



Journal of Enterprise Information Management

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Article information:

To cite this document:

Sunday C. Eze, Vera C. Chinedu-Eze, (2018) "Examining information and communication technology (ICT) adoption in SMEs: A dynamic capabilities approach", Journal of Enterprise Information Management, Vol. 31 Issue: 2, pp.338-356, <https://doi.org/10.1108/JEIM-12-2014-0125>

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Examining information and communication technology (ICT) adoption in SMEs

A dynamic capabilities approach

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Abstract

Purpose – Since the 1980s, a substantial number of theories have contributed extensively to information and communication technology (ICT) adoption. Much of such theories regarded ICT adoption as a one-off action as they specifically focus on factors affecting decision making at one decision point. They tend to play down on the fact that as adoption decision progresses through stages, they are supposedly influenced by the same or different factors. Therefore, the purpose of this paper is to examine the dynamic process of ICT adoption using the concepts of dynamic capabilities.

Design/methodology/approach – This study used qualitative approach to gain in-depth insight into the dynamic and evolutionary process of emerging information and communication technology (EICT) adoption in UK small service SMEs. Unstructured and semi-structured interviews were conducted in two separate rounds with 26 participants drawn from Crunch Online Data Base and Luton Business Directory. The participants were selected from a sample of 65 drawn from extended classification of professional service businesses proposed by Ramsey *et al.* (2008). They include managers, government agencies, SMEs consultants and IT vendors; and then purposeful random sampling and snowball sampling were used.

Findings – The study developed a framework from the concept of dynamic capabilities and found that using the concept of dynamic capabilities to examine the process of EICT adoption helps to unveil the recursive nature of the process and how the factors vary at both single and multiple stages of adoption.

Research limitations/implications – This study is limited by its focus and other factors. Studying the opinions of small service UK SMEs limits the power of generalizing the identified causal relationships; therefore, extended measures are required on accounts of environmental, cultural, geographical and sectoral differences. While some errors seemed unavoidable when measures appear subjective and prone to common error biases, the study advised on recognizing the over-riding influence of the factor(s) at each stage of the adoption process in order to be proactive in committing resources.

Originality/value – This work focuses on emerging ICT adoption in SMEs from the dynamic and evolutionary process perspective using the concept of dynamic capability. It advances ICT adoption research by developing a framework to depict that ICT is not a one-off event, rather it is dynamic and interactive in nature and factors influencing adoption vary from one stage or the other.

Keywords Dynamic capabilities, Adoption, Emerging ICT, Small service SMEs

Paper type Research paper

1. Introduction

Information and communication technology (ICT) adoption study is often considered as one of the most mature streams in information systems (IS) research (Brown *et al.*, 2010). This is explained by the availability of cognate theories (e.g. Ajzen and Fishbein, 1980, Davis, 1989; Rogers, 1983; Thong, 1999; Tornatzky and Fleischer, 1990), which have been applied in different contexts. Although considerable ICT adoption studies used traditional and utilitarian theories, the diversity of such studies in terms of theory and methodology is low (Eze *et al.*, 2014). McAfee (2006) accused most adoption studies of relying so much on

The initial version of this paper was presented at the 2013 UK Academy of Information System Conference, Oxford, London, UK.



determinism as if ICT adoption is predictable, straightforward, static and one-off event devoid of uncertainties. Often the theories focus on factors affecting adoption decision at one decision point and under-mind the interplay of the same or different factors as decisions progress (Eze *et al.*, 2011, 2014; Eze, 2013). Scholars assume that most prominent adoption theories are techno-economic and deterministic (Lawrence, 2010; Al-Natour and Benbasat, 2009; Benbasat and Zmud, 2003); they focus attention extensively on distinct roles and some stable characteristics of technology with the least attempt to handle the growing complexities of organizational life.

Therefore, to bridge the deterministic and utilitarian conceptualization of most classical theories, further research is urgently needed to provide insight into the socio-economic dynamic process of emerging information and communication technology (EICT) adoption and how factors influencing adoption vary from one stage to another as adoption decision progresses bearing in mind the ingrained challenges of the different stages of the adoption process. Adoption is dynamic and ongoing and thus, small businesses are supposedly more strategic in their ICT adoption decisions while recognizing the interplay of changing, but complex and multiple, environmental factors. Thus, providing a single definition of EICT, perhaps in the context of large firms, would be inherently problematic. EICT in this context is defined in a broad term to mean any new ICT development or improved ICT applications, including time tracking devices, customers and operations information, knowledge management systems, document management systems and mobile devices. Further, most previous studies in this area focus on realist ontology, positivist epistemology, deductive approach and nomothetic methodology, and attempt theory confirmation and hypotheses testing.

While positivistic quantitative approach is applauded for following Auguste Comte's inspiration of direct observation-based objectivity and the fabulous predictive power of the natural sciences (Giddens, 1979); they lack the capability to provide in-depth probe opportunities on the social actors in an attempt to confirm orthogonal or oblique relationships between phenomena studied. Scholars (Williams *et al.*, 2009; Eze *et al.*, 2014) posit that a more rigorous research tradition goes beyond hypotheses testing and spans methods such as interviews, mathematical modeling, field study, action research and secondary data analysis. Deductive and positivism approaches consider ICT adoption as one-off activity and focus on factors influencing ICT adoption at one particular decision point and ignore the fact that ICT adoption can be ongoing process spanning a rapid movement of ceaseless backward and forward flow of activities (Kim, 2009; Hanseth *et al.*, 2004; Braun and Clarke, 2006; Herold, 2010).

Therefore, proposed theories and models should consider ICT adoption as a dynamic, interactive and evolving process rather than a static and one-off process. This study aims to advance ICT adoption research by examining adoption from a dynamic process perceptible. It attempts to develop an improved insight into how SMEs constantly adopt and adapt ICT that is evolving as well as the factors influencing adoption across the different stages in the process. However, based on literature review, dynamic capability was adopted to unravel critical issues as they provide new opportunities and, most importantly, challenge the underlying assumptions upon which most prominent traditional adoption theories were built. Scholars (Ritchies and Brindley, 2005; Chibelushi and Costello, 2009) assume that this perspective is still under investigated or almost ignored in the context of small businesses despite the increasing complexity of new technology adoption and the more frustrating and volatile business environment. A conceptual framework underpinned by the concept of dynamic capabilities was proposed to depict the dynamic process, associated activates and key factors influencing adoption at different stages of the adoption process.

On the strength of the limitations of studying the social world using the positivistic epistemology, this research adopts interpretivism as a basis to gather in-depth and theoretically richer meanings of particular human experience that spontaneously flows from the social actors. Unstructured and semi-structured interviews as well as deductive and

inductive approaches were adopted in data analysis. The study raises awareness on examining EICT adoption based on dynamic process perspective and challenges researchers in the area on the necessity to diversify adoption research by using more explanatory theories and qualitative approaches. The paper addresses why we investigate the UK small business sector, examines the concept of dynamic capabilities as the theoretical underpinning, discusses stages of data collection methods and analysis and presents the framework and future research.

2. UK service SMEs

Small enterprises are key informal socio-economic drivers (Mutuala and Brakel, 2006) and service sector plays pivotal role (Parellada *et al.*, 2011). In most economies, small businesses are expected to grow even more prominently in the near future (Lee, 2004) following governments' encouragement in this digital era. In European Union and other western countries, small businesses represent about 99 percent of all businesses; they provide entrepreneurial skills, offer about 70 percent employment opportunities and provide innovation and gross added value of about 70 percent (Lindermann *et al.*, 2009; Castro *et al.*, 2010). Scholars (Martin and Halstead, 2004; Tilley and Tonge, 2003; Ritchies and Brindley, 2005) opine that since Bolton Report of 1971 in UK, small sector enterprises significantly drive the economy; contributing about 59 percent of GDP and providing regional and local developments. However, the emergence of globalization sets the main difference between the past and the future of service-oriented enterprises (Milla and Choi, 2011). This factor as well as global changes such as climate and environmental sustainability tied with the shift toward techno-economic paradigms such as ICT is pivotal in every business.

These raised the role of services and services industries. The UK small service businesses have expanded rapidly in the recent years and represents about 20 percent of the national output (BIS, 2010). The sector is an essential economic driver that sustains business competitiveness and supports both the private and public sectors. Though significant effort to improve the economy focuses increasingly on the service sector (BIS, 2010), the sector still operates in a much more complex business environment and still faces challenges keeping up with new technology platforms. Even when small service business owners adopt new ICT application(s), most of them continually accept it only as a short-term solution and ignore the long-term benefits (Rantapuska and Ihanainen, 2008). They are rarely aware that little change in their ICT adoption strategies can lead to competitive maneuverability.

2.1 *The concept of dynamic capabilities and study framework*

Small enterprises are usually ill equipped and sometimes compete with well-established larger firms; their inability to overcome the ordeals of limited resources is critical though their operating agility causes them to leverage their experiences to build solid ICT capabilities (Lin *et al.*, 2012). The less complexity in adoption decision enables small businesses to play faster role in adopting EICT and other corporate innovations than larger firms. Therefore, the thrust of dynamic capabilities lies on building successful competitiveness amidst limited resources and vulnerability to fierce competition (Wang and Shi, 2011). The concept of dynamic capabilities provides theoretical underpinnings to the understanding of the evolutionary nature of EICT since most extant theories are largely deterministic (Eze *et al.*, 2012; Zhang and Fjermestad, 2008) and the concept itself accommodates changing environmental forces. These classical theories rarely assume that ICT adoption is an unpredictable and ongoing process that involves leveraging feedback cycles from different stakeholders to build informed EICT capabilities.

Rarely, would such theories challenge implementation rather they accept technologies as they are and rely heavily on early adopters or opinion leaderships for diffusion

(Andrade and Urquhart, 2010; Rogers, 1995). The theory of dynamic capability underlines the mutually shaping of stakeholders and reveals situations where SME managers move from a homogenous isolated entity to a group of reformulated and heterogeneous entity (Millerand and Baker, 2009). Dynamic capabilities define a firm's ability to improve, adapt, adjust, reconfigure, refresh and renew a business process better than the competitors (Kim *et al.*, 2011). Drawing from other scholars (Helfat *et al.*, 2007; Helfat and Peteraf, 2009), Salunke *et al.* (2011) perceive it as the capability of an organization to purposefully co-create with internal and external actors, extend or modify its knowledge-related resources, capabilities or routines to improve effectiveness. Implicit is its co-ordinative management process that leads to inter- and intra-organizational learning and helps to reveal dysfunctional routines (Teece and Pisano, 1994). Further, organizations co-create values when they interface with their active clients to develop effective solutions (Salunke *et al.*, 2011; Prahalad and Ramaswamy, 2004; Vargo and Lusch, 2004). Thus, developing and adopting solution require the technical and in-depth knowledge of the clients' organizations and business process.

The knowledge base of dynamic capability simply means that contemporary organizations rarely go solo (Fordism); they share knowledge contents and foster innovations from outside (post-Fordism) (Prahalad and Ramaswamy, 2004). Professors Prahalad and Ramaswamy's value co-creation and Professors Vargo and Lusch's service-dominant logic of marketing stimulated a shift from family business to extended business enterprise, where enterprises use their skills to attract customer creativity in a holy collaborative network, and to synchronize it with core competencies to build competitive advantage. Although early research (Teece and Pisano, 1994) found links between dynamic capabilities and competitive advantages, other scholars (Salunke *et al.*, 2011; Cepeda and Vera, 2007) found that consensus is yet to be arrived on the nature of such relationships. Cepeda and Vera (2007) contend that the link in the early definition is tautological since studies claim that dynamic capabilities are linked to profit and corporate growth. The critics of dynamic capabilities rarely understood its different types and application in different contexts (Helfat and Peteraf, 2009; Weerawardena and Mavondo, 2011). Salunke *et al.* (2011) note that dynamic capabilities provide a sound basis for examining the processes through which firms anticipate, and respond to, environmental changes. Anticipation involves spotting out the sources and directions of the change(s) and response involves clear knowledge of the alternative options.

The concept of dynamic capability is relevant in this study because it aids the continual creation and adjustments of organizations' technology and builds competitive advantage based on differentiated services (Weerawardena and Mavondo, 2011). On accounts that SMEs are flexible, unique, associated with complex tasks and operate in a much more volatile environment, the concept of dynamic capabilities permits various SMEs to articulate their EICT needs, learn, coordinate, integrate and where possible, challenge and reconfigure their technology's capabilities. Often researchers develop different theories and concepts or extend existing concepts to understand the phenomena they are investigating on accounts that studies (Vandeven and Poole, 1995) argue that any theory that assumes ICT adoption and development as unpredictable rarely allows the researcher to understand the negotiation process involved across stages. Previous studies (see Teece and Pisano, 1994; Salunke *et al.*, 2011; Kim *et al.*, 2011) developed concepts in the area of dynamic capabilities. However, based on its theoretical strength, this study adopts Teece and Pisano's (1994) framework (of integrating, learning and reconfiguring) and uses that to explore the capabilities after the preliminary investigation (see Section 3.1 for details) and to unveil the factors that influence EICT adoption at both single and multiple stages.

Figure 1 shows the integrated concepts of dynamic capabilities; it suggests that resources must be well co-ordinated, and that the decision maker must carefully observe and

learn the environmental dynamics and thus, reconfigure and transform the resources accordingly to build competitive advantage.

Integration. Otherwise referred to as co-ordination of resources, integration involves the synthesis of the influence of external knowledge inputs, intangible resources and tangible capabilities (organization structure, culture, processes and inter-group relationships) in shaping an organization's competitive advantages (see Lin *et al.*, 2012; Teece and Pisano, 1994). Small businesses have trading partners/actors (customers, dealers, suppliers and consultants), who provide updated ideas to capture, align with and design appropriate EICT. Therefore, dynamic capability is embedded to encourage SMEs to strategically co-ordinate and combine resources to examine how and why a new technology application may be needed to support existing operation.

Learning. Competitive advantages are driven by intellectual capital and technology; therefore, agility in small businesses will continually cause growth in EICT adoption as well as recognition for firm's boundaries and environment. Learning is a significant concept of dynamic capabilities; it assists SMEs to make optimal decisions in their innovative strides (Lin *et al.*, 2012) and reveals dysfunctional routines (Teece and Pisano, 1994). Further, learning is essential to assess innovation's effectiveness in terms of internal and external stakeholders' view on how EICT platforms outperform conventional practices (Becker, 2008; Lopez-Nicolas and Soto-Acosta, 2010). Organization's learning involves knowledge creation, knowledge acquisition, information dissemination and information interpretation intended to create difficult-to-copy distinctiveness. The more organizations devote time to learn how knowledge is created, the more they are aware of obsolete technology applications that need replacement as well as knowledge that is more critical in developing a new innovation (Lopez-Nicolas and Soto-Acosta, 2010). Scholars (Templeton *et al.*, 2002; Rantapuska and Ihanainen, 2008) show that organization's learning is more relevant to small businesses because their characteristics make adoption a learning process. Small businesses maximize profits by learning how best to adopt and use the EICT especially those that impact on their long-term strategy needs.

Reconfiguring. Studies (Eisenhardt and Martin, 2000; Weerawardena and Mavondo, 2011) argue that dynamic capabilities may be studied in both high and moderate dynamic environment. Lin *et al.* (2012) opine that because business environment changes overtime, integrating and co-ordination of resources without reconfiguring and transforming them when the need arises rarely yield substantial competitive advantages. Often, change is costly and firms attempt minimizing risks; organizations must scan the environment carefully, develop and adopt new technologies, and reconfigure, re-create and transform resources to the right type of technology innovation ahead of rivals (Teece and Pisano, 1994).

In summary, adoption of emerging ICT in SMEs may not be encouraging in most cases. Small business managers often take ICT adoption decisions based on short-term and unplanned preparations due to lack of time to examine and learn what will actually benefit the organization in a long run. Previous studies (Salunke *et al.*, 2011; Al-Natour and

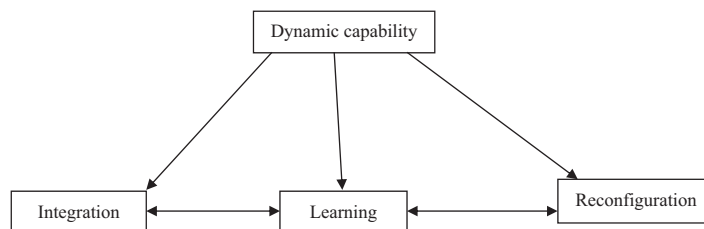


Figure 1.
Proposed study
framework

Benbasat, 2009; Benbasat and Zmud, 2003) show that diverse actors play important roles and may contribute to ICT adoption success. Several models have been developed ranging from linear models to traditional adoption theories; linear models apply to small business context and the adoption ladder in particular has been what the government uses to understand various areas of ICT adoption in most small businesses in the UK. The model and others have been critiqued for over-simplifying complex issues associated with SMEs. On the other hand, most traditional adoption theories share the same features with decision-making school because of the deterministic conception embedded in the technology (Barrett *et al.*, 2006). These theories assume that factors external to an individual profoundly shape the organization's outcome and actors' decisions are considered as insignificant (Bostrom *et al.*, 2009).

Most theories in this area are problematic because they de-emphasize the roles played by human agency and yet studies exist within the social context where actors control agency during a change process (Bostrom *et al.*, 2009). Theories in this area see technology as independent variables with a number of affects at different levels of analysis. Therefore, this research adopted the concept of dynamic capacities as an explanatory theory in this research.

3. Methods

This study used interpretivist approach to gain in-depth examination into the dynamic and evolutionary process of EICT adoption in UK small service SMEs. Unstructured and semi-structured interviews were conducted in two separate rounds with participants drawn from Crunch Online Data Base and Luton Business Directory. The participating outfits were selected based on the following predetermined criteria – they must have adopted a new ICT platforms in the last three years; they must be service orientated; staff strength must range from 1 to 250; and they must be operating in England. Since anti-positivist research tradition emphasizes the discovery and explanation of people's experiences (Schultze and Avital, 2011) and not statistical generalization, purposeful random sampling and snowball sampling were adopted. Snowball sampling was adopted because the initial interviewees introduced other key informants who took part in the interviews.

3.1 Interviews

Interviews were used to explain the participants' social world, experiences and opinions regarding the study's subject matter. Participants were selected from a sample of 65, which was drawn from extended classification of professional service businesses proposed by Ramsey *et al.* (2008). In total, 26 SMEs (A1-A26 in Table I) agreed to be interviewed and participants were interviewed in two stages; the first stage was unstructured and it involved 11 participants (A1-A11). The first stage helps to understand the prevailing state(s) of EICT adoption in service SMEs in order to have a broad and unconstrained view; and to test the applicability of the key concepts (theoretically driven codes) of dynamic capabilities (integration, learning and reconfiguration) to the initial raw data. The inclusion of these three concepts was based on the outcome of the applicability of these concepts to the raw data collected after the first stage of the interview to ascertain their credibility. This provides in-depth understanding of key issues that guide in developing interview questions for the second stage – semi-structured. In order to validate, and confirm the outcomes of the findings initially unveiled after the first stage of the interview, another 15 key respondents (A12-A26) identified were interviewed. The result of the interviews provided rich data for analysis and forms the bases for the validation of the first stage of the interview.

Participants/ Supporting cases	Position	Company size	Service
A1	Managing director	30	Security
A2	Manager	25	Internet marketing and advertising
A3	IT support staff		
A4	IT support staff		
A5	Manager	9	Social media/consultancy
A6	Manager	16	Social network provider
A7	Managing director	25	IT vendor/consultancy
A8	Directors		
A9	Operational manager	45	Sales and distribution
A10	Managing director	80	Construction
A11	Manager	5	IT vendor/consultancy
A12	Manager	52	Business and management /consultancy
A13	Manager/IT support staff	99	IT
A14	Manager	8	Accounting
A15	Developer	5	IT and networking
A16	Designer	4	IT
A17	Test analyst	245	IT Quality control
A18	IT designer/developer	2	IT
A19	IT developer	5	IT and networking
A20	IT consultant	11	Consultancy
A21	Small government agencies	10	Education and training
A22	Small government agency	16	Education and training
A23	Small government agencies	11	Education and training
A24	Small government agency	22	Learning and support services
A25	Small government agencies	30	Support and advisory services
A26	Manager	102	IT consultant/business supports/advice

Table I.
The participants'
interview profile

Before the interviews, a formal letter was sent ahead of time on the purpose of the research and confidentiality of the information. The key questions bordered on unveiling how the participating firms constantly keep up with new ICT at all times. These questions were accompanied by other prompt and further probing questions as the interview progressed. All the interviews were timed between 45 minutes and 1 hour. All the responses were transcribed verbatim in order to elicit deeper meaning from the data. The profile of the participants is presented in Table I.

3.2 Data analysis

Thematic analysis provided the core skills to transform complex qualitative information. Specifically, hybrid approach (see Boyatzis, 1998), which involves theory-driven (for stages of EICT adoption) and data-driven approaches (for the key capabilities at each stage and factors), was deployed to aid interpretation, communication and more comprehensive grasp of the phenomena investigated. Figure 2 represents the research design and how the data were generated, analyzed and reported.

At stage 1, before the interview, we reviewed theories such as Actor Network Theory, dynamic capabilities and some of the concepts generated from the said theories. The concepts/codes (integration, learning and reconfiguring, framing, translation, stabilization, extend and modify) drawn from extant literature formed the bases for categorizing the raw data. However, the definitions and characteristics of these theoretical codes were simplified using code name; the definition of what the code(s) is; and the description of how to know when themes associated with each code occurs. To ensure that codes generated from theory would be applicable to the raw data in stage 2, the

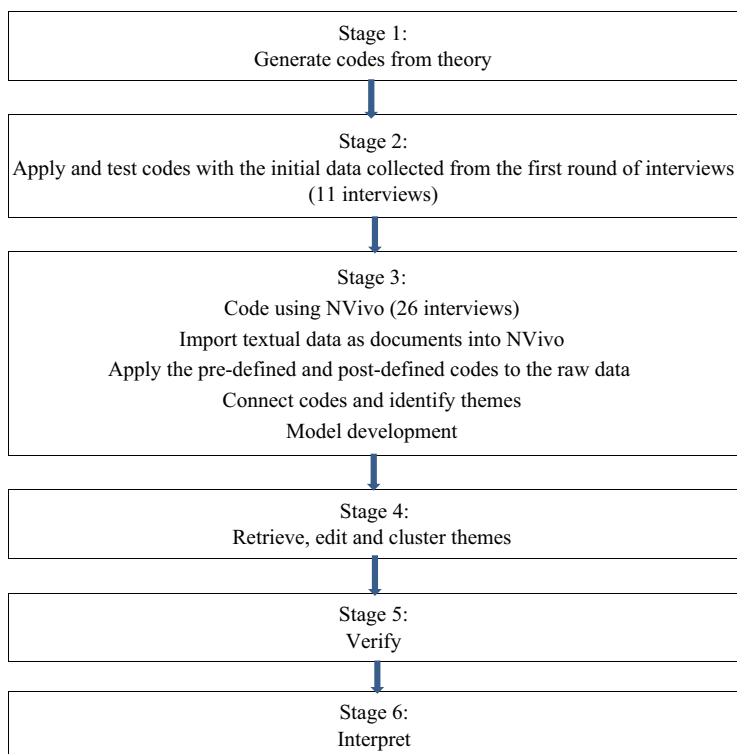


Figure 2.
Stages of data
analysis process

transcribed interview results in the first round of interviews were manually coded into both pre-defined and post-defined categories and reliability analysis was subsequently measured to ensure that the theoretical codes were credible and would be applicable to subsequent raw data. Following the preliminary coding process of the first round of the interviews, four judges related the quotes to the categories. These judges were colleagues who specialize in qualitative research and IS, and the result of the reliability analysis was 88 percent for the first two judges (see Table II).

In stage 3, all the transcribed data were treated with NVivo software and retrieved from NVivo in stage 4 to permit theoretical and empirical clustering of themes. Bearing in mind that verification in qualitative research is always an ongoing process; further verification in stage 6 implies validity checks. Face validity was conducted using two independent experts in the field who applied the codes to the same samples of data in order to cross-check the quotes in relations to the pre- (theoretical) and post- (data driven) codes. Inter-rater reliability involving percentage agreement (Boyatzis, 1998) with additional two colleagues was adopted for the study considering the fact that data coded

Scope	Number of judges	Reliability result	
		First two judges	Second two judges
Adoption process	4	0.88 (88%)	0.85 (85%)
Factors	4	0.89 (89%)	0.80 (80%)

Table II.
Reliability analysis

were nominal and require(s) little or no judgments by the coders. The instruments were quite reliable since they internally relate to the factors at levels above Miles and Huberman's (1994) benchmark of 0.70.

However, the findings presented in Table III depict the capabilities at each stage of the adoption process and the factors influencing EICT adoption. Themes associated with the findings (EICT stages and factors) were theory driven (Boyatzis, 1998) based on integration, learning and reconfiguration while the factors were data driven and clustered conceptually (Boyatzis, 1998) based on participants opinion.

4. Findings and discussion

The adoption of EICT involves a number of processes; to understand how small businesses constantly keep up with such applications involves unraveling situations that shape the entire process through the respondents' own narratives.

4.1 Integration (I)

EICT is associated with some degree of uncertainty; often small business managers show consciousness to innovation when they build customized versions that suit their own ideals (internal and external users) and specifics (Swanson and Ramiller, 2004; Teo *et al.*, 2011). Small businesses exhibit greater closeness to external actors (Herstatt and Hippel, 1992; Gottfrisson, 2011) because aside such actors generating better innovative ideas than external actors of larger organizations, governments themselves actively drive SMEs'

EICT adoption stages and the required capabilities	Supporting cases	Total supporting cases
Code 1: integration (<i>I</i>):		A1, A2, A4, A5, A9, A10, A11, A13, A14, A24
Problem assessment	A2, A5, A13	
Concept generation and evaluation	A4, A5, A10, A11, A24	
Concept specification	A1, A5, A14	
Code 2: learning (<i>L</i>):		A1, A2, A5, A9, A10, A11, A15, A17, A18, A19, A20
Role delegation	A5, A9, A11, A10, A19	
Misalignment and alignment of interest	A1, A15, A18, A20	
Product trial	A2, A5, A9, A17, A18, A20	
Code 3: reconfiguration (<i>R</i>):		A1, A2, A5, A6, A9, A13, A14, A15, A19, A24
Product modification	A1, A9, A13, A19	
Adaptation	A1, A2, A13, A14, A24	
Problem redefinition	A5, A6, A15	
<i>Factors</i>		
Factors affecting EICT adoption	Supporting cases	
Awareness of multiple contexts	A6, A9, A11	
Openness to change	A6, A10, A11, A12	
Shared supports	A1, A10, A14	
Integration	A3, A12, A13	
Ease of use	A1, A2, A7	
Safety and security	A1, A9, A14	
Managerial time	A3, A5, A6, A9	
Service quality	A2, A6, A9, A12, A14, A24	
Customer focus	A5, A10, A11, A13	
Return on investment	A2, A5, A9, A12, A22	
Competition	A1, A9, A10, A12, A13, A15, A24	
Adoption cost	A6, A10, A14, A15	

Table III. Key activities in each stage of EICT adoption process and factors with supporting cases

investment in ICT (Beckinsale *et al.*, 2006). Our finding lends support to this subject to the integration of experiences and knowledge of different informed stakeholders. The study proposes three interrelated activities within integration; they are problem assessment, concept generation and evaluation, and concept specification. Problem assessments happen when existing ICT is no longer meeting the needs for future growth. An SME manager says: “looking at future projection and [...] now, and looking at the past, the company actually sat down and evaluated their business process, reviewed where they hope to evolve into and based on that, try to map out that into the current solution [...] and found that what is envisaged [...] might not be possible for the current solution [...] to properly handle the companies processes” (A13) (Table IV).

Similar point was raised by other participants (A11, A6, A12 and A10). Where recommendations were made, they lead to generating, defining and evaluating the concept as commented by another participant: “[...] what we do here [...] is to come up with new service that we can introduce. Now [...] is more of a concept. So [...] what ideas or concepts that we can come out with, that can help introduce a new type of service [...] we generate the ideas; we evaluate the ideas and then plan the project” (A5). The interviewees propose that concept generation differs slightly amongst small businesses specially in terms of creating competitive advantages that differentiate one from other competitors. This point was supported by some respondents’ quotes (A5, A2, A6 and A7). A5 notes that the need for

EICT adoption stages and
the required capabilities

Samples of supporting evidence

Code 1: integration (I)

Problem assessment

“looking at the future projections and [...] now looking at the past, the company actually sat down and evaluated their business process, evaluated or reviewed where they hope to evolve into” (A13)

Concept generation
and evaluation

“We come up with a concept and the requirements, then we generate the ideas, we evaluate the ideas and then plan for other people that will join the project” (A5)

Concept specification

“The smart patrol is actually built around our specification and that is what we asked for” (A1)

Code 2: learning (L)

Role delegation

“When you have got a problem like that, a middle company or a middle man would help you because I am not sure what I wanted. So I need to talk to somebody that actually specializes in it, so he can sort my brand [...] they would know because I can’t do that myself” (A10)

Misalignment and
alignment of interest

“In respect of the smart patrol, it was very new and people who did it for us were IT specialists. They find it easy to work out, but their perception of what we wanted was different. So we told them to remove some part. Now it is exactly what we wanted” (A1)

Product trial

“[...] what we do is for example, with the CRM System, [is] we try them internally, basically it is just one person, myself and we also try it with three of our clients externally” (A5)

Code 3: reconfiguration (R)

Product modification

“[...] the solutions have been developed which is the solution by SAPs... However, when we identify our interests and selected that as the final product, it involved some customization” (A13)

Adaptation

“Every day new changes come [...] and sometimes we are a bit behind learning the skills [...]” (A14)

Problem redefinition

“When you are an entrepreneur you need to be able to do things quickly, fail, not necessary fail, but just understand your mistakes and then change them and continue to evolve. You must always have that mentality” (A6)

Table IV.
Key activities in each
stage of emerging ICT
adoption process with
samples of supporting
evidence

engaging in concept “specification [...] comes from the need to have what we call Intellectual Property (IP); something no one else offers [...]. Further, to achieve this requires incorporating the inputs of other external actors; you [must] bring in the expertise of informed internal and external stakeholders” (A11).

Supporting these findings, studies (see Lawrence, 2010; Kannabiran and Dharmalingam, 2012; Eze *et al.*, 2014) in small business context reported some of the challenges associated with SMEs which increase key actors' dependence on the external entity. For example, customers and governments play significant role here because ICT is rarely viewed in isolation; rather it involves addressing the basic specification of actors and other interest groups (concept specification). Although studies (Apulu *et al.*, 2011; Ongori, 2009) show that large organizations play role model for new technology innovation, this study suggests that in most cases small businesses exploit their operating agility to play prime-movership role in technology innovation. Participant A5 has this to say: “we always bring the business intelligent together, what we call those imaginary aspects into it [...] like a product development, business case, everything from branding to what it should be called, how to distribute it [...]” This statement has been support to the studies of Teo *et al.* (2011) and Lawrence (2010).

4.2 Learning (L)

EICT may originate from small businesses but learning is necessary to generate experimentation and experiences because they (small businesses) rarely have the required technical skills and other resources to take up the technology innovation to the next level (Eze *et al.*, 2014). Thus, critical issues as problem assessment, concept generation and evaluation, and concept specification may be delegated and ultimately misaligned to handle the long-run interests of stakeholders. Implicit is that although there are two options for adopting EICT (building ICT in-house and out-sourcing the ICT), sometimes SMEs end up out-sourcing ICT projects for dearth of resources to build ICT in-house. This assertion was supported across cases (A5, A9, A10 and A14). In line with the statement above, scholars (Simpson and Docherty, 2004; Herstatt and Hippel, 1992; Gottfrisson, 2011) recognize the importance of external actors in the adoption of ICT and pointed out that small businesses can be influenced by external actors when compared with large organization. One participant said: “when you have a problem like that, a middle company or a middle man would help you because you are not sure of what you wanted. So you need to talk to somebody that actually specializes in it, so he can sort your brand [...] they would know because you can't do that yourself” (A10). Therefore, small businesses are better off at out-sourcing ICT projects because ICT rapidly changes and employing knowledge IT staff or maintaining existing staff often appears costly.

Another issue that shapes learning is the difference that often arises amongst actors especially when roles are delegated. Small businesses believe so much in IT consultant; they often think that these consultants are proactive and trustworthy to provide the right information needed to make informed evaluation and decision. Chibelushi and Costello (2009) maintained that the major challenge facing small businesses is the existence of large number of non-proficient consultants that offer advice. They found that 47 percent of the companies still question the level of specialist knowledge being offered by consultants. The finding reveals different ways of disagreements occur amongst small business managers and other actors who are integral part of the process. “First, most times the issue we [IT experts] usually have is that [SME managers] [...] have a fixed idea of what they want” (A18). “Second, because sometimes the client [SME manager] comes with the different thing which has not been discussed previously. Therefore, during [...] negotiation the project continues or ends up here” (A20). “Third, in respect to the smart patrol, it was very new and people who did it for us [SME manager] were much of IT specialist. They find it easy to work out, but their perception of what we wanted was different” (A1).

There are implications to these outcomes. First, the study suggests that project's success to the next stage seems almost uncertain. Therefore, depending on organizations, small business managers may ignore the initial experts and consider new experts that may adhere to their interests, values and norms, where such conflicts persist. Second, key actors in most case were not clear on how they intend to achieve their ICT adoption goals and try to go back to relearn and re-assess what might best meet their need. The negotiation between most SME managers and other experts at this stage is unpredictable. The finding suggests that such negotiation is only successful where there is agreement between the key actors and others in the process. Such agreement often results to technology development, evaluation/trial. As noted by one SME manager: "[...] what we do is for example, with the CRM System [is] we try them internally, basically is just one person, myself, and we also try it with three of our clients externally" (A5).

This was supported by A2, A9 and A18. Note that organizational structure and culture may significantly affect the extent of evaluation. Organizations that are open may require several other actors in the evaluation exercise. Participants note that though EICT may be evaluated, it may not always be up to the standard envisaged and therefore, requires further adjustment. This suggests that there are constant challenges and movement of actors resulting to further learning and experimentation (see Akrich *et al.*, 2002; Teo *et al.*, 2011; Eze, 2013). Involving diverse actors may not always promote new ICT rather; it may hold back key actors from engaging in technology adoption/development. One of the advantages of this is that small business managers that are innovative may consider developing and/or adopting any new innovation only when it is conducive in terms of being in line with actors' requirements.

4.3 Reconfiguration (R)

Reconfiguration takes place when new ICT did not compatibly conform to existing organizational arrangements. Garud and Rappa (1994) note that every firm has standards and the more a piece of technology conforms to the required evaluation criteria and organization requirements the more valuable it is to the users. Furthermore, Attaran and Attaran (2002) emphasize that customization of ICT usage enables an organization to create optimally and efficient information resources. In most cases, customization is made in order to enhance small businesses' appeal. Evidence shows that EICT standards are not always achieved initially. This point was raised by a participant: "[...] the solution has been developed which is the solution by SAPs, which is off the shelf. However, when we identify our interests and select that as the final product; it involved some customization" (A13). In line with this finding, Walden and Browne (2009) recognized that ICT evolves rapidly and it is not clear if there would be a time when stable equilibrium would be achieved (see Eze *et al.*, 2014; Eze, 2013).

Therefore, modification was a fundamental activity various actors consider to ensure that the features of the new ICT are reliable and efficient. The study revealed that organizations that down-played employees' inputs in technology change may be ignoring the strategic and functional aspects of job satisfaction as well as competitive advantage following reduction in adoption time. A participant notes that: "as the operations manager, in that case I don't need to ask the employees, I am in a position to make that decision because I know what it will benefit the business" (A9). Tyre and Orlikowski (1994) note that employees who develop interests toward a routine behavior rarely shift grounds with ease. This implies that employees in most cases are dissatisfied with the new ICT, thereby leading to their resistance to switch from the old to the new ICT. "[...] another challenge was staff [...] resistance" (A13). However, evidence suggests that adaption may happen where there is a substantial training and ongoing support. "When you implement the program there need to be training, adequate training and on-going support as well until people feel confident" (A24).

Furthermore, it was revealed that as emerging technology advances and for businesses to continue to evolve, there is a need to adapt continually to meet the changing needs of the business environment. This issue was raised (A6) and supported by a number of participants (A1, A4, A8 and A7). “When you are an entrepreneur you need to do things fast, without necessarily ignoring change factors; understand your mistakes and then change them and continue to evolve. You must always have that mental alertness” (A6). This triggers managers to reconsider their EICT adoption decisions and to re-evaluate some or the entire adoption process: “[...] we are already looking for the other technology probably because there are other things that are better [...] I am looking at the next evolution of the whole process” (A1). Thus as technology evolves, organizations continually look for new applications that would meet their needs. Adoption of EICT in small businesses is a continuous and repetitive flow of activities, which is dynamic and underlines the mutual shaping of actors and reveals homogenous isolated entity to reformulated group entity (Millerand and Baker, 2009; Eze, 2013; Eze *et al.*, 2014).

4.4 EICT adoption framework

Classical theorists (Ajzen and Fishbein, 1980; Davis, 1989; Rogers, 1995) considered ICT adoption from static, linear and utilitarian perspectives. While these perspectives spurred scholarly interest, they have been challenged for neglecting the complex activities of SMEs and most importantly the multiplicity of stakeholders involved in the process. Therefore, this study proposes that such perspective should be replaced with iterative, spiral, systematic and people-centered models. Figure 3 depicts the framework and helps to account for how the factors were clustered within each stage or multiple stages of the adoption process. Drawing on the finding, the study reveals that the perception of various stakeholders involved in ICT adoption differs from one stage to another, thereby making adoption process an iterative and ongoing. However, the various internal and external stakeholders (small government agencies, IT experts and consultants) involved in establishing EICT adoption are interwoven and cannot be viewed in isolation. Evidence reveals that integration (I), learning (L) and reconfiguration (R) in the process make SMEs managers better informed, sophisticated and more responsive to environmental dynamics. I, L and R in the framework represent the three stages, while IL, LR, IR and ILR in the framework represent multiple stages in the framework. The framework below is used to rate the factors that affect the stages based on respondents’ opinions at both single and multiple stages.

Adoption is a dynamic process; therefore, the figure depicts critical factors influencing EICT adoption at single and multiple stages. It is important to note that although some

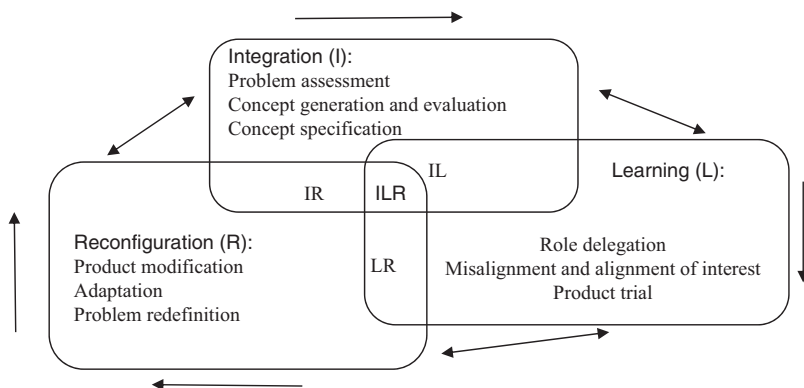


Figure 3. EICT adoption framework

of these factors may have been identified in previous studies, the study demonstrates that these factors do not influence adoption decisions at one particular point rather it can influence adoption at various stages as decisions are made and challenged along the process overtime (Table V).

5. Conclusion and implications

This paper advances ICT adoption research and practice by studying small businesses from evolutionary and dynamic process perspectives via the concept of dynamic capability. The concept of dynamic capability provides insight into the dynamic and interactive nature of emerging ICT adoption. It is a powerful and explanatory framework that reveals key capabilities involved in EICT at each stage and why and how these factors vary across stages. However, the outcome of literature review led to the adoption of Teece and Pisano's (1994) dynamic capability framework (integration, learning and reconfiguration) as well as attempts to reveal key capabilities involved in adoption process. The capabilities include problem assessment, concept generation and evaluation, concept specification, role delegation, misalignment and alignment of interest, product trial, product modification adaptation and problem redefinition. These aided the understanding that EICT adoption process in small business context is not a one-off event, constant or straightforward instead, it is an ongoing, interactive and dynamic process.

Thus, ICT adoption has moved from a simpler participation process to a complex and ongoing process, involving the interplay of human and non-human actors. Actors are involved in the adoption of EICT because of its complex and unpredictable nature; decision makers are competing actors that ensure other actors support their claims in technology development and deployment (Eze *et al.*, 2014). The key actors take up the role of the most visible actors and involve other actors in the decision. Interpretative data were collected from captains of small service enterprises made it possible to identify other internal (e.g. employees) and external (e.g. IT experts, IT vendors and consultants, and government agencies) actors. These set of actors constitute an integral part of the players for this study. The results confirmed that decisions are not influenced by a single individual rather by many whose views and perceptions may differ. The proposed framework and the theoretical codes generated from the concept of dynamic capacities as well as the factors emerged within them are relevant in understanding EICT adoption overtime as decisions are made and challenged along the adoption process.

This approach contrasts previous studies that tend to predict ICT adoption at the same stages and focus on traditional theories. Factors such as return on investment, ease of use managerial time and adoption cost influence ICT adoption at all stages, followed by openness to change, shared support, competition and customer focus which influence at least two stages. These factors have profound impact on small business managers' and other stakeholders' decision to adopt EICT. The implications of these are theoretical and practical.

Single stage factors				Multi stage factors	
I	L	R	IL	IR	ILR
Awareness of multiple context	Safety and security Integration	Service quality	Openness to change Shared support	Competition Customer focus	Return on investment Ease of use Managerial time Adoption cost

Table V.
Factors influencing
adoption at single and
multiple stages

5.1 Theoretical

Most ICT adoption studies use quantitative approaches and focus on factors affecting decision at one decision point and under-mind the interplay of the same or different factors as decisions progress (Williams *et al.*, 2009; Ritchies and Brindley, 2005). However, more resounding methodologies could be used to study emerging ICT adoption from a dynamic process perspective. Using the anti-positivism and most especially hybrid approach elicit more detailed meanings from data and/or conceptual or empirical ways of critically analyzing, organizing and clustering data into appropriate categories. Further in developing and implementing ICT, previous studies (see Orlikowski and Gash, 1994; Eze *et al.*, 2014) stressed that IT experts have always relied on methods that are structured in order to get information from small business managers and the people that use the technology. Hanseth and Monteiro (1997) argued that such approach rarely pays enough attention on assumptions, expectations, values and beliefs and how these may differ from diverse actors including the small business managers and the developers of the technology. Thus, this paper extends both the scope of ICT adoption models and data analysis approaches in the context of studying EICT adoption.

The concept of dynamic capabilities displays appropriateness for exploring and understanding factors influencing EICT adoption and for explaining their influence on adoption. And the conceptual formwork proposed for understanding factors influencing emerging ICT adoption further adds to extant theory and provides the basis for articulating and understanding the factors and their influence at every stage of adoption process. The framework provides a significant analytical tool to demonstrate the dynamics and evolutionary process view of EICT and attempts to develop novel way(s) of constantly considering the interplay of the same or different factors influencing EICT adoption at different stages and the influence of such factors on actors' role in the process.

5.2 Practical

The findings of this study may be useful to organizations involved in the design and development of ICT so that they can better be aware of how their values, expectation and interpretations differ or relate to small business managers' interests. Small business managers may use the framework to estimate the possible values and interests of co-actors in the adoption process since EICT adoption requires alignment of other human actors to key actors' interests. IT experts, vendors, consultants and other actors involved in the process must focus their attention on SMEs' arrangement to ensure that goals relate to the key actors' views and mindset. This has the possibility of improving managerial decisions through coping with unanticipated changes, reducing conflicts and time spent in deploying EICT as well as creating goal congruence.

5.3 Limitations and further study

While this study emphasizes on the need to consider ICT adoption from a dynamic process perspective, there are a number of limitations. First, small sample size as well as the scope of the factors presented is limited to the sectors concerned; thus, other factors may be prevalent to other sectors. Second, qualitative research is interpretive and subjective in nature and the limitations in the sample used are common in qualitative research. The generalization of the findings and the framework remain to be established across a wider population. Third, the study interviewed both end users of ICT and other stakeholder, without focusing on a specific EICT. While this may be criticized by other researchers who may investigate specific ICT, we believe that adoption is an ongoing action and managers respond to environment and the interplay of multiple stakeholders.

The diverse actors vary in terms of the factors they view critical in influencing EICT. There might be other factors that are prevalent to other sectors that may provide

researchers alternative ways of analyzing and viewing these factors. A further study is essential to replicate the measures and instruments of this study. Further, the current research contributes by raising awareness of the challenges posed by the rapid change in ICT. The study explored the notion that ICT adoption is unpredictable and evolutionary. Further research is needed to examine how ICT changes and how organizations constantly keep up with it. Such studies might explore more specifically, how such change affects SMEs and why keeping up with new ICT appears to be challenging for SMEs. An understanding of how ICT changes and the best way to deploy them help to explain the best mechanisms to adopt overtime.

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