
Impact of intellectual capital on innovation in pharmaceutical manufacturing SMEs in Pakistan

Ieeqan A. Qurashi

Faculty of Economics and Business,
Universiti Malaysia Sarawak,
94300 Kota Samarahan, Sarawak, Malaysia
Email: ieeqan@gmail.com

Muhammad Khalique*

School of Management,
Universiti Sains Malaysia,
11800 Minden, Penang, Malaysia
and
MUST Business School,
Mirpur University of Science and Technology (MUST),
10250, AJ&K, Pakistan
Email: drmkhalique@gmail.com
*Corresponding author

T. Ramayah

School of Management,
Universiti Sains Malaysia,
Minden, 11800 Penang, Malaysia
and
Faculty of Cognitive Science and Human Development,
Universiti Malaysia Sarawak,
94300 Kota Samarahan, Sarawak, Malaysia
Email: ramayah@usm.my

Nick Bontis

DeGroote School of Business,
McMaster University,
Hamilton, ON, Canada
Email: nbontis@mcmaster.ca

Mohd Rafi Yaacob

Faculty of Entrepreneurship and Business,
Universiti Malaysia Kelantan,
Kelantan, Malaysia
Email: rafi@umk.edu.my

Abstract: The main purpose of this study is to determine the impact of intellectual capital on innovation in pharmaceutical manufacturing SMEs operating in Karachi. This empirical research is based on a survey of 97 pharmaceutical manufacturing SMEs. Purposive sampling technique was used to select the targeted respondents. Multiple regression analysis was applied to test the proposed research hypotheses. The findings demonstrate that intellectual capital has a positive impact on the innovation of SMEs operating in pharmaceutical industry in Karachi. This study will help to comprehend the importance of intellectual capital on innovation in SMEs and provide guidance to capitalise it prudently. This research contributes to the existing literature by investigating effect of intellectual capital on innovation of pharmaceutical manufacturing SMEs in Karachi. This is a first study in Pakistan and it contributes in the existing theory of intellectual capital. It will provide a theoretical base for the future research endeavours.

Keywords: intellectual capital; pharmaceutical SMEs; innovation; knowledge-based economy; Pakistan.

Reference to this paper should be made as follows: Qurashi, I.A., Khalique, M., Ramayah, T., Bontis, N. and Yaacob, M.R. (2020) 'Impact of intellectual capital on innovation in pharmaceutical manufacturing SMEs in Pakistan', *Int. J. Learning and Intellectual Capital*, Vol. 17, No. 1, pp.61–76.

Biographical notes: Ieeqan A. Qurashi has more than 20 years experience in the field of Marketing and worked for several leading companies in Karachi, Pakistan. He is currently working in a leading pharmaceutical group in capacity of Senior Product Manager. Further to his interest, the researcher has been teaching from last more than 12 years as visiting faculty in some of the noted institutions in Karachi, Pakistan which leads him towards research. His research area is mainly marketing and management. He completed his thesis for his Master in Entrepreneurship from the Department of Management Sciences Faculty of Economics and Business University Malaysia Sarawak, Malaysia in the field of Intellectual Capital and Innovation particularly Pharmaceuticals in Karachi, Pakistan and has desire to pursue PhD in near future.

Muhammad Khalique is presently working as a Postdoctoral Fellow at the School of Management, Universiti Sains Malaysia and an Associate Professor/Director, MUST Business School (MBS), Mirpur University of Science and Technology (MUST). He is a Founder of MUST Business School. He received his PhD in Entrepreneurship from Universiti Malaysia Sarawak, Malaysia in 2012. He has 13 years teaching experience at national and international level. He won five research grants from Malaysia. He won 2nd Prize on DICE Mega Innovation Event 2017. He developed the theory of intellectual entrepreneurship and established the measurement scale. His main research areas include intellectual capital, intellectual entrepreneurship, developing country entrepreneurship, SMEs, Islamic entrepreneurship, tourism, innovation, and technological innovation.

T. Ramayah is currently a Professor of Technology Management, School of Management, Universiti Sains Malaysia, Visiting Professor King Saud University (Kingdom of Saudi Arabia), Minjiang University (China), Universiti Malaysia Sarawak (UNIMAS), Adjunct Professor at Sunway University, Multimedia University (MMU) and Universiti Tenaga Nasional (UNITEN), Malaysia. He has an h-index of 55 and citation of 12,864 in Google Scholar and i-10 index of 257. His publications have appeared in *Information & Management*, *International Journal of Operations & Production Management*, *Tourism Management*, *Journal of Travel Research*, *International Journal of*

Contemporary Hospitality Management, Journal of Environmental Management, Technovation and Knowledge Management Research & Practice. He also serves on the editorial boards and program committee of several international journals and conferences of repute.

Nick Bontis is the Chair in Strategic Management at the DeGroot School of Business in McMaster University. He received his PhD from the Ivey Business School at the Western University. He is the first McMaster Professor to win Outstanding Teacher of the Year and Faculty Researcher of the Year simultaneously. He is a 3M National Teaching Fellow, an exclusive honour only bestowed upon the top university professors in Canada. He is recognised as a leading professional speaker and consultant in the field of intellectual capital, knowledge management and knowledge worker productivity in worldwide.

Mohd Rafi Yaacob works as a Professor and the Deputy Vice Chancellor in the Universiti Malaysia Kelantan (UMK). He received his BSc in Geography from the University of Malaya in 1991 and pursued his MBA at the Middlesex University, UK in 1995. He obtained PhD in Management in 2007 from the University of Newcastle, Australia and Postgraduate Diploma of Entrepreneurship (PDGE), University of Cambridge in 2012. His research interests are in entrepreneurship especially in small and medium enterprises (SMEs) and environmental management in businesses. He has written more than 100 papers for national and international journals, conferences and seminar.

1 Introduction

Many researchers such as Agostini and Nosella (2017), Daou et al. (2014), Dzenopoljac et al. (2017) and Khalique and Pablos (2015) argued that intellectual capital is a nucleus of a knowledge-based economy and it appeared as a major source of competitiveness for high tech and knowledge intensive organisations. Intellectual capital is considered as an important catalyst for both private and government sectors to achieve effective and efficient performance (Marr, 2005). Those organisations who utilise their intellectual capital more effectively and efficiently can enjoy additional valuable position in a competitive business environment (Zhang and Li, 2007). It is a well understood that performance of organisation is mainly based on organisational innovation. Intellectual capital has a significant impact towards the process of innovation, which subsequently improve the performance.

In a knowledge-based economy small and medium enterprises are well known by developed and developing economies around the globe for their contribution to the economic stability, employment, job creation, innovation and social cohesion (Coyte et al., 2012; Daou et al., 2013; Henry and Watkins, 2013; Khalique et al., 2013a). SMEs are considered as an engine of innovation and organisational performance. The generation and capitalisation of intellectual capital and its incorporation with SMEs can improve the efficiency and effectiveness of their management and their performance through innovation. Beside the significant contribution of SMEs in economic activities unfortunately, the failure rate of small and medium enterprises is high around the world. Specifically, in Pakistan the failure rate of SMEs are 95% in the first five years and

therefore their sustainability and survival are questionable. There is a great need to capitalise intellectual capital and to be more innovative to grow economies and fewer failure and wasting value able resources. Better understanding of intellectual capital and innovation would be able to SMEs to increase the success-to-failure ratio.

In Pakistan, no study were conducted on the importance and the role of intellectual capital toward the innovation in the knowledge intensive SMEs such as pharmaceutical industry. According to Khalique et al. (2011b) first introduced the concept of intellectual capital in SMEs in Pakistan and emphasised the identification and application of intellectual capital in knowledge intensive SMEs. Pharmaceutical industry is considered as one of the most important knowledge intensive industry. However, in Pakistan, pharmaceutical industry also has several challenges for their growth and development. This industry is a complex and knowledge intensive, therefore it face multidimensional challenges. Rana et al. (2009) pointed out that the pharmaceutical industry in Pakistan is facing challenges like innovation. Un-doubtfully, in a knowledge-based economy, competitive business environment is mainly dominated by knowledge and innovation. In other words, knowledge and innovation are the main pillars of success for the high-tech organisations and to stay alive in a fierce business challenges. It is necessary for the organisations to have an extensive understating based on intellectual capital including its all components and scientific analysis.

2 Literature review

The term intellectual capital has secured overwhelming response from the academicians and researchers from the end of the last century. Nowadays, the concept of intellectual capital in the organisations of the developed economies is well comprehend and established. However, organisations operating in developing economies have a limited understanding which is suggested by waxed definitions of intellectual capital. To understand the concept of intellectual capital many researchers proposed various definitions, however Khalique et al. (2015) proposed a comprehensive definition of intellectual capital as “intellectual capital represents a combination of intangible assets or resources, such as knowledge, know-how, professional skills and expertise, customer relationships, information, databases, organisational structures, innovations, social values, faith and honesty.” On basis of the extensive literature review they proposed a common taxonomy in which intellectual capital is defined as encompassing human capital, customer capital, structural capital, social capital, technological capital and spiritual capital. Therefore this definition is considered as the guideline of this study.

Related literature review of intellectual capital clearly showed that many researchers proposed several models to understand the concept of intellectual capital. The first known intellectual model was proposed by Stewart (1997) that is based on three summative sub-components called human capital, customer capital and structural capital. This model was used by Bontis et al. (2000) in the Malaysian context and found that these three subcomponents of intellectual capital has significant positive impact on the organisational performance of organisations. Swart (2004) proposed intellectual capital model which is based on four subcomponents of intellectual capital namely, human capital, customer capital, structural capital and social capital. Bin Ismail (2005) extended the framework and introduced one of the most important construct of intellectual capital namely spiritual capital. In the same (Bueno et al., 2006) has added technological capital in the intellectual

capital model. After extensive literature review, Khalique et al. (2011a) proposed an integrated intellectual capital model (IICM) to fill the void. This model is based on six components of intellectual capital: human capital, customer capital, structural capital, social capital, technological capital and spiritual capital until now this model is considered as a latest and well established model in literature to measure the impact of intellectual capital in organisations.

Hashim et al. (2015), used the ICCM in their study and found that intellectual capital has positive contribution to enhance organisational performance. This model is widely accepted and applied in various organisations to measure the impact of intellectual capital on the organisational performance. For example Khalique et al. (2014, 2013b) applied this model in banking sector in Malaysia and found that this model is a useful tool to measure the impact of intellectual capital on the organisational performance of banking sector. Many researchers such as Khalique et al. (2015, 2018, 2013a), Khalique and Mansor (2016) and Khalique and Pablos (2015) used ICCM in their studies that were conducted in various sectors to determine the impact of intellectual capital. The empirical findings of these study clearly reported that this model is very useful to measure the impact of intellectual capital on the organisational performance of SMEs. This model is based on the above mentioned six components of intellectual capital.

3 Components of intellectual capital

Human capital can be elaborated as a bouquet of intangible resources that exist in the members of an organisation. It is a collective capacity and capability to extract the best outcomes from the knowledge of the individuals. These resources mainly are competencies (professional skills, know-how, and experimental knowledge), attitude (motivation, leadership, behaviour pattern) and intellectual agility (innovation, creativity, flexibility, adaptability). Customer capital is the backbone of business and reasonably it is the most valuable component of intellectual capital. It can be defined as the knowledge surrounded in the marketing channels and customers' relationships that an organisation develops through the services and products offered in the market and conducting business. It includes customers' satisfaction, customer loyalty; a strong network with customers and brand value that influence significantly the performance within an organisation.

Many researchers such as Bontis (2001a), Bontis et al. (2000) and Khalique et al. (2015) argued that structural capital is the inside framework and bond of an organisation and it includes all the non-human storehouses of knowledge like repetitive works, process manual, network, databases, procedures, systems, etc. Structural capital is a knowledge that set it within the systems, routines, procedures and deals with the mechanisms and structures of an organisation. This capital facilitates the employees to achieve the optimum intellectual as well as the business accomplishments (Bontis, 2001b; Bontis et al., 2000). Roos et al. (1997), structural capital "as what remains in the company when employees go home for the night." Social capital as the combination of a certain set of informal values or norms shared to authorise or permit cooperation among members of a group or community. In modern business environment social capital produce the glue which enables cooperation, sharing of ideas, values and innovation in organisations (Khalique et al., 2015; Khalique and Pablos, 2015). In the present economic habitat, the

enterprises have a keen interest in exploiting and developing the intellectual capital with the help of technological competence and ability. Dynamic and high technological knowledge, intensive organisations tends to exercise their technological abilities to take ruthless advantages in aggressive challenges (Khalique and Pablos, 2015). Nowadays, spiritual capital is known as one of the most vital components of intellectual capital. Spiritual capital consists of faith, values, emotional energy, heart power, will power and these can be learned, relearned, cultivated and enhanced (Khalique et al., 2015).

4 Pharmaceutical industries in Pakistan

From the last ten years the economy of Pakistan is unstable due to low economic growth, poor infrastructure, rolling blackout, and the war against terrorism. Before addressing the contribution of pharmaceutical industry in Pakistan there is a need to have a glance over its role at global level. Grounded on its dynamism and innovation, the pharmaceutical industry has become one of the most profitable industries and it is considered as a catalyst to move economy forward. The overall contribution of pharmaceutical market is worth of US\$786 billion (2015–2016), with an average annual growth rate of 5% and by continuing with the rate it has crossed the worth of US\$1.3 trillion by 2018. The market share of USA, European Union (EU) and Japan dominate the global pharmaceutical market with a market portion of 48%, 28% and 12%, respectively. The rest of the world has only 12% of the total world pharmaceutical market share.

During the last five years the growth rate of the Pakistani economy was approximately 6.6% per annum and the growth of pharmaceutical sector was approximately 11% (IMS Health Pakistan, 2015). The pharmaceutical industries produced high value added life-saving products and it is considered as the most important knowledge intensive organisations. There is no-doubt that the high-tech industries such as pharmaceutical industry can govern and make easier to establish a knowledge-based economy and uplift the living standards. Pakistan has a very vigorous, spirited and appears as a very progressive pharmaceutical manufacturing SMEs sector. There were hardly any pharmaceutical manufacturing SMEs in the country, at the time of independence in 1947 but now Pakistan has 628 (+/-5%, IMS Health Pakistan, 2015) pharmaceutical SMEs units including those operated by 30 multinationals present in the country. The Pakistan pharmaceutical manufacturing SMEs fulfil around 70% of the country's requirement of finished medicines. In term of their business share, the Pakistan pharmaceutical market is almost equally divided in between national and the multinational companies.

The Pakistan, pharmaceutical manufacturing SMEs sector is comparatively young as compared to the international pharmaceutical SMEs market with export gross revenue of over US\$100 million as of 2007. In Pakistan, pharmaceutical SMEs sector self-acclaimed of high standard manufacturers and numerous units are acknowledged and approved by regulatory authorities from all over the world. The sales in international pharmaceutical SME market have finished nearly double during last five years, as seen in the domestic pharmaceutical SME market. The Pakistan's pharmaceutical SMEs have focused an Export Vision of US\$2 billion by 2020 (PPMA, 2011). In the meantime, exports are also likely to be enhanced by the new regional and global opportunities. In Pakistan, pharmaceutical SMEs are considered as a success story, manufacturing high quality necessary medicines at reasonable price to millions of people. Pharmaceutical SMEs are

not only playing a key role in promoting and sustaining development in the field of medicine within the country, but are also well set to take on the international markets (PPMA, 2011).

5 Innovation and intellectual capital

In contemporary business environment all knowledge intensive organisations need to generate or adopt innovation for their survival and cutting edge benefits. Radical innovation refers to generate new products and process while incremental innovation considers adopting existing knowledge from inside and outside the organisation. In competitive business environment the survival and suitability of knowledge intensive/intelligent organisations are mainly based on innovation. The term innovation refers to new ideas and generation of products and services. Innovation originates from the capitalisation of intellectual capital. The innovative capacity and ability of organisations provides intellectual capital in pharmaceutical SMEs their aggressive advantages, a prime component in capturing favourable outcome for trade and competitiveness among the organisations (Mole and Worrall, 2001). Innovation is revealed by the establishment of a distinctive conception combined at the same time from current ideas and knowledge (O'Donnell et al., 2001). As a result, its favourable outcome is ascertained by its novelty and the amplitude of its endorsement through practice (Johannessen et al., 2001), and its transformation into an instrumental possibilities for the intellectual capital in pharmaceutical SMEs. Many researchers such as Hosein Chizari et al. (2016), Mehralian et al. (2012) and Pirozzi and Ferulano (2016) argued that the intellectual capital plays very vital in pharmaceutical industry to enhance innovation.

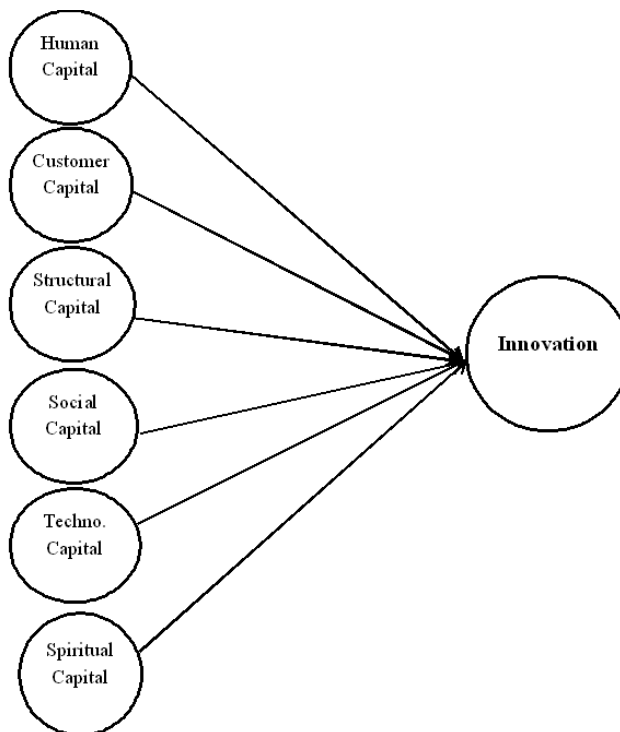
Many researchers such as Agostini and Nosella (2017), Agostini et al. (2017), Buenechea-Elberdin (2017), Chahal and Bakshi (2015), Dost et al. (2016), Dumay et al. (2013), Hosein Chizari et al. (2016) and Pirozzi and Ferulano (2016) have conducted their studies to find the contribution of intellectual capital to enhance the innovation in organisations. The empirical findings of these studies showed that intellectual capital has significant contribution to generate innovation in organisations. Many studies were conducted in developed economies while in under developing economics this research is still scant. In addition, mostly researchers used only three components of intellectual capital in their studies to find the role towards innovation. The strategic nature and importance of intellectual capital demanded a holistic study to examine the role of intellectual capital in innovation in pharmaceutical industry. Subsequently, ICCM was a best possible model to be employed in this study to examine the role of intellectual capital in innovation in pharmaceutical SMEs to understand the role of intellectual capital.

6 Conceptual framework

In contemporary business environment all knowledge intensive organisations need to generate or adopt innovation for their survival and cutting edge benefits. Radical innovation refers to generate new products and process while incremental innovation considers adopting existing knowledge from inside and outside the organisation. Earlier

empirical studies concluded that intellectual capital plays a very crucial role to enhance innovation in organisations. This study grounded on intellectual capital theory states that the intellectual capital is the most important strategic asset for the success and survival of organisations. The prime foundation of this theory is to create value added products and services in the organisation (Khalique et al., 2013b) that will come only through innovation. On theoretical background the main function of intellectual capital is to create value added products and services and it is mainly based on six components namely, human capital, customer capital, structural capital, social capital, technological capital and spiritual capital (Khalique et al., 2014, 2011a). These six components are considered as predictor variables while innovation is used as dependent variable. Intellectual capital is considered as the combination of intangible resources and capabilities that will help to create wealth of the organisation. These independent variables have been to examine the role of intellectual capital on the organisational performance of SMEs in Pakistan. In addition, this model posits that there is a direct and positive relationship between intellectual capital and organisational performance. Figure 1 outlines the conceptual framework of this study.

Figure 1 Conceptual framework



7 Research hypotheses

The conceptual framework of this study shows the flow of effect of the components of intellectual capital on innovation. Based on the above conceptual framework the

following six research hypotheses were proposed to address the research questions and fulfil the objectives of the study.

- Hypothesis 1 Human capital has a positive effect on innovation in pharmaceutical manufacturing SMEs in Karachi Pakistan.
- Hypothesis 2 Customer capital has a positive effect on innovation in pharmaceutical manufacturing SMEs in Karachi Pakistan.
- Hypothesis 3 Structural capital has a positive effect on innovation in pharmaceutical manufacturing SMEs in Karachi Pakistan.
- Hypothesis 4 Social capital has a positive effect on innovation in pharmaceutical manufacturing SMEs in Karachi Pakistan.
- Hypothesis 5 Technological capital has a positive effect on innovation in pharmaceutical manufacturing SMEs in Karachi Pakistan.
- Hypothesis 6 Spiritual capital has a positive effect on innovation in pharmaceutical manufacturing SMEs in Karachi Pakistan.

8 Research methodology

In this research the employed variables were measured by relevant items that were drawn from various researches on the basis of literature review. The unobserved constructs of the independent variables were measured by a validated structured questionnaire (Khaliq and Pablos, 2015; Khaliq et al., 2014) while the dependent variable namely innovation were taped with the help of items developed by Tsai et al. (2001). All the proposed items were pretested by using purification processes. The final and screened items of the six components of intellectual capital namely human capital, customer capital, structural capital, social capital, technological capital and spiritual capital were used. Similarly the same practice was used for the dependent variable of this study.

The final and updated structured questionnaire included 71 items of intellectual capital and 18 items of innovation. Before distributing the questionnaire survey the face and content validity of the research instrument was ensured with adequate representation of the concept of constructs and the expert opinion of subject experts and practitioners.

9 Sampling and data collection

To measure the impact of intellectual capital on innovation in pharmaceutical manufacturing SMEs in Karachi, a total of 392 questionnaire surveys were sent to the targeted respondents. Respondents of this study were targeted through purposive sampling technique. The sample unit of this study was owners, chief executive officer, senior managers, managers, assistant managers, junior managers, managing director and technical staff. The survey forms were targeted to the chief executive officers, managers, managing director and owners of the pharmaceutical manufacturing SMEs. The purpose behind choosing this industry was its dynamism, flexible, fast growing and bearing a cutthroat competition which is pushing this industry to be more innovative.

Pharmaceutical industry tends to produce new formulas. This industry considers highest rate of innovation and has shown increasing patent registrations. The targeted SMEs of the study are mainly based in Karachi City of Pakistan where there is a highest density of the pharmaceutical manufacturing SMEs. Distributions of questionnaires were carried out through personally administrated, post and email. After several reminders and visits 260 questionnaire surveys were received from the targeted respondents with a response rate of 66% which is considered as excellent. After initial data cleaning, only 248 feedbacks were valid and used for further data analysis.

10 Data analysis

The gathered data were screened and cleaned for outliers and normality test. Normality of data is a fundamental requirement for the statistical analysis. The results of normality test reported that the skewness and kurtosis of all the items were falling within threshold criteria ± 1.00 which is excellent and meet the range (Field, 2009). In addition, scale reliability of the employed constructs was also measured to check the internal consistency of the data, by using Cronbach's alpha. The findings of the Cronbach's alpha test in Table 1 shows that the items of the six components of intellectual capital and innovation are consistent and their alpha values are above than 0.7 the threshold criteria suggested by Hair et al. (1998) and Pallant (2010) which is excellent. The gathered data are consistent and reliable for further empirical analysis.

Table 1 Reliability test

<i>Measure</i>	<i>No. of Items</i>	<i>Rating</i>	<i>α-value</i>
Human capital	13	1–5	0.835
Customer capital	10	1–5	0.823
Structural capital	13	1–5	0.820
Social capital	11	1–5	0.834
Technological capital	13	1–5	0.823
Spiritual capital	11	1–5	0.802
Innovation	18	1–5	0.871

10.1 Exploratory factor analysis

Related literature review emphasised that exploratory factor analysis (EFA) is mainly used to reduce a large number of indicators to a smaller number of factors and purification (Hair et al., 1998; Khalique et al., 2015; Malhotra and Dash, 2010). In this study EFA was performed through principle components analysis (PCA) with varimax rotation to uncover the latent dimensions of employed variables. On the basis of sample size recommended by Field (2009) the accepted level of loading was 0.3999. EFA was run independently on the 13 items of human capital, 10 items of customer capital, 13 items of structural capital, 11 items of social capital, 13 items of technological capital, 11 items of spiritual capital and 18 items of innovation. One item of human capital, two items of customer capital, four items of structural capital, four items of social capital and one item of innovation were dropped due to poor factor loading and failed to meet the

minimum threshold criteria suggested by De Run et al. (2008), Hair et al. (1998) and Meyers et al. (2006). The EFA results of human capital proposed three sub-components of intellectual capital with Kaiser-Meyer-Olkin (KMO) 0.761, Bartlett's test with a chi-square of 1,042.113 ($p = 0.001$). Customer capital seemed to have two sub-components with (KMO) 0.761, Bartlett's test with a chi-square of 587.635 ($p = 0.001$) while structural capital was appeared with two sub-components with KMO 0.812, Bartlett's test with a chi-square of 678.856 ($p = 0.001$). One component of social capital was appeared with KMO 0.849, Bartlett's test with a chi-square of 628.504 ($p = 0.001$) and technological capital with two sub-components having KMO 0.779, Bartlett's test with a chi-square of 1,087.321 ($p = 0.001$). Spiritual capital and innovation were observed three components and four components with KMO 0.787, Bartlett's test with a chi-square of 725.646 ($p = 0.001$) and KMO 0.814, Bartlett's test with a chi-square of 1,705.499 ($p = 0.001$) respectively. The reliability and validity of the employed constructs were met the recommended criteria.

11 Testing of research hypotheses

In this study multiple regression analysis was performed to test the proposed research hypotheses. Table 2 presents the empirical results of multiple regression analysis.

Table 2 Multiple regression results

<i>Variables</i>	<i>Innovation</i>		<i>Sig. level</i>
	<i>Unstand. beta (b)</i>	<i>t-value</i>	
Constant (β)	1.230	5.685	0.000
Human capital	0.077	1.388	0.066
Customer capital	0.132	2.635	0.009
Structural capital	0.163	2.977	0.003
Social capital	0.068	1.233	0.019
Technological capital	0.272	4.023	0.000
Spiritual capital	0.056	0.875	0.082
R^2		0.437	0.001
<i>F statistics</i>		20.31	0.001

Note: Significant at $p, 0.05$.

The results show that of the components of intellectual capital that were employed as predictor variables while innovation as an outcome variable. In this study the Table 2 reported that the R^2 value (which is = 0.437) depicts that the six predictor variables jointly explain the 43.7% of variation in the dependent variable namely innovation in SMEs performing in pharmaceutical sector. The findings of the study show that the overall model of multiple regression with F -value also found statistically significant which is 20.31 at ($p < 0.001$) level. It is also important to point out that the Durbin-Watson value of the analysis 1.815 reports that there is no auto-correlation among the employed variables. The multiple regression analysis shows that the overall model is fit and fulfils the threshold criteria.

The empirical findings of the Table 2 report that the unstandardised beta coefficient (b) of human capital ($b = 0.077$, t -value = 1.388, $p > 0.05$) is appeared as insignificant variable in regression model therefore the hypothesis H1 is not supported. The findings of customer capital ($b = 0.232$, t -value = 2.635, $p < 0.05$), structural capital, ($b = 0.163$, t -value = 2.977, $p < 0.05$), social capital, ($b = 0.068$, t -value = 1.233, $p < 0.05$), technological capital ($b = 0.272$, t -value = 4.023, $p < 0.05$), and spiritual capital ($b = 0.056$, t -value = 0.875, $p > 0.05$) indicating that customer capital, structural capital, social capital and technological capital are seemed to be significant positive contributors therefore research Hypotheses H2, H3, H4, H5 were supported while research hypothesis H6 was not supported.

12 Discussion

The results of regression analysis of selected pharmaceutical manufacturing SMEs operating in Karachi, Pakistan demonstrated that overall intellectual capital has large positive impact on innovation. The inferences supported that the development of intellectual capital in pharmaceutical SMEs in Karachi, Pakistan contributes positively to improve the innovation. In other words the development, evolution and growth of intellectual capital in pharmaceutical manufacturing SMEs in Karachi, Pakistan is directly related to the enhancement of innovation. The findings regarding independent variables revealed that customer capital, structural capital, social capital and technological capital were appeared as significant positive contributors to enhance innovation in SMEs. These findings are supported by the previous studies that were conducted by Agostini and Nosella (2017), Agostini et al. (2017), Buenechea-Elberdin (2017), Chahal and Bakshi (2015), Khalique et al. (2015) and Khalique and Pablos (2015). This study found two interesting findings regarding human capital and spiritual capital. The findings revealed that human capital and spiritual capital are seemed as insignificant variables in regression model. The reason behind of insignificant may be the pharmaceutical manufacturing SMEs have neglected the importance of these variables in innovation. Many empirical studies such as Hashim et al. (2015), Khalique et al. (2018) and Khalique and Pablos (2015), argued that the human capital and spiritual capital are important variables and they have crucial role in organisation. On the basis of the previous studies this study strongly recommends to the pharmaceutical manufacturing SMEs in Karachi to strengthen these capitals.

13 Conclusions

Overall the findings of this research supported that the initiatives, strategies and actions taken by the Government of Pakistan in their commitments to enhance the intellectual capital to fulfil the competitive challenges of a knowledge-based economy in Karachi, Pakistan. Thus, the results of this study provide significant evidence to support that the intellectual capital has a critical catalyst for innovation in pharmaceutical SMEs in Karachi, Pakistan. The concept of intellectual capital for Pakistani pharmaceutical manufacturing SMES is a freshly emerging theme and until now, it has not been fully

comprehend by most of the knowledge intensive organisations, more specifically high-tech and knowledge intensive pharmaceutical manufacturing SMEs. This research is a useful eye-opener especially for policy makers, entrepreneurs, practitioners, businessman, chief executive officers, and scholars to find out the possible shortcomings that can show reasons of nonexistence of significant contributions of the components of intellectual capital with the innovation of pharmaceutical manufacturing SMEs.

This study provides several contributions not only specific to the theory of intellectual capital but could also be useful as a guideline for managerial and policy practices. The theoretical contribution of this study has tried to bridge the vacuum by examining the six components of intellectual capital by using IICM on innovation in first time. In contribution of intellectual capital theory is by showing how the six components of intellectual capital are facilitating innovation in pharmaceutical SMEs in Pakistan. The managerial contributions of this study are twofold: *first*, the empirical results of this study are viewing how the value of intellectual capital is linked to enhance innovation in SMEs. This will help managers to understand the real acumen about their intellectual capital and to enhance innovation. *Second, surprisingly* two components namely human capital and spiritual capital were appeared as insignificant variables in pharmaceutical SMEs operating in Karachi Pakistan. Khalique et al. (2015) conducted a study to examine the impact of intellectual capital on SMEs operating in the electrical and electronics manufacturing sector in Pakistan and found that human capital was appeared as insignificant variable while customer capital as a most important predictor variable in regression model. Despite this the theory and the empirical findings of the previous studies clearly showed that human capital and spiritual are very crucial contributors in the success of organisations; therefore this study will help managers and practitioners to strengthen these components also in their organisation to enhance and capitalise their innovation. In this study technological capital appeared as the most important and significant contributor, it showed that the management of pharmaceutical manufacturing SMEs believed that this component is a vital for innovation and there are investing on it.

14 Limitations and possible future avenues

This study has some limitations that the future research may address. This study is specifically carried out in selected pharmaceutical manufacturing SMEs in Karachi, Pakistan. Time sequences of the study, small sample size and cross-sectional nature may raise question about the generalisability of the findings of this study in other organisations. This study concludes with a call for more research in this area. Future studies can make a comparative analysis between public and private sector or between small and large organisations in order to find the impact of the intellectual capital on innovation. Parallely, the research could be extended for comparative study between the developed and developing economies. This study adds to the current understanding about the concept, applications and measurement of intellectual capital and produce high interest for potential contributors. Moreover, this will help us to become more aware of the applications, management and evaluation of intellectual capital in developed as well as developing countries at the global level.

References

- Agostini, L. and Nosella, A. (2017) 'Enhancing radical innovation performance through intellectual capital components', *Journal of Intellectual Capital*, Vol. 18, No. 4, pp.789–806.
- Agostini, L., Nosella, A. and Filippini, R. (2017) 'Does intellectual capital allow improving innovation performance? A quantitative analysis in the SME context', *Journal of Intellectual Capital*, Vol. 18, No. 2, pp.400–418.
- Bin Ismail, M. (2005) *The Influence of Intellectual Capital on the Performance of Telekom Malaysia (Telco)*, Unpublished Doctoral dissertation, Universiti Teknologi Malaysia.
- Bontis, N. (2001a) 'Assessing knowledge assets: a review of the models used to measure intellectual capital', *International Journal of Management Reviews*, Vol. 3, No. 1, pp.41–60.
- Bontis, N. (2001b) 'Managing organizational knowledge by diagnosing intellectual capital: framing and advancing the state of the field', Paper presented at the *World Congress on Intellectual Capital Readings*.
- Bontis, N., Chua Chong Keow, W. and Richardson, S. (2000) 'Intellectual capital and business performance in Malaysian industries', *Journal of Intellectual Capital*, Vol. 1, No. 1, pp.85–100.
- Buenechea-Elberdin, M. (2017) 'Structured literature review about intellectual capital and innovation', *Journal of Intellectual Capital*, Vol. 18, No. 2, pp.262–285.
- Bueno, E., Salmador, M.P., Rodríguez, Ó. and De Castro, G.M. (2006) 'Internal logic of intellectual capital: a biological approach', *Journal of Intellectual Capital*, Vol. 7, No. 3, pp.394–405.
- Chahal, H. and Bakshi, P. (2015) 'Examining intellectual capital and competitive advantage relationship: role of innovation and organizational learning', *International Journal of Bank Marketing*, Vol. 33, No. 3, pp.376–399.
- Coyte, R., Ricceri, F. and Guthrie, J. (2012) 'The management of knowledge resources in SMEs: an Australian case study', *Journal of Knowledge Management*, Vol. 16, No. 5, pp.789–807.
- Daou, A., Karuranga, E. and Su, Z. (2013) 'Intellectual capital in Mexican SMEs from the perspective of the resource-based and dynamic capabilities views', *Journal of Applied Business Research*, Vol. 29, No. 6, p.1673.
- Daou, A., Karuranga, E. and Su, Z. (2014) 'Towards a better understanding of intellectual capital in Mexican SMEs', *Journal of Intellectual Capital*, Vol. 15, No. 2, pp.316–332.
- De Run, E.C., Lo, M-C. and Heriyadi, K. (2008) *Basic Analysis: A Guide for Students and Researchers*, Jade Tree Press, Kuching.
- Dost, M., Badir, Y.F., Ali, Z. and Tariq, A. (2016) 'The impact of intellectual capital on innovation generation and adoption', *Journal of Intellectual Capital*, Vol. 17, No. 4, pp.675–695.
- Dumay, J., Rooney, J. and Marini, L. (2013) 'An intellectual capital-based differentiation theory of innovation practice', *Journal of Intellectual Capital*, Vol. 14, No. 4, pp.608–633.
- Dzenopoljac, V., Yaacoub, C., Elkanj, N. and Bontis, N. (2017) 'Impact of intellectual capital on corporate performance: evidence from the Arab region', *Journal of Intellectual Capital*, Vol. 18, No. 4, pp.884–903.
- Field, A. (2009) *Discovering Statistics using SPSS*, Sage Publications, London.
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (1998) *Multivariate Data Analysis*, Vol. 5, Prentice Hall, Upper Saddle River, NJ.
- Hashim, M.J., Osman, I. and Alhabshi, S.M. (2015) 'Effect of intellectual capital on organizational performance', Paper presented at the *Proceedings of the 2nd Global Conference on Business and Social Science-2015, GCBSS-2015*, Bali, Indonesia, 17–18 September, Vol. 211, pp.207–214.
- Henry, L. and Watkins, D. (2013) 'Intellectual capital in developing micro-states: the case of Caribbean SMEs', Paper presented at the *Proceedings of the 5th European Conference on Intellectual Capital 2013*.

- Hosein Chizari, M., Mehrjardi, R.Z., Sadrabadi, M.M. and Mehrjardi, F.K. (2016) 'The impact of intellectual capitals of pharmaceutical companies listed in Tehran Stock Exchange on their market performance', Paper presented at the *Proceedings of the 1st International Conference on Applied Economics and Business, ICAEB 2015*, Vol. 36, pp.291–300.
- IMS Health Pakistan (2015) [online] <http://www.imshealth.com.pk> (accessed 30 August 2015).
- Johannessen, J.-A., Olsen, B. and Lumpkin, G.T. (2001) 'Innovation as newness: what is new, how new, and new to whom?', *European Journal of Innovation Management*, Vol. 4, No. 1, pp.20–31.
- Khalique, M. and Mansor, S.A. (2016) 'Intellectual capital in Malaysian hotel industry: a case study of Malacca', *International Journal of Business Performance Management*, Vol. 17, No. 1, pp.103–116.
- Khalique, M. and Pablos, P.O.d. (2015) 'Intellectual capital and performance of electrical and electronics SMEs in Malaysia', *International Journal of Learning and Intellectual Capital*, Vol. 12, No. 3, pp.251–269.
- Khalique, M., Bontis, N., Shaari, J.A.N.B. and Isa, A.H.M. (2015) 'Intellectual capital in small and medium enterprises in Pakistan', *Journal of Intellectual Capital*, Vol. 16, No. 1, pp.224–238.
- Khalique, M., Bontis, N., Shaari, J.A.N.B., Yaacob, M.R. and Ngah, R. (2018) 'Intellectual capital and organisational performance in Malaysian knowledge-intensive SMEs', *International Journal of Learning and Intellectual Capital*, Vol. 15, No. 1, pp.20–36.
- Khalique, M., Isa, A.H.M. and Shaari, J.A.N.B. (2013a) 'Predicting the impact of intellectual capital management on the performance of SMEs in electronics industry in Kuching, Sarawak', *IUP Journal of Knowledge Management*, Vol. 11, No. 4, p.53.
- Khalique, M., Shaari, J.A.N.B. and Isa, A.H.B.M. (2013b) 'The road to the development of intellectual capital theory', *International Journal of Learning and Intellectual Capital*, Vol. 10, No. 2, pp.122–136.
- Khalique, M., Shaari, J.A.N.B. and Isa, A.H.B.M. (2014) 'Determining the influence of intellectual capital on the organisational performance of banking sector in Kelantan, Malaysia', *International Journal of Learning and Intellectual Capital*, Vol. 11, No. 4, pp.306–319.
- Khalique, M., Shaari, N., Abdul, J. and Isa, A.H.B.M. (2011a) 'Intellectual capital and its major components', *International Journal of Current Research*, Vol. 3, No. 6, pp.398–401.
- Khalique, M., Shaari, N., Abdul, J., Isa, A.H.B.M. and Ageel, A. (2011b) 'Role of intellectual capital on the organizational performance of electrical and electronic SMEs in Pakistan', *International Journal of Business and Management*, Vol. 6, No. 9, pp.253–257.
- Khalique, M., Shaari, N., Abdul, J., Isa, A.H.B.M. and Samad, N.B. (2013) 'Impact of intellectual capital on the organizational performance of Islamic banking sector in Malaysia', *Asian Journal of Finance & Accounting*, Vol. 5, No. 2, pp.75–83.
- Malhotra, N. and Dash, S. (2010) *Marketing Research: An Applied Approach*, Pearson Education South Asia, Dorling Kindersely.
- Marr, B. (2005) 'Management consulting practice on intellectual capital: editorial and introduction to special issue', *Journal of Intellectual Capital*, Vol. 6, No. 4, pp.469–473.
- Mehralian, G., Rajabzadeh, A., Reza Sadeh, M. and Reza Rasekh, H. (2012) 'Intellectual capital and corporate performance in Iranian pharmaceutical industry', *Journal of Intellectual Capital*, Vol. 13, No. 1, pp.138–158.
- Meyers, L.S., Gamst, G. and Guarino, A. (2006) *Applied Multivariate Research: Design and Implication*, Sage Publications Inc., CA.
- Mole, K. and Worrall, L. (2001) 'Innovation, business performance and regional competitiveness in the West Midlands: evidence from the West Midlands Business Survey', *European Business Review*, Vol. 13, No. 6, pp.353–364.
- O'Donnell, A., Gilmore, A., Cummins, D. and Carson, D. (2001) 'The network construct in entrepreneurship research: a review and critique', *Management Decision*, Vol. 39, No. 9, pp.749–760.

- Pakistan Pharmaceutical Manufacturers Association (PPMA) (2011) [online] <http://www.ppma.org> (accessed 9 July 2012).
- Pallant, J. (2010) *SPSS Survival Manual 4th Edition A Step by Step Guide to Data Analysis using SPSS*, 4th ed., McGraw-Hill Education, Berkshire UK.
- Pirozzi, M.G. and Ferulano, G.P. (2016) 'Intellectual capital and performance measurement in healthcare organizations: an integrated new model', *Journal of Intellectual Capital*, Vol. 17, No. 2, pp.320–350.
- Rana, T.M., Salaria, M.R., Herani, G.M. and Qureshi, M. (2009) 'Role of quality management in pharmaceutical development: evidence from Islamabad and Lahore', *Indus Journal of Management and Social Sciences*, Vol. 3, No. 2, pp.99–109.
- Roos, J., Edvinsson, L. and Dragonetti, N.C. (1997) *Intellectual Capital: Navigating the New Business Landscape*, Springer, London.
- Stewart, T. (1997) *The New Wealth of Organizations*, Nicholas Brealey, London.
- Swart, J. (2004) *Identifying the Sub-Components of Intellectual Capital: A Literature Review and Development of Measures*, University of Bath Working Paper Series.
- Tsai, C-T., Huang, K-L. and Kao, C-f. (2001) 'The relationships among organizational factors, creativity of organizational members and organizational innovation', *Journal of Management*, Vol. 18, No. 4, pp.527–566.
- Zhang, X. and Li, S. (2007) 'The definition and discussion of intellectual capital conception', *International Journal of Business and Management*, Vol. 2, No. 6, pp.81–84.