand China strategy and Chinese Firm Performance: Role of IT Analytic Capability and Product Life Cycle. *International Journal of Information Systems and Supply Chain Management*, 14(4), 26. doi:10.4018/IJISSCM.2021100105
- Boateng, H., Ampong, G. O. A., Adam, D. R., Ofori, K. S., & Hinson, R. E. (2020). The Relationship between social interactions, trust, business network, external knowledge access, and performance: A study of SMEs in Ghana. *VINE Journal of Information and Knowledge Management Systems*. Advance online publication. doi:10.1108/VJIKMS-05-2020-0088
- Boateng, J. K., Tetteh, I., & Boateng, J. (2015). *Managerial and Usage Challenges Associated With the E-Zwich Payment System in Ghana*. University of Ghana. <http://197.255.68.203/handle/123456789/7534>
- Bucher, P., Birkenmeier, B., Brodbeck, H., & Escher, J.-P. (2003). Management principles for evaluating and introducing disruptive technologies: The case of nanotechnology in Switzerland. *R & D Management*, 33(2), 149–163. doi:10.1111/1467-9310.00289
- Budiarto, D. S., Prabowo, M. A., & Herawan, T. (2017). An integrated information system to support supply chain management & performance in SMEs. *Journal of Industrial Engineering and Management*, 10(2), 373–387. doi:10.3926/ijem.2180
- Camagni, R. (2018). Functional integration and locational shifts in new technology industry. In *High Technology Industry and Innovative Environments* (pp. 48–64). Routledge. doi:10.4324/9781315149769-3
- Cho, Y. S., & Linderman, K. (2020). Resource-based product and process innovation model: Theory development and empirical validation. *Sustainability*, 12(3), 913. doi:10.3390/su12030913
- Coffie, C. P. K., Hongjiang, Z., Mensah, I. A., Kiconco, R., & Simon, A. E. O. (2021). Determinants of FinTech payment services diffusion by SMEs in Sub-Saharan Africa: Evidence from Ghana. *Information Technology for Development*, 27(3), 539–560. doi:10.1080/02681102.2020.1840324
- Cruz-Jesus, F., Pinheiro, A., & Oliveira, T. (2019). Understanding CRM adoption stages: Empirical analysis building on the TOE framework. *Computers in Industry*, 109, 1–13. doi:10.1016/j.compind.2019.03.007
- Depietro, R., Wiarda, E., & Fleischer, M. (1990). The context for change: Organization, technology and environment. *The Processes of Technological Innovation*, 199(0), 151-175.

- Dilu, E., Gebressie, M., & Kebede, M. (2017). Human Resource Information System implementation readiness in the Ethiopian health sector: A cross-sectional study. *Human Resources for Health, 15*(1), 1–10. doi:10.1186/s12960-017-0259-3 PMID:29262832
- Earl, M. J. (1993). Experiences in strategic information systems planning. *Management Information Systems Quarterly, 17*(1), 1–24. doi:10.2307/249507
- Fatoki, O. (2014). The Causes of the Failure of New Small and Medium Enterprises in South Africa. *Mediterranean Journal of Social Sciences, 5*(20), 922–927. doi:10.5901/mjss.2014.v5n20p922
- Gbandi, E. C., & Amissah, G. (2014). Financing options for small and medium firms (SMEs) in Nigeria. *European Scientific Journal, 10*(1), 327–340.
- Giropoulos, I., Kontolaimou, A., Korra, E., & Tsakanikas, A. (2017). What drives ICT adoption by SMEs? Evidence from a large-scale survey in Greece. *Journal of Business Research, 81*, 60–69. doi:10.1016/j.jbusres.2017.08.007
- Isensee, C., Teuteberg, F., Griese, K. M., & Topi, C. (2020). The relationship between organizational culture, sustainability, and digitalization in SMEs: A systematic review. *Journal of Cleaner Production, 275*, 122–944. doi:10.1016/j.jclepro.2020.122944
- Kent Baker, H., Kumar, S., & Rao, P. (2017). Financing preferences and practices of Indian SMEs. *Global Finance Journal, 1*–16.
- Kiil, K., Hvolby, H. H., Trienekens, J., Behdani, B., & Strandhagen, J. O. (2019). From Information sharing to information utilization in food supply chains. *International Journal of Information Systems and Supply Chain Management, 12*(3), 85–109. doi:10.4018/IJISSCM.2019070105
- Kubuga, K. K., Ayong, D. A., & Bekoe, S. (2021). Ghana's ICT4AD policy: Between policy and reality. *Digital Policy, Regulation & Governance, 23*(2), 132–153. doi:10.1108/DPRG-02-2020-0020
- Kyakulumbye, S., & Pather, S. (2021). Understanding ICT adoption amongst SMEs in Uganda: Towards a participatory design model to enhance technology diffusion. *African Journal of Science, Technology, Innovation and Development, 1*–12. doi:10.1080/20421338.2020.1802843
- Le, P. B., Lei, H., Le, T. T., Gong, J., & Ha, A. T. (2020). Developing a collaborative culture for radical and incremental innovation: The mediating roles of tacit and explicit knowledge sharing. *Chinese Management Studies, 14*(4), 957–975. doi:10.1108/CMS-04-2019-0151
- Levy, M., & Powell, P. (2000). Information systems strategy for small and medium sized enterprises: An organisational perspective. *The Journal of Strategic Information Systems, 9*(1), 63–84. doi:10.1016/S0963-8687(00)00028-7
- Lu, H., Pishdad-Bozorgi, P., Wang, G., Xue, Y., & Tan, D. (2019). ICT implementation of small-and medium-sized construction enterprises: Organizational characteristics, driving forces, and value perceptions. *Sustainability, 11*(12), 3441. doi:10.3390/su11123441
- Moh'd Anwer, A. S. (2019). Towards better understanding of determinants logistical factors in SMEs for cloud ERP adoption in developing economies. *Business Process Management Journal, 25*(5), 887–907. doi:10.1108/BPMJ-01-2018-0004
- Neirotti, P., Raguseo, E., & Paolucci, E. (2018). How SMEs develop ICT-based capabilities in response to their environment: Past evidence and implications for the uptake of the new ICT paradigm. *Journal of Enterprise Information Management, 31*(1), 10–37. doi:10.1108/JEIM-09-2016-0158
- Ngo, Q. H. (2021). How market orientation induces small businesses' performance: The role of strategic fits. *Gadjah Mada International Journal of Business, 23*(1), 55–75. doi:10.22146/gamaijb.60623
- Nguyen, M. A. T., Lei, H., Vu, K. D., & Le, P. B. (2019). The role of cognitive proximity on Supply chain collaboration for radical and incremental innovation: A study of a transition economy. *Journal of Business and Industrial Marketing, 34*(3), 591–604. doi:10.1108/JBIM-07-2017-0163
- Ntwoku, H., Negash, S., & Meso, P. (2017). ICT adoption in Cameroon SME: Application of Bass diffusion model. *Information Technology for Development, 23*(2), 296–317. doi:10.1080/02681102.2017.1289884

- Ocloo, C. E., Xuhua, H., Akaba, S., Addai, M., Worwui-Brown, D. K., & Spio-Kwofie, A. (2018). B2B E-commerce Adoption amongst manufacturing SMEs: An Evidence from Ghana. *Australian Journal of Economics and Management Sciences*, 8(1).
- Oduro, S. (2020). Exploring the barriers to SMEs' open innovation adoption in Ghana: A mixed research approach. *International Journal of Innovation Science*, 12(1), 21–51. doi:10.1108/IJIS-11-2018-0119
- Paré, G., Trudel, M. C., Jaana, M., & Kitsiou, S. (2015). Synthesizing information systems knowledge: A typology of literature reviews. *Information & Management*, 52(2), 183–199. doi:10.1016/j.im.2014.08.008
- Pathan, Z. H., Jianqiu, Z., Akram, U., Khan, M. K., Latif, Z., & Tunio, M. Z. (2017). Innovation-diffusion determinants of cloud-computing adoption by Pakistani SMEs. *Human Systems Management*, 36(3), 197–209. doi:10.3233/HSM-171794
- Podrug, N., Filipović, D., & Kovač, M. (2017). Knowledge sharing and firm innovation capability in Croatian ICT companies. *International Journal of Manpower*, 38(4), 632–644. doi:10.1108/IJM-04-2016-0077
- Puklavec, B., Oliveira, T., & Popovič, A. (2018). Understanding the determinants of business intelligence system adoption stages: An empirical study of SMEs. *Industrial Management & Data Systems*, 118(1), 236–261. doi:10.1108/IMDS-05-2017-0170
- Quartey, P., Turkson, E., Abor, J. Y., & Iddrisu, A. M. (2017). Financing the growth of SMEs in Africa: What are the constraints to SME financing within ECOWAS? *Review of Development Finance*, 7(1), 18–28. doi:10.1016/j.rdf.2017.03.001
- Ramdani, B., Raja, S., & Kayumova, M. (2021). Digital innovation in SMEs: A systematic review, synthesis and research agenda. *Information Technology for Development*, 1–25. doi:10.1080/02681102.2021.1893148
- Sağlam, B. B. (2018). ICT diffusion, R&D intensity, and economic growth: A dynamic panel data approach. *Journal of the Knowledge Economy*, 9(2), 636–648. doi:10.1007/s13132-016-0353-0
- Selase, A. M., Selase, A. E., Ayishetu, A. R., Comfort, A. D., Stanley, A., & Ebenezer, G. A. (2019). Impact of technology adoption and its utilization on SMEs in Ghana. *International Journal of Small and Medium Enterprises*, 2(2), 1–13. doi:10.46281/ijsmes.v2i2.382
- Shahzad, B., Abdullatif, A. M., Ikram, N., & Mashkoo, A. (2017). Build software or buy: A study on developing large scale software. *IEEE Access: Practical Innovations, Open Solutions*, 5, 24262–24274. doi:10.1109/ACCESS.2017.2762729
- Skafi, M., Yunis, M. M., & Zekri, A. (2020). Factors influencing SMEs' adoption of cloud Computing services in lebanon: An empirical analysis using toe and contextual theory. *IEEE Access: Practical Innovations, Open Solutions*, 8, 79169–79181. doi:10.1109/ACCESS.2020.2987331
- Slim, A., Sarah, O., Kadhim, K., Ali, B., Hammood, A., & Othman, B. (2021). The effect of information technology business alignment factors on performance of SMEs. *Management Science Letters*, 11(3), 833–842. doi:10.5267/j.msl.2020.10.019
- Spanos, Y. E., Prastacos, G. P., & Poulmenakou, A. (2002). The relationship between information and communication technologies adoption and management. *Information & Management*, 39(8), 659–675. doi:10.1016/S0378-7206(01)00141-0
- Steiber, A., Alänge, S., Ghosh, S., & Goncalves, D. (2020). Digital transformation of industrial firms: An innovation diffusion perspective. *European Journal of Innovation Management*, 24(3), 799–819. doi:10.1108/EJIM-01-2020-0018
- Stoneman, P., & Karshenas, M. (2018). The diffusion of new technology: extensions to theory and evidence. In *New Technologies and the Firm* (pp. 177–200). Routledge. doi:10.4324/9781351120586-9
- Thong, J. Y. (1999). An integrated model of information systems adoption in small businesses. *Journal of Management Information Systems*, 15(4), 187–214. doi:10.1080/07421222.1999.11518227
- Twi-Brempong, C., Gu, H., Oppong-Baah, T., Owusu, I., Gyamfi, E., Pinas, J., Kim, E., Nsful, A. A., Boateng, F. A., Ofosu, D., Nketiah, E., Adjei, M., Fianko, S. K., Gyamerah, K. K., & Owusu, J. A. (2019). The Impact of Access to Electricity on E-Commerce Adoption in Ghanaian SMEs, an Empirical Analysis. *Open Journal of Business and Management*, 8(01), 245–261. doi:10.4236/ojbm.2020.81015

- Usman, U. M. Z., Ahmad, M. N., & Zakaria, N. H. (2019). The Determinants of Adoption of Cloud-Based ERP of Nigerian's SMES Manufacturing Sector Using Toe Framework and Doi Theory. *International Journal of Enterprise Information Systems*, 15(3), 27–43. doi:10.4018/IJEIS.2019070102
- Vargo, S. L., Akaka, M. A., & Wieland, H. (2020). Rethinking the process of diffusion in Innovation: A service-ecosystems and institutional perspective. *Journal of Business Research*, 116, 526–534. doi:10.1016/j.jbusres.2020.01.038
- Walsham, G. (1993). Interpreting Information Systems in Organizations. *Organization Studies*, 15, 269.
- Wardoyo, D. T. W., Iriani, S. S., & Kautsar, A. (2018). Adoption of e-commerce, entrepreneurship orientation mediated by business strategy on the performance food industries. *International Journal of Civil Engineering and Technology*, 9(5), 896–902.
- Yoo, H. S., Lee, C., & Jun, S. P. (2018). The characteristics of SMEs preferring cooperative research and development support from the government: The case of Korea. *Sustainability*, 10(9), 3048. doi:10.3390/su10093048
- Zahra, S. A., & Pearce, J. A. II. (1990). Research Evidence On The Miles-Snow Typology. *Journal of Management*, 16(4), 751–768. doi:10.1177/014920639001600407

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