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Cloud computing utilization and mitigation of informational and marketing barriers of the SMEs from the emerging markets: Evidence from Iran and Turkey

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Authors	Hosseini, S.; Fallon, G.; Weerakkody, Vishanth J.P.; Sivarajah, Uthayasankar
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Abstract

This study seeks to investigate the effectiveness of Cloud Computing Utilization (CCU) in the mitigation of informational and marketing barriers for SMEs from the Emerging Market-Countries (EM-SMEs). A quantitative-research methodology was applied to collect data by using self-administered questionnaires from top managers of 227 SMEs based in Iran and Turkey. The study contributes theoretically to both small business and international business literature by developing a new classification of the internationalization barriers that EM-SMEs face, and proposing a series of cloud computing (CC) solutions for mitigating these barriers, resulting in the creation and testing of a new model. The empirical findings confirm that CCU can help EM-SMEs to mitigate a series of informational and marketing barriers. The key practical contributions of the study offer insights to both EM-SMEs and Cloud-Service-Providers (CSPs) on the extent to which CCU is effective in mitigating the internationalization barriers faced by EM-SMEs.

Keywords: SMEs from Emerging Markets, Internationalization barriers, Cloud computing utilization, Born globals

1. Introduction

Despite the barriers to internationalization that many Small and Medium-sized Enterprises (SMEs) from Emerging Markets (EM-SMEs) face, an increasing number are agile enough to overcome these barriers and export at an early stage, aided by the increasingly open market conditions created by globalisation and the growing availability of advanced innovations in ICT (Jones et al., 2017; Pezderka and Sinkovics, 2011; Bell & Loane, 2010). Consequently, the opportunity to accelerate their internationalization offers EM-SMEs a more open platform to compete with larger global companies who are already well established (Freeman et al., 2006; Anderson and Wictore, 2003; Moen and Servais, 2002; Madsen et al., Rasmussen, Servais; 2000). However, many scholars argue that a firm's internationalization constitutes a process of increasing involvement in international markets (Asgari, et al., 2010; Welch & Luostarinen, 1988; Susman and Gerald, 2007). The emergence of the '*Born Globals*' (BGs) (Pla-Barber and Escriba-Esteve, 2006; Rennie, 1993; McKinsey & Co., 1993; Madsen and Servais, 1997; Oviatt & McDougall, 1999, 1994, 2005), and 'International New Ventures' (INV), (Oviatt & McDougall, 1994, 2005) has in many cases been supported by the utilization of effective information and communications technologies (ICTs) that can mitigate internationalization barriers and thus promote accelerated internationalization.

SMEs often face informational and marketing barriers to internationalization (Kuada, 2006; Pinho and Martins, 2010). This problem can be a major one for SMEs based in Emerging Market Countries (EMCs) (such as those of the Middle East) and yet there is a shortage of extensive academic research on this subject (Leonidou, 2004; Wright et al, 2005; Altintas et al., 2007; Al-Hyari et al, 2012). There is, therefore a gap in the academic literature which this paper seeks to help fill, by investigating the informational and marketing barriers to internationalization for EM-SMEs, and the ways in which Cloud Computing Utilization (CCU) can mitigate them.

CCU has also emerged as a potential approach that allows SMEs to mitigate internationalization barriers to exploit opportunities offered by foreign markets (Jones et al., 2017; Oviatt & McDougall, 2005). Despite many studies which have been conducted on the advantages of CC, few studies have been carried out to identify the main factors of fast pace growth of the CCU among the EM-SMEs (Weisinger, 2014; Leavitt, 2009).

This study represents a timely investigation of the prevalence of CCU among the EM-SMEs. For example, according to IDC study (2018), CC is on a path of transformation. IDC predicts that by 2020, public IT cloud services will account for 58 percent of the $355 billion combined spending on traditional plus public cloud applications, development and deployment tools, infrastructure software, storage, and servers. ICD predicts that by 2018, more than 85 percent of enterprise IT organisations will commit to multi-cloud architecture, and 75 percent of developer teams will include cognitive/artificial intelligence functionality in one or more application and virtually all of those services will be sourced from the cloud. Gartner also predicts that by 2020, about a quarter of organizations in emerging markets will run their core CRM systems in the cloud, up from around 10 percent in 2012 (Rivera, 2015).

Based on these facts, and despite the existence of various classification of barriers to EM-SMEs' internationalisation, specifying a taxonomy of barriers for the EM-SMEs' internationalisation assists the researchers to evaluate the possible effective solutions through CCU to mitigate these barriers. This study aims to investigate why EM-SMEs have a strong propensity to adopt this technology, and whether these firms are able to mitigate the internationalisation barriers, namely Informational Barriers (IBs) and Marketing Barriers (MBs), through CCU.

The importance of this study lies in the impact of CCU on Informational and Marketing Barriers of EM-SMEs. Mitigation of IBs is strategically important for EM-SMEs so that they will be able to overcome the obstacles in internationalisation by acquiring sufficient information and mobilising their resources in a target market (Kahiya, 2013). Furthermore, mitigation of MBs in market entry and marketing-mix would be tactically vital for EM-SMEs when these firms - with limited resources - will be able to enter other markets by identifying foreign business opportunities, accessing distribution channels, having surveillance over middle-men, gaining representation in the foreign market, and establishing a sustainable business (Leonidou, 2000; Da Rocha et al., 2008). In addition, these firms are able to mitigate marketing-mix barriers associated with product modification, based on the foreign market preferences, the obtaining of efficient promotional approaches, and by offering an appropriate strategy for pricing (Pinho and Martins, 2010; Ahmed et al., 2008).

In order to achieve this aim, this study tests the impact of CCU that is developed based on the definition of CC by NIST (Mell & Grance, 2011:2) with the concept of technology adoption theory as a new model, on a series of informational barriers (Rajendran, 2015; Leonidou, 2004) and marketing barriers (Bose, 2016; Leonidou, 2004) that EM-SMEs face with their internationalisation. Ultimately, this study proposes a series of cloud computing (CC) solutions for mitigating these barriers, in order to examine the effectiveness of these solutions for EM-SMEs' internationalization barriers.

The main theoretical contributions of the study are threefold: i) to develop a new classification of Informational and Marketing barriers for the EM-SMEs' internationalization, ii) to propose a series of CC solutions for mitigation of these barriers and iii) to examine the effectiveness of proposed solutions in mitigation of Informational and Marketing EM-SMEs' barriers. The key practical contributions of the study offer insights to both EM-SMEs and Cloud Service Providers (CSPs) into the extent to which CCU (i.e. CC based solutions) is effective in mitigating the internationalization barriers - IBs and MBs - faced by EM-SMEs.

2.   SME, emerging markets and internationalization: the context

Due to the SMEs' limited capital resources, expert labours and knowledge, these firms are faced with many constraints in their home markets; also, they are more vulnerable when they internationalize in the EMCs, where in these markets, the reserving of capacities of industrial sectors are directly being controlled and supervised by the government. The entrepreneur-firms are not free enough to choose their own trajectory and apply their own strategic marketing. Initially, these companies are required to obtain licences from the local government before engaging in any activity. This limitation would be the main barrier for many EM-SMEs to convert themselves into modern and large enterprises. consequently, in these markets, many small firms are operating at a small scale and uneconomically in different industries (Singh, 2009). Moreover, due to the lack of efficient institutional regulation in emerging markets, often the EM-SMEs try to circumvent the problems and compensate for the inefficiencies by applying efficient arrangements through creating business-groups to enhance their capital, labour productivity and product development (Jones et al., 2000).

The Uppsala theory contends SMEs follow a slow and incremental process to become international players through following a pattern of knowledge acquisition from foreign markets,

avoiding uncertainties and risks, and managing many barriers in these markets (Johanson & Vahlne, 1977; Jones, 2012; Persinger et al., 2007; Naidu et al., 1997). This theory is unable to explain the innate abilities of BGs which can mitigate their internationalization barriers towards a speedy internationalization in incipient days. Thus, it is important to investigate how firms can be effective in collecting sufficient international knowledge, experience and other technical abilities to mitigate the internationalization barriers in order to accelerate their internationalization from the early stages.

Evidence gathered over two decades ago suggests that firms do not need to follow a progressive accumulation of resources and capabilities to penetrate global markets. Yet, more recent empirical evidence elsewhere contradicts this by showing how SMEs are unable to internationalize during the early stages of their existence (Freeman et al., 2006; Anderson and Wictore, 2003; Moen and Servais, 2002; Madsen et al., 2000). Lopez et al. (2009) posit that despite having limited resources and little knowledge in organisational learning, by adopting advanced ICTs SMEs can mitigate their internationalization barriers towards an accelerated internationalization, as many researches show that innovations in the Internet can help firms to be more focused on their marketing orientation and chase up a series of successful operations rather than acquiring sequential knowledge in the target markets (Jones, 2012; Sivarajah et al., 2016; A-Ortiz and F-Ortiz, 2010; Ramaseshan and Soutar, 1996). Therefore, the dynamic capabilities offered by innovations in ICT can lead to efficiencies when small firms are able to boost their limited resources towards gaining of their competitive advantages by mitigation of barriers to speed up their internationalization from the nascent stages (Weerawardena et al., 2007).

Mainly, the competitive advantage of these firms can be identified by two main factors. Firstly, firms need to follow a similar behaviour pattern in identical markets where the technological capability of management in an extended value-chain can be similarly applied in other markets to experience an accelerated internationalization. Secondly, a firm has to be a pioneer in order to access the host's market-resources in an accelerated internationalization. This approach is known as BGs and it makes the rivalry tighter in terms of entering markets (Hilmersson & Johanson, 2016; Oviatt & McDougall, 1994, 1999, 2005; Madsen & Servais, 1997). McKinsey and Co. (1993:4) define BGs as "*firms that view the world as their marketplace from the outset and see the domestic market as a support for their international business*". Furthermore, due to inherent features of BGs, they are able to spread rapidly

and globally, as other empirical evidence has shown some companies wait only a few days or weeks before entering a new market (Kim, 2003). Moreover, Kudina, et al., (2008:38) discussing BGs states, "*some companies rapidly become players on the global stage, often much faster than larger competitors do.*"

2.1 Internationalization barriers

With regards to internationalization, many studies have been conducted to identify export barriers (e.g. Shaw and Darroch 2004; Fillis 2002; Leonidou 2000; Bell, 1997; Crick, 2002). Leonidou (2004:281) defines export (Internationalization) barriers as *"all those constraints that hinder the firm's ability to initiate, develop or sustain business operations in overseas markets".* Due to increased globalisation and decreasing barriers to firms' internationalization, a new trend of internationalization has taken placed because of increasing globalisation and decreasing barriers to firms' internationalization. Many studies have discussed this trend by explaining how advances in ICT have contributed and enabled firms to compete vigorously (Kocak & Abimbola, 2009; Cavusgil & Knight, 2009) with other competitors in the home and global markets (Leonidou, 2004; Barnes et al., 2006; Da Rocha et al., 2008). Yet, internationalization remains a major challenge for many EM-SMEs, particularly those operating in markets that are influenced by both external and internal Informational and Marketing barriers. This study has developed a new taxonomy for the EM-SMEs' internationalization barriers in the EMCs. The '*Informational Barriers*' (IBs) refer to any limitation in collection and processing of information in the target market. The results of a study conducted by Dutot et al., (2014) showed that a better match between IT capabilities and information requirements for SMEs does indeed exert a positive influence on internationalization performance. The '*Marketing Barriers*' (MBs) refer to those barriers that hinder firms in the foreign markets because of difficulties in marketing mix activities in international markets (Bose, 2016; Leonidou, 2004). Table-1 offers a synopsis of the studies that have identified the barriers to EM-SMEs' internationalization. These barriers are classified based on the earlier discussion of evidence in this paper according to the two groups of *Informational* and *Marketing*.

[Table 1 near here]

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2.2 Cloud computing utilization in internationalization

Extant literature highlights that the prevalence and internationalization of new and small firms are hugely based on the emergence of advanced innovations in ICT along with the influence of the easiness in free trade of global economic integration, free capital mobility and mitigation of international trade barriers (Knight & Cavusgil, 1996; Kocak & Abimbola, 2009; Cavusgil & Knight, 2009). One of the key drivers of these influences is the Internet (Bell and Loane, 2010). Latecomers such as developing countries imitate developed countries in the adoption of advanced ICT in order to benefit from the same potentialities of technological opportunities, as utilising these technological potentialities can assist developing countries to minimise the economic gap between themselves and their developed counterparts (Fong, 2009). As Matthews (2006) sees, the pivotal elements of "*Learning, Leverage and Linkage*" are the strategic approaches for the firms from the emerging markets to penetrate developed markets. By leapfrogging and the adoption of advanced technologies the developing countries are able to alleviate the barriers to the growth of their economy, as well as increasing the likelihood of excelling in developed countries in economic growth. As the "technology leapfrogging" implies the adoption of advanced technology in an area in which the prior technology has not been adopted earlier and as a result of this fact, technological leapfrogging has become an attractive impulse for the developing countries (Fong, 2009). Thus, the adoption of technology by EM-SMEs could be considered a strategic path that enables them to maintain their competitive advantages over larger businesses, leverage operational and communication efficiencies, and overcome locational and temporal barriers (Badrinarayanan &West, 2010). CC is a prime example of how innovations in ICT and the Internet can be combined to help accelerate the internationalization process of EM-SMEs by overcoming deficiencies in their computing infrastructure (Ensley, 2005). The CCU would be an easier path to adopt for EM-SMEs who may lack the technical knowledge in terms of installing, maintaining, and updating software (Parikh 2009; Gruman & Knorr, 2008). In addition, CC potentially offers EM-SMEs access to a series of levels of usage and infrastructure for adoption (Grossman, 2009) so that these firms could adjust their demands based on their capacities to turn their finite inventories into additive throughput by accessing high-quality software and hardware (Marston et al., 2011).

The biggest potential benefit of the adoption of CC is its potential to eliminate the huge costs associated with in-house hardware and software maintenance (Jones et al., 2017; Sultan, 2010). By utilizing CC, EM-SMEs are able to avoid the costs associated with expert labour, installation,

operation, maintenance, upgrading and troubleshooting (Tsao et al., 2011) as CCU delivers infrastructure, platforms, and software to customers on a subscription-based pay-per-use model (Armbrust et al., 2010). Mell and Grance (2011:2) at NIST define CC as; "*a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service*". CC as an advanced technology not only has the potentiality to convert firms to BGs, but also the technology enables firms to control their resources remotely from their geographical advent. For instance, firms can load their web pages, through uploading limited information in a preassigned capacity grid[1]-web-based internet (Vaquero et al., 2008; Sivarajah et al., 2015). Therefore, CC enables enterprises to benefit from a dynamic environment where, SMEs are able to set up their businesses virtually on a flexible infrastructure (Armbrust et al., 2010; Mell & Grance, 2011).

2.3 Research hypothesis and model development

In order to investigate the effectiveness of CCU in mitigating the EM-SMEs internationalisation barriers, this study has developed a new model based on the definition of CC by NIST (Mell & Grance, 2011:2), and the concept of technology adoption theory. The adapted elements of application, storage, share, networking, and communication were extracted from the CC definition to quantify to what extent these elements are effective in mitigating the EM-SMEs' internationalization barriers where the factors of marketing, learning orientation and the entrepreneurial processes adopted in creating firms keep the competitive advantages for the EM-SMEs in an international market (Kocak & Abimbola, 2009; Cavusgil & Knight, 2009). Therefore, this research study has developed a model to scrutinize the EM-SMEs' internationalization facilitated by CCU to mitigate their informational and marketing barriers, in order to control their limited resources which have been caused by a series of deficiencies in capital, knowledge of the target market, management skills, knowledge of computer science and encountering proper infrastructure. It is highlighted that the control of resources is an important strategy in internationalization where "*trade secrets, embedded technological knowledge as well as managerial, marketing, and production skills which are valuable, difficult to imitate, and*

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[1] "*A system that coordinates resources which are not subject to centralized control, using standard, open, general-purpose protocols and interfaces to deliver nontrivial qualities of service*" (Vaquero et al., 2008:53).

provide the competitive advantage needed for internationalization", (Dlugoborskyte and Petraite, 2013:9).

Therefore, based on the aforementioned definitions and theories, this research study through an empirical quantitative analysis, intends to investigate the role played by CCU in potentially mitigating the internationalization barriers that are currently faced by EM-SMEs. Table-2 proposes four solutions for IBs and fourteen solutions for IMs by CCU for internationalisation of EM-SMEs.

[Table 2 near here]

Therefore, according to the EM-SMEs' Informational and Marketing Barriers in internationalisation, and the proposed solutions for the mentioned barriers the following hypotheses are proposed:

H_1: CCU has a significant positive effect on the mitigation of Informational Barriers for EM-SMEs' internationalization.
H_2: CCU has a significant positive effect on the mitigation of Marketing Barriers for EM-SMEs' internationalization.

Figure-1 illustrates a schematic framework of this research study that examines the effectiveness of CCU for mitigation of IBs and MBs to EM-SMEs' internationalization.

[Figure-1 near here]

3.   Research methodology

Based on a positivist philosophy, this study is conducted deductively to investigate the interrelationship between facts and observable occurrences. A quantitative method is applied to measure the cause and effect of variables in an array rather than to analyse processes of a trend (Denzin and Lincoln, 2007), along with a Likert survey to construct the questionnaire appropriately for a quantitative research strategy (Saunders et al., 2012). Generally, data collection with survey strategy

is connected with a deductive approach, where a research study commences a theory and follows its hypotheses in order to test whether these hypotheses are significant or not (Bryman and Bell, 2011).

The rationale for mapping the questionnaire in this research is to require the participants to answer series of closed-ended questions to distinguish to what extent their companies have been integrated with the use of CCU for IBs and MBs classified in table-2. Therefore, based on the NIST CC definition (2011:2), a self-administered questionnaire was designed to elicit from the participants an indication of how many different apps (application, storage, share, networking, and communication) they use on their smartphones, tablets, and computers in order to facilitate IBs and MBs in their international business activities (see Appendices A1& A2).

3.1 Developing the constructs

3.1.1 The variables associated with EM-SMEs+CCU

The construct of 'EM-SMEs+CCU' is used to quantify the integration of EM-SMEs with CCU, as we deconstructed the definition of CC by NIST (Mell & Grance, 2011:2) into five independent variables (*i.e.* application, storage, share, networking, and communication). This helped the study to find out to what extent respondents are facilitated by use of various CC applications to mitigate their internationalisation barriers. Therefore, the research's constructs have been composed of five independent variables: INTapplication, INTstorage, INTshare, INTnetworking, and INTcommunication and consequently, a survey was designed using a series of closed questions to enumerate these applications that might well be used among the EM-SMEs. The INTapplication variable indicates the degree of EM-SMEs' integration with various applications they use in their daily tasks. In the questionnaire, questions Q32 and Q36 were designed to quantify the number of uses of various applications by the respondents. The INTstorage variable indicates the degree of EM-SMEs' integration with different applications that enable them to store their documents in the clouds. Question Q34 was designed to quantify the number of applications the respondents use to store their business documents in the clouds. The INTshare variable indicates the degree of EM-SMEs' integration with those applications in which these firms can share their data with other partners. Question Q35 was designed to quantify whether the respondents use cloud applications to share their business documents with other colleagues or businesses. The INTnetworking variable indicates the

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degree of EM-SMEs' integration with various applications in which they can establish networks among different stakeholders. Question Q37 was designed to quantify the number of various applications that the respondents use to socialize and build networking for business purposes. The INTcommunication variable indicates the degree of EM-SMEs' integration with a series of applications in which these firms can communicate with their partners and customers. Questions Q38 and Q39 were designed to quantify whether the respondents prefer to communicate by direct telephone calls or by using various applications on their gadgets (Appendix A1).

The outcome of the survey as shown in Table-3 indicates descriptive statistics of the participants' integration (EM-SMEs) with CCU, as it shows that all participants have utilized different types of CC applications for storing, sharing, networking, and communicating with other international partners. As a result of this, the construct could assist us to find out the magnitude of EM-SMEs' integration with the CC applications (EM-SMEs+CCU construct).

[Table 3 near here]

3.1.2 The variables associated with internationalization barriers (IBs & MBs)

Based on the literature reviews, this study extracted internationalization barriers on two constructs of Informational and Marketing barriers as dependent variables (DV) for its theoretical framework.

The IBs and MBs constructs:
The DVs of IBs and MBs constructs were measured in accordance with the studies, which have been gathered in table-1. In the questionnaire, participants were asked to measure the influence that the proposed CC solutions have on their international business in order to mitigate IBs (Q3 and Q4 -two items) and MBs (Q13MARK, Q14MARK, Q15MARK, Q16MARK, Q17MARK, Q18MARK, Q19MARK and Q20MARK -eight items), as this research study ultimately intends to find whether CCU is effective in mitigating IBs and MBs to EM-SMEs' internationalization (see Appendix A2).

Table-4 shows the descriptive statistics of two constructs of internationalization barriers that were collected from the participants, where they were asked to rate the aforementioned questions in

appendix-2 as to what extent CCU could facilitate to mitigate the barriers. The five-point Likert scale used in the questionnaire measured the extent of agreement based on Strongly Disagree=1, Disagree=2, Neutral=3, Agree=4 and Strongly Agree=5.

[Table 4 near here]

3.2 Data collection

The aim of data collection in this research was to capture a qualified snapshot of evidence from a population to generalize and to find credible answers to the proposed research-questions. The accuracy of collecting data is essential for preserving the honesty of this research study. Therefore, it is essential to ensure that the method of data collection is valid and accurate and the data has been gathered based on the argument of the research study (Sapsford, 2006; Jupp, 2006).

According to the geographical context of this study, Iran and Turkey as two Middle Eastern countries were chosen for sampling purposes to generalize the EMCs. Arguably they each possess good economic and business potential, whilst each has a set of contrasting economic and institutional capabilities and constraints, resulting in very different risks and challenges for SME development, internationalization potential and the adoption of innovative ICT (WEF, 2017).

Turkey, as a member of the Group of Twenty (G20) countries, has achieved a good record of economic growth and SMEs development since 2000 and is seeing considerable progress in terms of business take-up of the latest technologies. Its economy and businesses continue to be held back, however, by the weaknesses of its institutional framework, its labour market rigidities, and the inefficiency and instability of its financial markets. Iran also has considerable economic and SMEs development potential, but its economy and businesses continue to suffer from various economic sanctions that have been in place for a number of years. Its businesses are generally less innovative than those of Turkey but are showing good catch up potential, although they continue to be held back by Iran's institutional, labour market and financial weaknesses.

The target population of this research was focused on SMEs from two EMCs. The data samples were collected randomly (Hair et al., 2010) from these two countries by means of an online survey from CEO who established their own companies (EM-SMEs) and the senior managers working in these firms. These two countries represent a spectrum of opportunities and constraints in the EMCs.

One of the common and popular methods for collecting data is a survey. This method enables researchers to collect the required data for statistical analysis and ultimately to generalize the outcomes for a population (Collis & Hussey, 2014). In addition, a survey is considered as an efficient approach for collecting a considerable amount of data from a major population and assisting the researchers to a have a power and control over the procedures (Saunders et al., 2009), where the ultimate intention of the survey research leads to a generalization (Creswell, 2003). Moreover, Creswell (2003) identifies four types of survey namely: structured observations, interviews, questionnaires created by self-administration, and reviews by structured record such financial information. Based on these classifications in this study, the data were collected by a questionnaire which was developed by a self-administered and piloted instrument for each aforementioned construct, and disseminated by the use of SurveyMonkey® (an online survey development website) in three languages: English, Farsi and Turkish, and the link to the survey was randomly distributed among 950 SMEs in the two countries, Iran and Turkey, from 15th Dec. 2015 to 10th March 2016, targeting the CEOs and top managers and posted to various business communities representing EM-SMEs.

The advantages of an online survey are that it is relatively easy to manage; in comparison to another collecting method it can be produced in lesser time; it can be managed remotely through an online questionnaire. This method can be conducted conveniently beyond geographical boundaries; moreover, a survey has the capacity for data collection in a large quantity. However, the survey's questions can be interpreted differently by different participants and errors can be caused. In order to minimise this defect, the questions were translated from the English language to the context languages.

A series of random firms in different industries were selected from the official websites in both countries such as "*Turkish-Manufacturers.com*" which is "*Turkish SME's Trade Development Center*" and certified by the Republic of Turkey Ministry of Economy and in Iran the official website of

"*Trade Promotion Organisation of Iran*" affiliated to the Iranian Ministry of Commerce, the Tehran Chamber of commerce and the profile list of major Iranian exporters.

A simple random sampling requires each member of a population to have an equal chance to be selected, as the sample needs to be collected properly in order to achieve generalizability; a core principle of random sampling is that all elements in the researcher's target population have an equal chance of being selected for inclusion in the study. In addition, in some cases and on infrequent occasions, this research study has used the snowball-sampling strategy. As stated, "*Snowball sampling also includes relying on previously identified group members to identify others who may share the same characteristics as the group already in place*" (Henry, 1990:21). In addition, this research study has identified other SME clusters in social media such as LinkedIn, Twitter and Telegram which are active in supporting, businesses in these two countries. In response, a total of 243 questionnaires were collected, consisting of 114 participants from Iran and 129 participants from Turkey. Sixteen incomplete questionnaires were deleted and 227 valid questionnaires were used for data analysis in this research study.

3.3 Applied technique

This study deployed Analysis Moment of Structure (AMOS) Ver. 21 software and performed Structural Equation Modelling (SEM) on the collected data. The SEM is a technical method for estimation of a series of regression equations in a research study (Janssens et al, 2008). Many scholars have identified the SEM as a mixture of factor analysis, analysis of regression and/or path analysis (Janssens et al. 2008; Hox and Bechger, 1998). This study made use of from path analysis and confirmatory factor analysis (Hair et al., 2010) to analyze the covariance and causal modelling.

Moreover, the SEM applied in this study enables the researcher to apply a series of factor analyses as well as regression tests to its models (Abramson et al., 2005). The application of factor analysis is to reduce a series of variables to a set of lesser basic factors. This enables the study to extract those variables that can be loaded as main factors. Eventually, the factor analysis and the analysis of multiple regressions enable the researcher to find and specify the existence of logical relationship among dependent and independent variables in this study (Tabachnick and Fidell 2001).

4.   Data analysis

4.1 Constructs reliability

In addition to assessing the designed questionnaire internally in a pilot study, we performed additional tests to carry out the SEM technique. According to Cronbach's alfa reliability test, the internal consistency of the questionnaire was evaluated based on how items in a group were closely related to a set where Bryman and Bell (2007) define reliability assessment as the consistency of a motion measurement. Moreover, the results of this study highlight that the internal constancy of IBs, MBs and the CCU constructs have high reliability (Hinton et al., 2004). In addition to Cronbach's alfa test, KMO and Bartlett's Test were conducted to examine whether the variables in a sample were adequately correlated (Janssens et al., 2008; Field, 2009; and Hair et al., 2010) with each other and according to Bartlett's Test how homoscedasticity or homogeneity of variances are equally variated across the set. Based on the outcomes of the result, the designed questionnaire was suitable for the confirmatory factor analysis (CFA) (Hinton et al., 2004) as outcomes for the KMO measures were found to be 0.847, which was greater than 0.6, and the result on Barlett's Test of Sphericity's significance was 0.000, which was less than 0.05, which was therefore significant (Appendix A3).

4.2 The measurement of initial and final models

Based on the NIST CC definition (2011:2), the magnitude integration of EM-SMEs was measured by five independent variables in this study. The factor loadings of these variables were respectively as follows: NTapplication (0.700), INTstorage (0.860), INTshare (0.367), INTnetworking (0.873) and INTcommunication (0.763). Despite obtaining a low factor loading of 0.367 for the item of INTshare, this factor was not deleted in the initial model; hence this item is considered as an independent variable in this research study with regards to NIST's definition (Mell & Grance, 2011) of CC and also, the outcome for this item is consistent with another study that found SMEs do not want to use cloud for sharing and collaboration, and these firms prefer their old conventional methods for sharing and collaborating with their stakeholders (Gupta et al., 2013).

Because of the low factor loading of the three items Q16MARK (0.047), Q17MARK (0.069) and Q19MARK (0.159) in the initial model, these items were deleted. Other items in the Final Model were able to obtain at least four fitted tests for confirmatory factor analysis (CFA); in addition, the outcomes

of the CFA indicate that the Final Model does not need refinement in order to achieve the acceptable level of indices for being fitted (table-5), therefore, the Final Model was accepted (Hair et al., 2010). Moreover, in this model, the indices attained the minimum recommended criteria (Anderson & Gerbing, 1984) and fit for the acceptable thresholds that have been previously suggested by Hooper, Coughlan and Mullen (2008). Due to the satisfactory results of the goodness of fit indices in the Final Model, the model is accepted for further measurements such as reliability and validity assessments, structural model testing and testing of the proposed hypothesis.

[Table 5 near here]

4.3 Composite reliability and validity

Table-6 presents the reliability and validity of the constructs, which have been created for this research study.

[Table 6 near here]

4.4 Confirmation of the structural model and research hypotheses

The structural model approves the relationships among the factors that have already been proposed in the research as the CFA of the Structural Model obtained the minimum acceptance in the goodness of fit for the model. Figure-2 illustrates the path regression-weights of relationships in the proposed conceptual framework. In addition, the hypotheses in this research study are examined by interpreting the significant path of each relationship. The two hypotheses of this research study are examined by using the standardized estimate, critical ratios (C.R.)/t-value and p-value. The critical ratio or t-value can be calculated by dividing the regression weight estimate (Estimate) by standard error (S.E). Thus, relationships between variables are significant when t-value is more than 1.96 with a p-value of <0.05. The outcomes for path estimates of the two hypotheses in this study show that the two paths EM-SMEs+CCU → IBs and EM-SMEs+CCU →MBs in the Structural Model are significant as the calculations report that the C.R. or t-values are above 1.96 and the p-value is <0.05. Moreover, the outcomes show that there is a significant and positive association between 'EM-SMEs+CCU' with IBs

and 'EM-SMEs+CCU' with MBs that respectively have a path regression-weight value of 0.270, and 0.210. Consequently, the hypotheses H_1 and H_2 are supported.

<div align="center">**[Table 7 near here]**</div>

5.   Discussion and synthesis

5.1 Informational barriers (IBs)

According to the extant literature, IBs refers to the factors that hinder the EM-SMEs' internationalization because of lack of adequate information and data about the target markets (Da Rocha et al., 2008; Pinho and Martins, 2010; Shaw and Darroch, 2004). The results of this study found the CCU by EM-SMEs (EM-SMEs+CCU) has a significant positive impact on IBs with a path estimate of 0.270, t-value of 2.110 and a significant p-value of <0.05 and consequently the hypothesis (H_1) is supported and more broadly, the concept of generalizability can be deduced by moving from observations to a hypothesis.

Our findings show that the respondents identify customers' information by use of search engines through home/foreign official websites (Q4INFO), as the standardized regression weight between 'Barriers Mitigated by CCU' and this item is 0.601, with t-value of 3.045 and a significant p-value of <0.05. Consequently, our findings support empirically the proposed solutions of S1 & S3 for the barriers of IB01 & IB03. The results are also consistent with the prior studies of Purcell (2014) and Pérez-López and Alegre (2012) who argue that competency in a highly integrated IT can facilitate firms to access the right information effectively and quickly by the use of search engines. The new generation of search engines have been equipped with new algorithmic engineering that works based on Cloud ontology, such as a set of Cloud concepts, individuals of those concepts, and the relationship among those individuals, whereas the previous generation of web search-engines looked up and

<div align="center">17</div>

classified the search items on the basis of semantic algorithms (Kang and Sim, 2011; Iovan & Daian, 2013). These findings are also consistent with the study of Villars, Olofson, and Eastwood (2011) who posit that CCU provides SMEs with adequate privilege to access high volumes of data and information storage that is refined and analysed appropriately. As Purcell (2014) emphasises, CCU enables firms to utilize big data technology more conveniently and with less obligation.

Our findings also reveal that the respondents find effective information for trading opportunities on home/foreign official websites (Q3INFO), as the standardized regression weight between 'Barriers Mitigated by CCU' and this item is 0.609, with t-value of 2.193 and a significant p-value of <0.05. Consequently, the findings support empirically the proposed solutions of S2 & S4 for the barriers of IB02 & IB04. It can be inferred that the respondents benefit from appropriate data stored and shared in home/foreign official cloud-based websites to gain effective information. Moreover, the findings show that CCU enables EM-SMEs to enhance their informational capabilities as well as providing constant awareness of possible business opportunities in the foreign markets (Kumar et al., 2017; Iovan & Daian, 2013).

5.2 Marketing Barriers (MBs)

Marketing barriers refer to those factors that hinder the EM-SMEs' internationalization because of an inadequate marketing and communication mix in target markets (Da Rocha et al., 2008; Julian and Ahmed, 2005; Crick, 2002). Results found that CCU by EM-SMEs (EM-SMEs+CCU) has a significant positive impact on MBs with a path estimate of 0.210, t-value of 2.110 and a significant p-value of < 0.05 and consequently hypothesis (H_2) is supported. The concept of generalizability can be deduced by moving from observations to a hypothesis.

Our findings show that the respondents use various social networking applications to collect useful information from target markets in order to develop their product/service based on the needs of the target market (Q13MARK), as the standardized regression weight between 'Barriers Mitigated by CCU' and this item is 0.690, with t-value of 11.192 and a significant p-value of <0.05. Consequently, the findings support empirically the proposed solutions of S24, S25 and S26 for the barriers of MB24, MB25, and MB26.

The solution of S24 is consistent with prior studies by Tapscott (2008) that emphasize firms' possibility to observe directly and evaluate the market needs and requirements by a direct route. Moreover, our findings are consistent with those of Bell & Loane (2010), and Ching & Ellis (2004), since both studies show that CCU enables firms to overcome the greatest challenge in selling internationally. As competition increases in international markets, firms are persuaded to use advanced Internet applications to facilitate their involvement in many international activities. Furthermore, the outcomes of this research study are consistent with the prior studies by Blesa and Ripolla (2008) and Zhang et al. (2009) that argue CCU enables firms to pursue efficient and successful marketing approaches in terms of acquiring superior knowledge in '*market-sensing*', '*customer-linking*', and '*channel-bonding*'.

In addition, the solution of S25 is consistent with the prior study by Pérez-López and Alegre (2012) who argue that competency in information technology such as CC leads to knowledge management processes and directly affects market performance. The results are also consistent with prior studies in which it is argued that knowledge management processes contribute to product quality and new product development (Pérez-López and Alegre, 2012; Ho, 2009). Therefore, CCU enables EM-SMEs to gain effective knowledge-based facilities that can lead them to know how to use knowledge appropriately for improving productivity, creativity and sustainability in market performance. Consequently, the CCU enables EM-SMEs to benefit from the knowledge base that leads them to produce and develop standardized products of quality in line with the needs of the target market (Ujaley, 2018; Pérez-López and Alegre, 2012; Cavusgil and Knight, 2009; Lin and Kuo, 2007).

Furthermore, the results show the solution of S26 is also consistent with prior studies that posit that the CCU enables firms to significantly mitigate the level of cost of hiring more employees (Jones et al., 2017; Sultan, 2010; Forrest, 2009). This capability enables SMEs to invest in the preference for niche-market products (Ujaley, 2018; Marston et al., 201; Sultan, 2010). In addition, applications such as Google Analytics, search engines and social networks, can track visitors and referrers by pull marketing. They also track display advertising, pay-per-click networks, email marketing and digital collateral such as links within PDF documents (Marston et al., 2011) in order to collect valuable information based on tastes and orientation in the foreign market.

The outcomes of this study show that the respondents use various applications such as email, networking, storing, data sharing, and audio-visual communications to facilitate the duties of after-sales service (Q14MARK), as the standardized regression weight between 'Barriers Mitigated by CCU' and this item is 0.772, with t-value of 11.517 and a significant p-value of <0.05. Consequently, the findings support empirically the proposed solution of S12 for the barrier of MB12. Therefore, the results are consistent with prior studies that argue SMEs are able to reduce the costs of post sales services and to support their customers over large geographical distances in order to maintain their competitive advantage (Jones et al., 2017; Noyes, 2015; Zackariasson and Wilson, 2004).

The outcomes reveal that utilizing various applications assist respondents to reduce their general costs in order to produce cheaper products/services (Q15MARK), as the standardized regression weight between 'Barriers Mitigated by CCU' and this item is 0.764, with t-value of 11.464 and a significant p-value of <0.05. Consequently, our findings support empirically the proposed solutions of S21 & S22 for the barriers of MB21 & MB22. Therefore, the solution of S21 is consistent with the prior studies by Suciu et al. (2014), Interoute (2012) and Armbrust et al. (2010) as these studies discuss how due to the 'pay-per-use' model, the CCU enables firms to reduce the cost of production and offer customers reasonable finished prices. This means that there would be no need for upfront payment fees for licences, hardware and software installation, maintenance and hiring expert labour. Moreover, price setting represents one of the strategic keys for a company that leads to longer term business.

Furthermore, the outcome for solution S22 is consistent with the prior studies by Jones et al., (2017), Bell and Loane (2010), and Mell and Granc (2011) who argue that CCU assists firms to reduce their general costs towards producing at lower costs. In addition, this technology enables firms to benefit from provisional substitute services that can eliminate the entrance barriers of all rivals in a tighter economy. The positive aspect of CCU is also to increase rivalry and consequently, this leads to reducing the prices of products and services of other competitors. The CCU also empowers firms to be substantially cost effective and to be able to benefit from capabilities in marketing to enhance awareness and speed up delivery. For example, increasing demand for 4G broadband smart devices in the Korean telecommunication market has caused the increased use of mobile applications which work under web 3.0 generation on the clouds; these services have strengthened competition among advertising industry players in the more complex ecosystem to advertise intelligently with focusing on

targeted marketing and applying marketing insights for mobile advertising and consumer segmentation in the cloud era. Furthermore, the findings are consistent with prior studies by Cheng et al. (2014) and Kim et al. (2011) who argue that electronic systems of distribution provide facilities for both customers and suppliers to communicate through means of CC as a '*bridge*'.

We also found that the respondents have not effective applications to assist them in the distribution channels of the target markets (Q16MARK), as this item was deleted for the final CFA model because of low factor loadings (0.047). Consequently, the proposed solutions of S14 for the barrier MB14 is rejected empirically where, the findings are inconsistent with EM-SMEs' experience and with the prior studies of Chen et al. (2016) that argue the dimensions of CC portal interface, usefulness, service-oriented and functions make SMEs to perceive more outcomes for organisational performance in order to link up with competent representatives. In addition, the proposed solutions of S17 & S18 for the barriers MB17 and MB18 are rejected empirically. Therefore, the findings are respectively inconsistent with EM-SMEs' experience and with the prior studies of Kumar et al. (2017), Cheng et al. (2014) and Kim et al. (2011) who discuss how CCU facilitates the transaction between customer and supplier more effectively, as this technology helps EM-SMEs to cut costs by streamlining their business processes, harnessing improved and faster communications with their customers, and enhancing product distribution through expanding utilization of online channels.

We found that the respondents have not been assisted by any CC applications to be consistently connected with their representatives in foreign markets in order to foresee any deficits in the markets (Q17MARK). This item was deleted for the final CFA model because of low factor loadings (0.069). Consequently, the proposed solution of S19 is rejected empirically, as the results are inconsistent with EM-SMEs practice and with other prior studies by Lindner et al. (2010) and Cheng et al. (2014) who argue that CCU enables firms to benefit from the cloud supply-chain facility and also enables them to provide a network of interconnected businesses in the CC environment. This facility enables them to have an '*end-to-end*' supply chain management for their products and services for their customers.

The results show that the various applications assist the respondents and their agents to gain proper information for warehousing in target markets (Q18MARK), as the standardized regression weight between 'Barriers Mitigated by CCU' and this item is 0.601, with t-value of 8.867 and a

significant p-value of <0.05. Consequently, our findings support empirically the proposed solution of S20. The outcomes are consistent with the prior studies by Zackariasson & Wilson (2004), Li et al. (2012) and Mishra et al., (2012) who argue that CCU enables firms to be logistically active in host countries in terms of transportation, warehousing, distribution, information and collecting feedback. These activities need to be handled by using proper and efficient ubiquitous software and applications that are supported by IT systems in target markets.

We also found that the respondents have not been assisted by any CC applications in order to pay lower insurance and transportation costs due to access to information such as weather conditions, road and travel safety, environment protection, and traffic awareness (Q19MARK). This item was deleted for the final CFA model because of low factor loadings (0.159). Consequently, the proposed solution of S13 is rejected empirically. Therefore the findings show that the EM-SMEs have not yet benefitted from the facilities mentioned in order to pay lower costs for transport and insurance. The findings are inconsistent with EM-SMEs' experience and with the prior studies by Bitam & Mellouk (2012) and Marston et al. (2011) who argue that the Intelligent Transportation System on the cloud, (ITS-Cloud) can improve the long-distance transportation. Rick Zaffarano, vice president, consumer products solutions, Transportation Insight, Hickory, NC has stated, "*Cloud computing is becoming the norm within supply-chain management, because it allows companies to deploy transportation management solutions quickly, easily and for less cost*," (Parker, 2017). Consequently, this facility affects the risks of transportation in terms of applying lower insurance costs, and firms by exploiting the CCU are able to reduce the executive transportation and insurance costs.

Our findings reveal the respondents are able to set out efficiently some promotional activities in the foreign market and to target customers through social-networking applications (Q20MARK), as the standardized regression weight between 'Barriers Mitigated by CCU' and this item is 0.737, with t-value of 3.050 and a significant p-value of <0.05. Consequently, the findings support empirically the proposed solutions of S15 & S16 for the barriers of MB15 & MB16. The solution of S15 is consistent with the prior studies by Hsieh & Wu (2018) and Bell & Loane (2010) who argue CCU enables firms to directly run their businesses by eliminating the intermediaries, as it is widely accepted that the Internet with allied information and communication technologies facilitates firms' internationalization. In addition, the outcomes are consistent with the study by Pezderka et al. (2012) who argue that

Internet-based capabilities allow firms to avoid or to reduce their physical presence in host markets and enable them to enhance their internationalization.

Moreover, the outcome for the solution of S16 is consistent with the prior studies by Kim & Lee (2015) and Kim et al. (2011) who posit that CCU enables firms to target customers more intelligently by means of collecting useful classified information about customers' profiles in target markets, moreover, CCU enables firms to apply pull marketing as a strategic method to assess customers' behaviour in target markets.

6.   Conclusions and implications

The data were collected through self-administered questionnaires from top managers of 227 random SMEs based in Iran and Turkey (114 participants from Iran and 129 participants from Turkey) in a response rate of 23.89 percent. A brief description of the descriptive statistics of the respondents can be found in tables 3&4. Cronbach's alfa test, KMO and Bartlett's Test were conducted to examine whether the variables in a sample are adequately correlated. Therefore, the above assessments confirm that the data for the study were suitable for factor analysis. The SEM technique was used in data analysis by the use of IBM® SPSS® Amos software. The key findings of this research study shed light on the effectiveness of the CCU for the EM-SMEs to mitigate the IBs and MBs in internationalization.

The theoretical contributions of this research study include the identification of the EM-SMEs' internationalization barriers as well as categorising these barriers into two types of IBs and MBs. The contribution extends to identifying a series of CC solutions for mitigation of these internationalization barriers. In addition, this study contributes by creating and testing a new model through the use of NIST's definition where the empirical findings could contribute to the practice of CSPs and EM-SMEs where these findings enable EM-SEMs to mitigate their IBs and MBs by utilising appropriate applications in CC. Also the outcome could shed light on the areas in which CSPs and CC programmers could develop useful applications to maximize the potential for EM-SMEs' internationalization where CCU can enable these firms to think globally by acting locally.

6.1 New classification of the internationalization barriers (IBs & MBs)

This research study contributes to the classification of eighteen barriers for the EM-SMEs internationalisation in two main categories of Informational and Marketing from different studies. Table-1 has been developed to categorize four items of informational barriers and fourteen items of marketing barriers for the EM-SMEs where there is inadequacy in acquiring informational resources and difficulties in market entry *e.g.* creating new sales leads, identifying foreign business opportunities, accessing distribution channels, having surveillance over middle-men, gaining representation in foreign markets, and establishing a sustainable business (Leonidou 2000; Da Rocha et al. 2008) and marketing mix (Pinho & Martins 2010; Julian & Ahmed, 2005), could hinder the EM-SMEs internationalisation.

6.2 Cloud computing solutions for mitigating the IBs & MBs

In regards to IBs, our finding revealed that CCU facilitates EM-SMEs to mitigate the IBs significantly. The implications of other variables under this factor are as follows: the respondents believe that their firms can search for some effective information about their trading opportunities on the home/foreign official websites and social media which are deployed by CC.

The implications, of the use of the new generation of search engines also enable EM-SMEs to search for information based on ontology and conceptual algorithms rather than semantic algorithms that were being used in the algorithm of the previous generations of search engines (Kang and Sim, 2011). This technique enables EM-SMEs readily to access series of proper and adequate information by means of ubiquitous applications in a foreign market (Purcell, 2014; Pérez-López and Alegre, 2012; Villars, Olofson, & Eastwood, 2011).

In regards to MBs, our finding revealed that CCU facilitates EM-SMEs to mitigate the MBs significantly. The implications of other variables under this factor are as follows: the EM-SMEs' managers believe that their firms, through utilizing various social media applications with a series of defined networking, are able to collect useful information from target markets in order to develop their product/service based on the needs of target markets. Moreover, these managers use various applications on the clouds such as storing and data sharing, networking, audio-visual communications

and even virtual spaces for their emails to facilitate after-sales service duties (Jones et al., 2017; Noyes, 2015; Zackariasson & Wilson, 2004).

In addition, the application of CCU can reduce the administration and general costs for EM-SMEs, and these firms are able to produce cheaper products and services where the application of this strategic utilization enables these firms to produce their products at competitive prices (Vaquero et al., 2008; Armbrust et al., 2010).

Furthermore, the respondents believe that the applications related to estate agencies enable EM-SMEs to collect useful information in regard to accessing appropriate warehousing and facilities in target markets to aid these firms to optimise supply chain and logistics costs (Zackariasson and Wilson, 2004; Cheng et al., 2014).

Moreover, the survey revealed that in regards to distribution channels, EM-SMEs have not yet been facilitated by a kind of comprehensive CC application that effectively manages the path of their goods or services in order to pass until they reach the end consumer. Providing relevant applications for this purpose seems essential for the firms and the CC programmers and CSP by producing these types of application could benefit from this gap in the market. However, the respondents believe that social networking applications can be utilized efficiently for some promotional and advertising activities in foreign markets by targeting the right and potential customers.

Our findings also show that the respondents have not yet been facilitated by a series of comprehensive applications in which to encompass the holistic activities of EM-SMEs' supply chain management (SCM). The implication of this finding is useful for the knowledge of the CSPs and the CC programmers in order to provide a series of applications for SCM of EM-SMEs to ease them in their distribution channels, and to aid them to foresee any deficit in the target market and consequently to reduce costs in their target markets. Moreover, the outcomes of this study reveal that EM-SMEs need a series of applications to aid them to find and compare reasonable insurance premium prices and transportation costs available for them in the target markets.

6.3 Creating and testing a new model

This research study has contributed methodologically by creating and testing a new model to quantify the level of magnitude of integration of EM-SMEs by the use of NIST's CC definition (Mell & Grance, 2011:2). The level of magnitude of integration of these firms with CCU has been measured in the five areas of Application, Storage, Share, Networking, and Communication in order to measure to what degree EM-SMEs are successful in mitigating the IBs & MBs in their internationalisation. The findings revealed that in general, the CCU mitigates the barriers mentioned despite rejection of some solution items in each construct.

7.   Limitations of the study

Moving from observation to a universal hypothesis for generalizing the findings in this research study could be summarized in how the use of applicable numbers of appropriate sampling, approaches in data collection and the choice of techniques behind formulating the causal model has strengthened the generalizability of the outcome. While this research has attempted to investigate the effective impact of cloud computing technology in mitigation of IBs & MBs for EM-SMEs, like any research, the findings of this study should be interpreted with three limitations in mind.

Firstly, this research study used a single method (i.e. survey), which was conducted in two emerging markets. Due to the quantitative nature of the study, it was not possible to further explore some of the key issues of CCU in SMEs identified through the literature review. This research study was initially based on literature reviews leading to the development of two hypotheses which needed to be confirmed or rejected trough empirical findings. However, the constraints of the research approach applied (i.e. deductive using surveys in a particular context) could lead to a lack of generalizability of the findings (Saunders et al., 2009). For example, conducting face-to-face interviews with EM-SMEs would have enabled the researcher to further explore how CCU would help mitigate some of the informational and marketing barriers that influence SM-SMEs internationalization agenda. Secondly, the data were collected at a single point in time and changes in political and economic conditions over time can change the dynamics of international business. Therefore, the researchers of this study recommend that longitudinal studies should be conducted to further validate the findings of this study and develop new propositions. Thirdly, due to the scope limitations of this research study, other classification for EM-SMEs' internationalization barriers need

to be considered; therefore further studies need to be conducted to investigate the effectiveness of CCU in mitigation of Operational and Environmental Barriers for the EM-SMEs.

8.   References

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9. Appendix

A1

Table A1-Instrument for Integration of EM-SEMs+CCU Construct

Solution	Possible Solution	Code	Instrument (closed-ended questionnaire)
"*A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications and services) which can be quickly provisioned and released with minimal management effort or service.*" (Mell & Grance: NIST, 2011:2)	INTapplication	Q32	Have you already purchased and/or downloaded any free application for business purposes either for your mobile phone, tablet or for PC? Yes No
		Q36	Which one of the following application categories the does company use for its business purposes on your mobile phone, tablet, or PCs? o Voice Communication o Audio & Visual o Finance & Banking o Email o Promotional o Storing and archiving o Service & Maintenance o Networking o Domain and Website o Accounting o Socializing o Messaging o Searching information o Surveillance o Other (please specify)
	INTstorage	Q34	Do you store your business documents on any cloud applications? o E-mail spaces o OneDrive o Dropbox o iCloud o Google Drive o Other (please specify)
	INTshare	Q35	Do you share your business documents on internet/cloud with other colleagues or businesses? Yes No
	INTnetworking	Q37	Have you ever used any social networking for your business purpose? o Facebook o Twitter o LinkedIn o Google Plus+ o WhatsApp o Instagram o Telegram o imo o Other (please specify)
	INTcommunication	Q38	In the case of requiring communicating with your business partners or customers in a foreign country, which one of the following choices would be your first choice? o Direct telephone and mobile phone o Through mobile and PC's applications
		Q39	Which one of the following applications on your mobile phone and PC is your first communicative tools? o Skype o Line o What's app o ooVoo o Telegram o BBM o imo o FaceTime o Viber o Tango o Other (please specify)

A2

Table A2-Instrument for the IBs and MBs constructs

	Barrier Code	Solution Code	Item Code	Instrument (five-point Likert-type scale)
Informational	IB01	S1	Q4INFO	Our Company identifies customer information by using search engines in home/foreign official websites.
	IB02	S2	Q3INFO	Our Company finds effective information for trading opportunities on home/foreign official websites.
	IB03	S3	Q4INFO	Our Company identifies customer information by using search engines in home/foreign official websites.
	IB04	S4	Q3INFO	Our Company finds effective information for trading opportunities on home/foreign official websites.
Marketing	MB12	S12	Q14MARK	Utilizing various applications connected to the internet such as email, networking, storing, data sharing, and audio-visual communications can facilitate the company after-sales services duties.
	MB13	S13	Q19MARK	Due to accessing clear information such as weather condition, road and travel safety, environment protection, and traffic awareness, our company experiences lesser insurance and transportation costs.
	MB14	S14	Q16MARK	Utilizing powerful networking and convenient communication with applications on mobile phones, tablets and PCs cause our company effectively to manage distribution channels in the target market.
	MB15	S15	Q20MARK	The company is able to set out efficiently some promotional activities in the foreign market through social networking applications with targeting right customers.
	MB16	S16		
	MB17	S17	Q16MARK	Utilizing powerful networking and convenient communication with applications on mobile phones, tablets, and PCs cause our company effectively to manage distribution channels in the target market.
	MB18	S18		
	MB19	S19	Q17MARK	Utilizing various applications enable the company consistently connects with its representatives in foreign markets and this leads to foresee any deficits in the markets.
	MB20	S20	Q18MARK	Utilizing various applications connected to the internet on mobile phones, tablets, and PCs assist the company and our agents to gain proper information for warehousing in target markets.
	MB21	S21	Q15MARK	Utilizing various applications connected to the internet on mobile phones, tablets and PCs can help to produce cheaper products or services by reducing general costs.
	MB22	S22		
	MB24	S24	Q13MARK	Utilizing various applications connected to social media network can help our management to collect useful information from target markets in order to develop product/service based on their needs.
	MB25	S25		
	MB26	S26		

Table A3-KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.847
Bartlett's Test of Sphericity	Approx. Chi-Square	1756.669
	df	105
	Sig.	.000

Tables and Figures

Table 1

Table -1 The collection of Internationalization Barriers (IBs & MBs) of SMEs, adopted from different studies (Author)

TYPE	CODE		Ramaseshan and Soutar (1996)	Bell (1997)	Morgan and Katsikeas (1998)	Tesar and Moini (1998)	Dean et al. (2000)	Leonidou (2000)	Da Silva and Da Rocha (2001)	Crick (2002)	Fillis (2002)	Hornby et al. (2002)	Suarez-Ortega (2003)	Leonidou (2004)	Shaw and Darroch (2004)	Julian and Ahmed (2005)	Barnes et al. (2006)	Neupert et al. (2006)	Da Rocha et al. (2008)	Korneliussen and Blasius (2008)	A-Ortiz and F-Ortiz (2010)	Pinho and Martins (2010)	Jones (2012)	Rajendran (2015)	Bose (2016)
Informational Barriers	IB01	Inadequate data to place and analyse the target market					*	*		*	*		*	*		*	*				*			*	*
	IB02	Uncertain, misleading and timely data in the foreign market												*										*	
	IB03	Identifying opportunities in foreign markets	*			*	*	*	*	*				*	*	*	*				*	*		*	*
	IB04	The weakness of identifying and communicating with potential overseas customers												*										*	
Marketing Barriers	MB12	Difficulties in doing after-sales services in a foreign market				*	*	*		*				*		*									
	MB13	Immoderate transportation/insurance expenses	*				*		*	*		*	*	*	*	*			*		*				
	MB14	Linking with potential representatives in the foreign market												*										*	*
	MB15	Holding an effective surveillance upon intermediary in the foreign market												*										*	*
	MB16	Setting proper promotional activities in the foreign market				*	*																	*	*
	MB17	The difficulty with distribution channels in the foreign market	*			*	*	*	*	*	*	*		*		*	*	*				*		*	*
	MB18	Availability of proper		*	*		*			*				*								*		*	

Barrier Code	Description																
	distribution channels for exporting																
MB19	Difficulties to supply the product continuously	*	*		*		*				*				*	*	*
MB20	Inaccessible warehousing in the foreign market										*					*	*
MB21	Offering reasonable finished prices for consumers		*		*	*		*			*	*	*				*	*
MB22	Difficulty to offer competitive prices										*					*	*
MB24	Adapting products complying with the tastes and needs of the foreign market					*		*			*		*		*	*	
MB25	complying standards and quality based on international market criteria	*		*	*	*	*	*			*			*		*	
MB26	Other taste and orientation in the foreign market					*					*	*	*		*	*	*

Table 2

Table-2 The proposed CCU solutions for EM-SEMs' Internationalization Barriers

	Barrier Code	Solution Code	Proposed CCU Solutions	Authors
Informational	IB01	S1	Retrieving and sorting useful data stored in Cloud by search engines technologies	Purcell, 2014; Pérez-López and Alegre, 2012; Villars, Olofson, & Eastwood, 2011; Kang and Sim, 2011;
	IB02	S2	Accessing appropriate data through foreign official websites stored on the cloud	Kumar et al., 2017; Iovan & Daian, 2013;
	IB03	S3	Conducting convenient research for business opportunities through official agents' websites	Iovan & Daian, 2013; Kang and Sim, 2011;
	IB04	S4	Enabling ubiquitous, convenient, and on-demand networking access to carry out systematic research and communicate with potential customers	Kumar et al., 2017; Mell & Grance, 2011; Raymond et al., 2005; Zackariasson &Wilson, 2004;
Marketing	MB12	S12	CCU works as the main actor in networking and in doing after-sales services in an organisation	Jones et al., 2017; Noyes, 2015; Zackariasson & Wilson, 2004;
	MB13	S13	Improving road safety, travel reliability, informed travel choices, and traffic resilience to moderate transport/insurance costs	Parker, 2017; Marston et al., 2011; Bitam & Mellouk, 2012;
	MB14	S14	Capabilities in linking up with competent representatives	Chen et al., 2016; Zackariasson and Wilson, 2004;
	MB15	S15	CCU enhances direct networking and eliminates the intermediaries	Hsieh & Wu, 2018; Kumar et al., 2017; Tsao et al., 2011;
	MB16	S16	Enable digital promotion through STP strategy	Kim and Lee, 2015; Kim, Kim and Lee, 2011;
	MB17	S17	Assisting to facilitate distribution channels in the foreign market	Kumar et al., 2017; Cheng et al., 2014; Find, 2011;
	MB18	S18	Strengthening the distribution channels by facilitating networking and communication	Kumar et al., 2017; Li et al., 2012; Mishra, Jain, and Durresi, 2012; Knight and Cavusgil, 2004;
	MB19	S19	Enabling end-to-end in the structure of the supply chain	Lindner et al., 2010; Cheng et al., 2014;
	MB20	S20	CCU can assist SMEs to access proper information	Zackariasson and Wilson, 2004; Cheng et al., 2014;
	MB21	S21	Ability to offer satisfactory prices to clients	Suciu et al., 2014; Interoute, 2012; Armbrust et al., 2010; Ensley, 2005; Throng, 2010, Botteri, 2008;
	MB22	S22	Assisting to reduce the general costs of production in order to produce at a competitive price	Jones et al., 2017; Suciu et al., 2014; Bell and Loane, 2010; Etro, 2009; Sultan, 2010; Ogawa & Piller, 2006;

MB24	**S24**	Enabling to collect analytical information, strengthening administration control, and better marketing support	Blesa and Ripolla, 2008; Zhang et al., 2009; Gulati 1998; Alvarez and Barney, 2001; Steensma et al., 2000; Coviello & Cox, 2006; Tapscott, 2008; Ching & Ellis, 2004; Jean et al., 2008; Jean et al., 2010; Yamin & Sinkovics, 2007;
MB25	**S25**	CCU enabling an effective knowledge management that can lead to producing high-quality products for a niche market	Ujaley, 2018; Moen et al., 2003; Reuber and Fischer, 2011; Lin and Kuo, 2007; Ho, 2009; Pérez-López and Alegre, 2012;
MB26	**S26**	Enabling to save up costs toward efficient niche production based on market needs	Ujaley, 2018; Marston et al., 2011; Sultan, 2010;

Table 3

Table-3 Descriptive Statistics of EM-SMEs+CCU construct

Variable items	Item Code	N	Min	Max	Sum	Mean	SD
INTapplication	Q32, Q36	227	2	15	1497	6.59	3.289
INTstorage	Q34	227	1	6	547	2.41	1.501
INTshare	Q35	227	1	2	407	1.79	0.406
INTnetworking	Q37	227	1	8	714	3.15	1.951
INTcommunication	Q38, Q39	227	1	10	828	3.65	2.097

Table 4

Table-4 Descriptive Statistics of IBs and MBs constructs

Construct	Item Code	N	Mean	SD
Informational Barriers (IBs)	Q3INFO	227	3.91	0.705
	Q4INFO	227	3.88	0.764
Marketing Barriers (MBs)	Q13MARK	227	3.84	0.847
	Q14MARK	227	3.81	0.869
	Q15MARK	227	4.03	0.703
	Q16MARK	227	3.89	0.726
	Q17MARK	227	3.86	0.772
	Q18MARK	227	3.97	0.710
	Q19MARK	227	3.86	0.824
	Q20MARK	227	3.93	0.862

Table 5

Table-5 The Confirmation of Final Model

Name of category	Name of index	Level of acceptance	Final Model
	Chi-Square	P-Value>0.05	0.000
Absolute fit	RMSEA	RMSEA < 0.08	0.064
	GFI	GFI$\geq$ 0.900	0.933
	AGFI	AGFI$\geq$0.800	0.897
Incremental fit	CFI	CFI$\geq$0.900	0.969
	IFI	IFI$\geq$0.900	0.969
	TLI	TLI$\geq$0.900	0.960
Parsimonionous fit	Chisq/df	Chi-Square/df <3.0	1.939

AGFI=Adjusted Goodness of Fit Index; CFI=Comparative Fit Index; df=degree of freedom; GFI=Goodness of Fit Index; IFI=Incremental Fit Index; RMSEA=Root Mean Square Error; TLI=Tucker Lewis Index

Table 6

Table-6 The Reliability and Convergent validity and the Correlation Matrix and Discriminant Validity of the constructs.

Construct	Item	Initial Model Loading	Final Model Loading	CR	AVE	MSV	MaxR(H)	IBs	CCUint	MBs
IBs	Q3INFO	0.774	0.774	0.741	0.589	0.441	0.742	0.768		
	Q4INFO	0.761	0.761							
CCUint	INTapplication	0.700	0.700	0.847	0.542	0.002	0.920	-0.044	0.736	
	INTstorage	0.860	0.860							
	INTshare	0.367	0.367							
	INTnetworking	0.873	0.873							
	INTcommunication	0.763	0.763							
MBs	Q13MARK	0.815	0.815	0.926	0.714	0.441	0.961	0.664	-0.003	0.845
	Q14MARK	0.859	0.859							
	Q15MARK	0.872	0.871							
	Q16MARK	0.047	-							
	Q17MARK	-0.069	-							
	Q18MARK	0.788	0.788							
	Q19MARK	0.159	-							
	Q20MARK	0.887	0.888							

Figure 1

Figure-1 – The Theoretical Model of Research Study
"The impact of CCU on the EM-SMEs' Internationalization Barriers: Informational & Marketing Barriers"
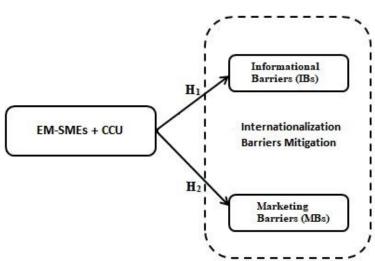
Figure 2

Figure-2 The Structural Model -The Regression Path Coefficients between the Constructs