Exploring the role of technological developments and open innovation in the survival of SMEs: an empirical study of Pakistan

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Abstract: Small and medium enterprises (SMEs) play an important role in terms of sustainable economic development. Therefore, the survival of this sector is highly important for every economy. This study theoretically and empirically explores the role of technological developments and open innovation (OI) on SME survival. The first part of this paper is based on library search and available literature on SMEs and the role technological innovations towards the flourishing of SME. Findings from this review shed some lights on the potential of social networking as part of online marketing. Furthermore, the researchers conducted a self-administrated questionnaire-based survey to empirically examine the conceptual framework. The empirical results revealed that the effect of online marketing via social media is more powerful and diverse due to its ability to reach more customers. In addition, open innovation is an effective and emerging tool in the success of SME.

Keywords: technological developments; open innovation; small and medium enterprises; SMEs; SMEs survival; Pakistan.


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1 Introduction

In current era, small and medium enterprises (SMEs) play an important role in the flourishing of any economy around the globe (SMEDA, 2012, State Bank of Pakistan, 2014; Liong et al., 2016). According to the Pakistan’s National SME Policy (2007), SME is defined as “a business with an employment size of up to 250, paid up capital of PKR 25 million and an annual turnover of PKR 250 million”. Pakistani SMEs constitute nearly 90% of all private businesses; they are employing 80% of the non-agricultural labour force; and their share in the annual GDP is 40% (Global Entrepreneurship Monitor, 2012). Furthermore, according to SBP (2014), SME financing was Rupees 287.88 billion as on December 31, 2014 showing an increase of almost 20% as compared to September, 2014. SMEs’ studies are getting more attention since early 1950s in Western countries especially after United States initiate the Small Business Administration (SBA) established by Congress under Small Business Act (Cull et al., 2006; Bischoff, 2011) however, in Pakistan; emphasis on SME is started in 1998 after the establishment of Small and Medium Enterprises Development Authority (SMEDA). Since that, from the fundamental question on SME start-up, business funding to SME internationalisation process, technology always happen to be the important variables for SME (Chong, 2012; Rahman et al., 2014). Technology alone is basically referred to the machinery, tools and instrument to speed up business operations (Radam et al., 2008; Saunila et al., 2014)
whereas innovation, on the other hand, manages to inculcate the culture of creating something new and valuable whether a new product or service, production process, structure or administrative system (Hult et al., 2004; Tseng, 2014). In general, SMEs operate at low levels of technology (Bharati and Chaudhury, 2015; Kurnia et al., 2015) which generate lower productivity.

According to Economic Survey of Pakistan (2017), 90% of the Pakistani businesses are SMEs (Ministry of Finance, Government of Pakistan, 2017) and small businesses are highly important for developing countries (Rao, 2014; Ratten, 2014; Hyder and Lussier, 2016). However, only 40% have communication software for business operation (Ahmed et al., 2010). This fact is a clear sign that SMEs have lack of IT knowledge. Furthermore, numerous research studies disclosed that most of SMEs fail within initial five years of their establishment as about 80% to 90% of SMEs fail to survive just within 5 to 10 years in the UK, the USA and Australia (Zimmerer et al., 2008; Hodgetts and Kuratko, 2004; Ahmed et al., 2010; Khalique et al., 2011). Parallel situation is in the Pakistan where SMEs failure rate is about 90% to 95% (Ullah, 2011). In addition, Syed and Shaikh (2012) revealed that e-business adoption in SMEs of Pakistan is very low and researchers also highlighted some obstacles in the success of SMEs, i.e., lack of awareness of e-business technologies, lack of resources, lack of power supply, lack of technological infrastructure, lack of proper business plan and lack of trained labour (Hyder and Lussier, 2016). The growing number of business failure and higher failure rate for infant business demands SME survival to be the centre of attention with technological and open innovation (OI) acting as the medium leading to higher survival rate. Ul Haq et al. (2014) found limited research of SMEs and highlighted the need for further research in Pakistan. In this connection, this paper aims to theoretically and empirically evaluate the relationship of technological developments and OI with the SMEs survival.

2 Literature review

2.1 The impact of technological developments on SMEs

SME has different terms and definitions according to countries. Particularly the size, full time employees and sales turnover are the main criteria in separating SME worldwide (SME Corporation Malaysia, 2011). In fact, there is no established definition of SMEs (Hooi, 2006) because it is difficult to formulate a universal definition (Scheers, 2011) as the economies of countries vary and most of the scholars adopt specific standards for SME based on specific purposes. According to the Pakistan’s National SME Policy (2007), SME is defined as “a business with an employment size of up to 250, paid up capital of PKR 25 million and an annual turnover of PKR 250 million”. In Pakistan, 90% of the overall business entities are SME. There are three major sectors in Pakistan to be exact; services, agriculture and manufacturing (Ministry of Finance, Government of Pakistan, 2017). SMEs contribute 59.59% to the GDP of Pakistan and share 80% of the total job employment (SMEDA, 2010; Global Entrepreneurship Monitor, 2012; Ministry of Finance, Government of Pakistan, 2017).
Over the years, research studies are no longer put a spotlight attention on SME challenges. Current researchers are shifting from emphasising the drawbacks to finding solution or remedy to overcome those issues. Notwithstanding the severity of SME challenges, most of the challenges are studied in a mass publication starting from the year 1994 in a survey initiated by Asia-Pacific Economic Cooperation (APEC, 1994) until the year 2009 before the topic is deemed as not current to the literature review. Then, scholars are turning their interest to study SME performance and success factor which significantly heading towards proposing frameworks and models to improve the SME industry from 2009 up till the year 2016 (Inyang and Enuoh, 2009; Coca and Alberti, 2010; Kale et al., 2010; Chittithaworn et al., 2011; Makbul and Hasun, 2011; Muñoz-Bullón and Sanchez-Bueno, 2011; Simpson et al., 2012; McDermott and Prajogo, 2012; Bayo-Moriones et al., 2013; Oyeku et al., 2014; Iorun, 2014; Basu et al., 2016; Dutot et al., 2016; Jin and Jung, 2016). Findings from these studies, proposed that technology is the determinant of SMEs’ success. Among others, Tidd and Bessant (2010) defined successful SMEs as those who innovate by adopting technologies with the intention of providing them with market competitive edge. In other words, they claimed that SMEs that practice innovation show growth and sustainable performance compared to others who do not use technology.

Further, technology also had been placed as one way to practice innovation in business. As in Littunen (2010) study, innovation is divided into four main types which are innovation in terms of product, process, market and organisational. Each of these types relies on technology as medium to innovate both through the social networking, free access to information via internet and also machines or technology tools in business operation. Overall, the author agreed that growth, success and firms’ survival are depending on the firm’s ability to innovate on a continual basis. Interestingly, it is very exceptional for researcher to highlight on SME Survival but there are also studies that mentioned regarding this issue. For instance, based on a study in 2005, Ramayah et al. (2005) had touch on the surface of SME survival by bringing up important factors to sustain a long-term business survival is to continuously keeping the relevancy and maintain business competitiveness regardless of sectors and country of origin.

Currently, references are been tailor made to match the role that entrepreneurs should play in stimulating innovation which proposed the existence of a strong connection between innovation and entrepreneurial activity (Littunen, 2010; Oly Ndubisi and Iftikhar, 2012) and portrays entrepreneurs as innovator (Schumpeter, 1965 as cited in Marcati et al., 2008; Abdullah et al., 2012). Researchers claimed that latest data on Pakistani SMEs is not available (Hyder and Lussier, 2016) however; Ahmed et al. (2010) revealed that most of Pakistani SMEs has not advanced telecommunications and interconnectivity capabilities, as only 40% SMEs have communication software. This is considered as missing link in achieving business success as online marketing which has been highlighted in past studies as the competitive strategy for SME to market themselves among other businesses (Raman and Annamalai, 2011).
### Table 1  Summary of selected literature

<table>
<thead>
<tr>
<th>Research title</th>
<th>Author(s)</th>
<th>Nature of study</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary qualitative findings on technology adoption of Malaysian SMEs</td>
<td>Abdullah et al.</td>
<td>Exploratory</td>
<td>Interview two companies in Malaysia, Internal factors: SME’s owner manager’s characteristics have significant influence on technology adoption among SMEs</td>
</tr>
<tr>
<td>Literature analysis on determinant factors and the impact of ICT in SMEs</td>
<td>Consoli (2012)</td>
<td>Literature</td>
<td>Efficient and effective performance, growth in terms of productivity, organisational expansion, new products/services</td>
</tr>
<tr>
<td>The determinants of SME succession in Malaysia, from entrepreneurship perspective</td>
<td>Gan and Almsafir (2013)</td>
<td>Quantitative</td>
<td>Individual determinants such as manage finance skills, manage social skills and manage own creativity into business is more important than environmental factors such as government support or political involvement</td>
</tr>
<tr>
<td>The social media and entrepreneurship growth</td>
<td>Jagongo and Kinyua (2013)</td>
<td>Quantitative</td>
<td>Social media tools provide greater market access and CRM which have a significant impact on the growth of SMEs</td>
</tr>
<tr>
<td>Critical success factors for ERP implementation in SMEs</td>
<td>Ahmad and Cuenca (2013)</td>
<td>Literature</td>
<td>Organisational associated factors play an important role in ERP implementation</td>
</tr>
<tr>
<td>Factors affect the success of SME in Bangladesh: evidence from Khulna City</td>
<td>Uddin and Bose (2013)</td>
<td>Interview based</td>
<td>Management skills, use of technology, government support, effective business plan positively associated with SMEs’ success</td>
</tr>
<tr>
<td>The influence of network effects on SME performance</td>
<td>Naude et al. (2014)</td>
<td>Quantitative</td>
<td>Entrepreneurial style does not influence external networking behaviour</td>
</tr>
<tr>
<td>ICT impact on SMEs performance</td>
<td>Tarutė and Gatautis (2014)</td>
<td>Comparative</td>
<td>ICT has impact on the improvement of external and internal communication and SMEs performance</td>
</tr>
<tr>
<td>Acceptance of e-marketing strategies in developing countries-a case study of Tanzania SMEs</td>
<td>Michael (2014)</td>
<td>Exploratory</td>
<td>This mode of marketing drop the marketing cost by 57% but only 27% SMEs were using e-marketing</td>
</tr>
<tr>
<td>Open innovation in SME’s of Southern Punjab Pakistan</td>
<td>Khan et al. (2015)</td>
<td>Questionnaire</td>
<td>Open-innovation (OI) is relatively new concept in Pakistan, SMEs facing the high cost of using OI.</td>
</tr>
<tr>
<td>Open innovation A new classification and its impact on firm performance in innovative SMEs</td>
<td>Ahn et al. (2015)</td>
<td>Survey based</td>
<td>Open innovation successfully enhances the SMEs’ performance</td>
</tr>
</tbody>
</table>
In addition, OI has appeared as a novel concept among researchers and practitioners (Hossain and Kauranen, 2016). This emerging concept is introduced by Chesbrough (2003, p.24) and delimited it as “open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas and internal and external paths to market, as the firms look to advance their technology”. Research studies on OI in SMEs are originating. Some researchers have already explored its different aspects, such as industrial dynamics (Christensen et al., 2005), external sourcing (Laursen and Salter, 2006), open-source strategies (Henkel, 2006; Lecocq and Demil, 2006), strategies for technology transaction (Lichtenthaler, 2008), trends and challenges (Van de Vrande et al., 2009) and the effects of diverse OI undertakings (Parida et al., 2012). Researchers argue that OI in SMEs has acknowledged less-than-expected consideration from academicians and practitioners (Van de Vrande et al., 2009; Hossain, 2013). Taking into account the significance of OI in SMEs, the paucity of research studies on OI in SMEs is really surprising. Researchers are repetitively indicating that still there is a need to investigate the in-depth role OI in SMEs (Van de Vrande et al., 2009; Wynarczyk, 2013).

Besides, world had witnessed that technology helps business to expand market share and look up for new idea for business growth. Yet, this is where the geographical expansion leads to a problem (Pirich et al., 2001; Cull et al., 2006) on how to reach the customers in distance. Again, technology comes in with emerging economy booster through the social networking (Littunen, 2010; Naude et al., 2014; Choban et al., 2015), computerised record (Saad et al., 2010; Osotimehin et al., 2012) and online marketing (Reiss, 2006; Littunen, 2010; Lee et al., 2012).

Many researchers and practitioners study these four fractions of technology as part of innovation (Littunen, 2010; Wynarczyk, 2013; Naude et al., 2014; Ahn et al., 2015; Choban et al., 2015). Some even coined these ideas as technological innovation. Technological innovations refer to the new rules and ideas with practicality and/or commercialized by entrepreneurs (Naudé and Szirmai, 2013). As documented in the OECD Report (1991), technological innovation derived from the idea of ‘innovation’ which is a process initiated by the perception of new market and/or new service opportunity for a technology-based invention; which leads to development, production, and marketing tasks striving for the commercial success of the invention (refer Garcia and Calantone, 2002).

Despite the varying perspectives for ‘innovativeness’, researchers also started to re-working on innovation success and failure (Saad et al., 2010). A number of literature from 2002 until now are looking for successful innovation and its predictors (Huang et al., 2002; Van Riel et al., 2004; Prajogo and Ahmed, 2006) for current business setting even the concept is already studied since 1982. Thus, current studies are shifting attention from evaluating successful innovation in terms of tangible result (asset, profit, financial position, etc.) to a more comprehensive picture which covers firms’ growth (Littunen, 2010; Saad et al., 2010), survivability (Ramayah et al., 2005; Littunen, 2010), customers loyalty and satisfaction (Ganiyu et al., 2012).

Over the years, SME success is a wide term used to describe the business performance regardless of financial measurement or non-financial measurement. Most of previous literatures focus on financial measurement as the key to evaluate business success. However, this evaluation is considered biased by scholars who believe non-financial measurements are also important to be assessed as SME success. In addition, SME performance is widely accepted to assess business well-being from two main
aspects from financial performance and product market performance (Lee et al., 2012; Özer and Tinaztepe, 2014) but for SME category the performance nowadays are the second priority they need to concentrate if the business cannot sustain operation (Beaver and Jennings, 2005; Reiss, 2006). Failure rate of SMEs in Pakistan is at an alarming stage as 90% to 95% SMEs fail in its initial five year (Ullah, 2011; Hyder and Lussier, 2016). Further, Small Business Administration (2014) disclosed that only one-third of all new businesses survive ten years or more. Therefore, survival is more critical to SME compared to the efforts to improve their performance. According to Eurostat-OECD Manual (2010), the survival of an enterprise is defined in the following way: An enterprise born in year 20 or having survived to year 20 from a previous year is considered to have survived in year $20 + 1$. If it is active in terms of turnover and/or employment in any part of year $20 + 1$, then it is said as survived business. Further, Longenecker et al. (2007) concluded that in small and privately-held business, data of sales and profits is often not available. Thus, number of employees or employee growth has been used as a proxy for business survival.

Apart the discoveries of the technological innovations’ impact on SME, different countries may have different results. As in under developed countries, the promising world of globalization alone cannot be satisfied by the firms due to lack of financial funding, then the innovation is no longer perceived as ways to improved business performance. In contrary, for the developing and developed countries, business sustainability through technological innovation either from social networking context, computerized record or online marketing can be achieved therefore the firm’s survivability can be secured. With the rapid changing world of internet and its impact to the SME, the fight to sustain business is more crucial than business growth and profitability. Once business survival rate is improved, then business performance will be easily maintained rather than focusing on business growth but the core issue in business cycle to progress is neglected. Table 1 is the summary of selected literature on SMEs related to current paper’s area of discussion.

Technological innovation refers to the process by which firms implement the strategy and start production of products/services that are new to the business irrespective of whether the products/services are new to their competitors or their customers or the world (Mytelka and Farinelli, 2000). In this study, social networking, computerized record and online marketing are categorised under technological innovation. Whereas, OI is the defined as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the market for external use of innovation, respectively” (Chesbrough, 2006).

2.2 Social networking

Research shows that SMEs using the internet to conduct business have higher revenues (Jagongo and Kinyua, 2013; Nobre and Silva, 2014; Omer, 2015). Social networks are no longer been placed as communication medium for individuals. However, with the vast technological advancements these days, SME needs to adopt social networking as their source of communication channel (Choban et al., 2015; Naude et al., 2014) on top of acting as the marketing tool (Nobre and Silva, 2014) for business growth. Social networking has led to the beginning of social media marketing and presented ways of communication to expand targeted customer on various internet platforms (Choban et al., 2015). On the other hand, there are also research findings that do not support the
establishment of innovation in business lead to SME growth (Jagongo and Kinyua, 2013). Theoretically, that is the reason that social networking does not only significant in assisting business to improve business performance, growth and profitability but it should also facilitate in terms of business survivability. In this study, social networking is defined as bounded groups of individuals, organisations, communities or societies are linked, where members interact, discuss and exchange knowledge via online applications (Vásquez and Escamilla, 2014). Therefore, hypothesis for this variable suggests that there is a relationship between social networking and SME survival as the more SME owners utilise social networking, the better survival rate for business can be achieved.

H1 Social networking is positively associated with SME survival.

2.3 Computerised record

Recent studies are promoting the use of computerised record as part from accounting system to have an improved process flow, reduced inventories incorrect, better data analysis and better customer service as well as improved profit margins (Fan and Fang, 2006 as cited in Jagongo and Kinyua, 2013). In advance, lack of organisational preparation of SME (Motwani et al., 2002) and resource scarcity (Beke, 2010; Padachi, 2012) is the main discussed factor that make computerised record is difficult to be implemented in business. Although computerised record had shown significant benefits for business, SME is still sceptical to use accounting software for computerised record keeping (Chong, 2012). In this study, computerised record refers to the financial records, for example the sales (sales journal), purchasing transactions (purchases journal), cash or cheque payments book, petty cash book and any other assets management using computer or digital technology (Maseko and Manyani, 2011). Given that, documents and records are based on computerised system, more quality decision making (Beke, 2010) can be achieved through easy access to the business information. As a result, hypothesis for computerised record proposes that SME Survival can be improved if SME implement computerised record in business operation.

H2 Computerised record is positively related to SME survival.

2.4 Online marketing

The Malaysian SMEs’ Masterplan 2012–2020, highlighted that there are six main key challenges which includes human capital development, access to financing, market access, legal and regulatory environment, infrastructure, as well as innovation and technology adoption. The last one reported as the most significant performance lever with the highest result on total productivity and employment growth (SMECorp, 2011). Low commercialisation set with low awareness on research and development activity (Lee et al., 2010) suggested as one of the impactful key challenges under innovation and technology adoption for SME. This is as a result from SME perception on technology that assumed innovation is costly and do not take this as an investment opportunity which leads them to be outdated and not relevant to be competed in current market (Malaysian Science and Technology Information Centre, 2008). In this study, online marketing refers to the use of digital and information technology to fulfil traditional marketing practices (Kilmartin, 2013). Overall, hypothesis for this variable recommends that the more SME
owner engage in online marketing, the more chances for business to secure SME survival.

H3 Online marketing is positively related to SME survival.

2.5 Open innovation

OI is defined as the use of “purposive inflows and outflows of knowledge to accelerate innovation and to expand the markets for external use of innovation, respectively” (Chesbrough, 2006). The OI appears as the key model that seeks to operate key organisational networks and players, (i.e., suppliers, public and private research centres, competitors, customers, institutions and universities) in order to boost innovation capabilities and the competitiveness of the organisation (Claussen and Pohjola, 2009; Wynarczyk et al., 2013). OI is an effective approach to enhance the SMEs’ performance (Ahn et al., 2015) as it enable the SMEs to react according to market changes and to meet customers’ demand and/or develop novel sale channels (Van de Vrande et al., 2009; Lee et al., 2010). Hence, this discussion leads to conclude that:

H4 OI is positively related to SME survival.

2.6 Conceptual framework

On the basis of above discussed literature, researchers draw the following conceptual framework which shows the hypothesised relationships.

Figure 1 Conceptual framework

3 Methodology

In the first part of this study, researchers employed systematic literature review (SRL) methodology (as suggested by Jesson et al., 2011) in the current study (see Figure 2). This methodology is widely used in numerous prior studies (Garengo et al., 2005; Thorpe et al., 2005; Vázquez-Carrasco and López-Pérez, 2013; De Medeiros et al., 2014; Klewitz and Hansen, 2014; Costa et al., 2016; Mbuyisa and Leonard, 2016; Ramos et al., 2016). Furthermore, this paper is based on library search and available literature on SMEs and
the impacts of technological developments on businesses. The library search encompasses from online and offline materials to article journals and chapter in a book. References are based on online databases such as Emerald, Elsevier, Wiley Online library, Google Scholar, Scopus and Web of Science. The advance search is limited to SMEs, innovation, technology developments and small businesses survival. References are only taken from article from journal, chapter from a book and full text document. Thus, limitations from this paper could be due to limited resources from databases as mentioned earlier as the search results are also excluded Sciences, Education and Health studies related to technological innovation impact towards business. Also, the SMEs references are not restricted to Pakistani SMEs but also taking into consideration worldwide SMEs progress from 2000 to 2016.

Figure 2 SRL methodology

![SRL methodology diagram]

Source: Jesson et al. (2011)
Furthermore, second part of this study based on the data collection, data analysis and empirical results. The researchers utilised positivist research methodology for data collection (Saunders et al., 2017), whereby a survey questionnaire is distributed among the managerial staff of Pakistani SMEs. This research instrument is based on the existing studies. Moreover, convenient sampling technique was used for data collection. The rationale for using this sampling method is its ability to yield data more quickly (Ahmed and Ward, 2016). This sampling technique was widely used by numerous research studies in the context of technology adoption (Altuna and Konuk, 2009; Varshney and Joy, 2015). The researchers distributed 250 self-administrated research questionnaires among the respondents; however, 190 were correctly responded. Hence, the sample of this study comprised 190 participants from the Pakistani SMEs. There is no specific rule of sample selection, however a sample of 200 respondents or more is considered to be adequate (Anderson and Gerbing, 1988; Kline, 2015). Furthermore, this data was analysed by using SmartPLS software (Ringle et al., 2005).

4 Data analysis

After yielding data, researchers developed the datasheet by incorporating the responses in the MS Excel file. Furthermore, this data was analysed by using SmartPLS software (Ringle et al., 2005). Researchers employed partial least square-structural equation modelling (PLS-SEM) to assess the data validity, reliability and to examine the hypothesised relationships among the latent variables. The rationale for using SmartPLS lies in its ability to evaluate the multiple relationships (Hair et al., 2014). Additionally, Hair et al. (2017) stated that PLS-SEM is better approach than CB-SEM. In PLS-SEM, data was analysed at two levels

1 Measurement model analysis/inner model analysis, where the reliability, validity, correlation, predictive power of the model was assessed.

2 Structural equation modelling/outer model analysis, where the beta-coefficients, standard deviation score, t-values and p-values were assessed.

Table 2  Average variance extracted, composite reliability and Cronbach’s alpha

<table>
<thead>
<tr>
<th>Construct name</th>
<th>AVE</th>
<th>Composite reliability</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended criteria</td>
<td>&gt; 0.50</td>
<td>&gt; 0.70 (Hulland, 1999)</td>
<td>&gt; 0.70 (George, 2011)</td>
</tr>
<tr>
<td>Computerised record</td>
<td>0.787</td>
<td>0.917</td>
<td>0.865</td>
</tr>
<tr>
<td>Open innovation</td>
<td>0.787</td>
<td>0.881</td>
<td>0.729</td>
</tr>
<tr>
<td>Online marketing</td>
<td>0.741</td>
<td>0.895</td>
<td>0.825</td>
</tr>
<tr>
<td>Social network</td>
<td>0.697</td>
<td>0.873</td>
<td>0.786</td>
</tr>
<tr>
<td>SME survival</td>
<td>0.818</td>
<td>0.931</td>
<td>0.889</td>
</tr>
</tbody>
</table>

4.1 Testing data reliability and validity

Constructs reliability is measured through the values of average variance extracted, composite reliability and Cronbach’s alpha. All constructs should be considered reliable if they meet the following criteria (AVE ≥ 0.70, composite reliability ≥ 0.50 and
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Cronbach’s alpha ≥ 0.70) (Hulland, 1999; George, 2011; Hair et al., 2014). The results of reliability test are presented in Table 2 which meets the recommended criteria, hence all constructs are reliable.

4.1.1 Factor loadings and cross loadings

Furthermore, constructs validity is assessed through the factor loadings and cross loadings of the latent variables. All items of the corresponding constructs should be considered valid if the factor loadings were greater than 0.60 (Hair et al., 2014). Table 3 represented the results of factor loadings (bolded values). All indicators meet the recommended criteria (see Table 3).

Cross loadings are used to assess the discriminant validity of the constructs at indicator level. All indicators should be considered valid if they possess the higher loading with their own construct (Hair et al., 2014). Cross loadings of all indicators are presented in Table 3. All indicators meet the suggested criteria, hence considered valid.

Table 3  Factor loadings and cross loadings

<table>
<thead>
<tr>
<th>Construct name</th>
<th>CR</th>
<th>OI</th>
<th>OM</th>
<th>SN</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR1</td>
<td>0.853</td>
<td>0.539</td>
<td>0.660</td>
<td>0.603</td>
<td>0.655</td>
</tr>
<tr>
<td>CR2</td>
<td>0.891</td>
<td>0.504</td>
<td>0.706</td>
<td>0.649</td>
<td>0.678</td>
</tr>
<tr>
<td>CR3</td>
<td>0.916</td>
<td>0.591</td>
<td>0.704</td>
<td>0.717</td>
<td>0.814</td>
</tr>
<tr>
<td>OI1</td>
<td>0.590</td>
<td>0.896</td>
<td>0.607</td>
<td>0.659</td>
<td>0.579</td>
</tr>
<tr>
<td>OI3</td>
<td>0.500</td>
<td>0.878</td>
<td>0.580</td>
<td>0.560</td>
<td>0.538</td>
</tr>
<tr>
<td>OM1</td>
<td>0.723</td>
<td>0.616</td>
<td>0.885</td>
<td>0.651</td>
<td>0.652</td>
</tr>
<tr>
<td>OM2</td>
<td>0.705</td>
<td>0.607</td>
<td>0.867</td>
<td>0.686</td>
<td>0.690</td>
</tr>
<tr>
<td>OM3</td>
<td>0.575</td>
<td>0.501</td>
<td>0.829</td>
<td>0.552</td>
<td>0.621</td>
</tr>
<tr>
<td>SN1</td>
<td>0.564</td>
<td>0.485</td>
<td>0.587</td>
<td>0.815</td>
<td>0.559</td>
</tr>
<tr>
<td>SN2</td>
<td>0.512</td>
<td>0.576</td>
<td>0.537</td>
<td>0.819</td>
<td>0.538</td>
</tr>
<tr>
<td>SN3</td>
<td>0.747</td>
<td>0.648</td>
<td>0.692</td>
<td>0.869</td>
<td>0.751</td>
</tr>
<tr>
<td>Survival1</td>
<td>0.797</td>
<td>0.597</td>
<td>0.710</td>
<td>0.694</td>
<td>0.913</td>
</tr>
<tr>
<td>Survival2</td>
<td>0.709</td>
<td>0.540</td>
<td>0.688</td>
<td>0.652</td>
<td>0.926</td>
</tr>
<tr>
<td>Survival3</td>
<td>0.692</td>
<td>0.571</td>
<td>0.667</td>
<td>0.695</td>
<td>0.874</td>
</tr>
</tbody>
</table>

Table 4  Fornell-Larcker criterion

<table>
<thead>
<tr>
<th>Construct name</th>
<th>CR</th>
<th>OI</th>
<th>OM</th>
<th>SN</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>0.887</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OI</td>
<td>0.616</td>
<td>0.887</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OM</td>
<td>0.778</td>
<td>0.669</td>
<td>0.861</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>0.743</td>
<td>0.689</td>
<td>0.734</td>
<td>0.835</td>
<td></td>
</tr>
<tr>
<td>Survival</td>
<td>0.812</td>
<td>0.630</td>
<td>0.762</td>
<td>0.752</td>
<td>0.904</td>
</tr>
</tbody>
</table>

Note: SN = social network; CR = computerised record; OM = online marketing; OI = open innovation.
4.1.2 Fornell-Larcker criterion

In addition, Fornell-Larcker criterion is used to access the data validity at construct level (Fornell and Larcker, 1981). Constructs were considered to meet the validity criteria, if the diagonal value higher to its own construct (horizontally and vertically) (Hair et al., 2014). The results presented in Table 4 show that all variable meet the validity criteria. Furthermore, Table 4 also shows the correlation among the latent variables. For the most reliable results, each construct must have higher correlation to its own rather than other construct.

4.2 Predictive power of the model

R-square values are used to access the overall predictive power of the model. It explains how much independent variables explain the dependent variable. The R2 values can be interpreted as 0.19 = weak, 0.33 = moderate and 0.67 = strong (Henseler et al., 2009; Chin, 2010; Hair et al., 2014). R-square values were obtained by using PLS-SEM. The study results (see Table 5) revealed that proposed research model has 72.9% predictive power.

Table 5 Predictive power of the model

<table>
<thead>
<tr>
<th>Construct name</th>
<th>R square</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SME survival</td>
<td>0.729</td>
<td>Strong</td>
</tr>
</tbody>
</table>

Figure 3 Graphical representation of structural equation modelling results (see online version for colours)
4.3 Graphical representation of structural equation modelling results

The PLS-SEM results are graphically represented in Figure 3. This graphical representation shows the factor loadings, beta values and $R^2$ value of the model.

4.4 Testing the hypothesised relationships

The beta values, standard deviation score, t-values and p-values are presented in Table 6. Beta values range from 0.210 (OM → Survival) to 0.443 (CR → Survival). These values show the intensity of the relationship among the variables, where the sign (+, –) of beta values show the nature of relationship (positive/negative). Furthermore, t-values and p-values show the significance of the hypothesised relationships. Study results (see Table 6) revealed that all hypotheses show the significant results. $H1 (\beta = 0.228, t = 2.268, p < 0.05)$ and $H3 (\beta = 0.210, t = 2.009, p < 0.05)$ are significant at 0.05 level, whereas $H2 (\beta = 0.443, t = 4.758, p < 0.01)$ and $H4 (\beta = 0.260, t = 3.090, p < 0.01)$ are significant at 0.01 level (see Table 6).

<table>
<thead>
<tr>
<th>Hypothesis no.</th>
<th>Relationships</th>
<th>Beta ($\beta$)</th>
<th>Standard deviation</th>
<th>T-values</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>SN (+) → Survival</td>
<td>0.228</td>
<td>0.100</td>
<td>2.268</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>H2</td>
<td>CR (+) → Survival</td>
<td>0.443</td>
<td>0.093</td>
<td>4.758</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>H3</td>
<td>OM (+) → Survival</td>
<td>0.210</td>
<td>0.105</td>
<td>2.009</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>H4</td>
<td>OI (+) → Survival</td>
<td>0.260</td>
<td>0.084</td>
<td>3.090</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

Note: SN = social network; CR = computerised record; OM = online marketing; OI = open innovation.

5 Discussion and conclusions

This paper has successfully developed a theoretical framework and then empirically tested that framework by conducting self-administrated questionnaire based survey. This study has provided new insight view on SME studies and shifts the development of business research from looking at the performance and success factors to different angle which is identifying factors to improve the SME survival. Theoretically and empirically, it was proved that social networking ($H1: \beta = 0.228, t = 2.268, p < 0.05$), computerised record ($H2: \beta = 0.443, t = 4.758, p < 0.01$), online marketing ($H3: \beta = 0.210, t = 2.009, p < 0.05$) and OI ($H4: \beta = 0.260, t = 3.090, p < 0.01$) have the significant and positive influence on SME survival. Furthermore, PLS-SEM results show that the parsimonious research model has strong predictive power, i.e., 72.9%. These results implied that SMEs should use social networking sites to promote their product and services to the potential buyers in order to minimise the advertising cost. These results are in line with the previous studies (Jagongo and Kinyua, 2013; Nobre and Silva, 2014; Vásquez and Escamilla, 2014; Choban et al., 2015; Naude et al., 2014). The advertising through social media (Facebook, WhatsApp, etc.) in Pakistan is the cheapest source of promotion of product and services. Moreover, to maintain computerised record is also helpful for SME. There are numerous software available in the market to maintain computerised record.
Computerised record enable the SME to easily maintain and update the financial as well as stock data. Additionally, this will enhance the SME image in the market. These findings are similar to previous research studies (Beke, 2010; Maseko and Manyani, 2011; Chong, 2012).

OI is a novel concept in Pakistan. Strategy makers/managerial staff of SMEs are not aware about the concept of OI, but they are involved in such practices. OI appears as the key model that seeks to operate key organisational networks and players, (i.e., suppliers, public and private research centres, competitors, customers, institutions and universities) in order to boost innovation capabilities and the competitiveness of the organisation (Clausen and Pohjola, 2009; Wynarczyk et al., 2013). OI is an effective approach to enhance the SMEs’ performance (Ahn et al., 2015) as it enable the SMEs to react according to market changes and to meet customers’ demand and/or develop novel sale channels (Van de Vrande et al., 2009; Lee et al., 2010).

5.1 Research implications

This study will be helpful for the academicians and managerial staff of SME in order to gain in depth knowledge about the drivers of SME survival. This study upgrades the prior knowledge on SMEs and success drivers of SMEs. The failure rate of small businesses in Pakistan is very high, however little research work available on why these small businesses failed. The understanding of the key drivers behind SMEs survival is very helpful in order to promote the small business in Pakistan. We suggest that SMEs should implement these innovations in their business operations in order to expand their business operations and to increase their sales volumes. The use of social media in Pakistan is at its peak level, therefore, advertising the business offerings through social media can benefit to SMEs. Further, the use of computerised record provides more accuracy and quick access to previous record. Therefore, we suggest that policy makers should assist SMEs towards the adoption of computerised record.

5.2 Research limitations and future research directions

Similar to other research studies, there are some limitations of this study. First of all, the research framework of this study is self-constructed with reference to the previous literatures. Therefore, generalisation is not suitable to be applied. In addition, the research is limited to SMEs, innovation, technology developments, OI and small businesses survival. Future research studies should focus on other factors that have an influence on the survival of SMEs such as, government support, technological infrastructure and financial support available to SMEs, availability of proper business plan, etc. In addition, Hyder and Lussier (2016) highlighted some issues faced by SMEs of Pakistan, i.e., lack of training and education of entrepreneurs, lack of financial resources, lack of proper business plan, lack of governmental support, etc. Furthermore, for the first part of this study, references are only taken from article from journal, chapter from a book and full text document. Thus, limitations from this paper could be due to limited resources from databases as mentioned earlier as the search results are also excluded sciences, education and health studies related to technological innovation impact towards business. Moreover, for the second part of this study, researchers collected data by using survey questionnaire method. However, future research studies should focus on other ways of data collection such as, semi-structured interviews.
References


Exploring the role of technological developments and open innovation


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