Information and Knowledge Management
ISSN 2224-5758 (Paper) ISSN 2224-896X (Online)
Vol.6, No.10, 2016

Intellectual Property Rights (IPRs) in Software Industry of Pakistan: An Overview of Dual Perspective of Demand and Supply Side

Fahad Asmi[1*] Rongting Zhou[2] Tongliang He[1]
1. School of Public Affairs, University of Science and Technology of China, No.96, JinZhai Road Baohe District, Hefei, Anhui, 230026,P.R.China
2. Department of Sci-Tech Communication and Policy, University of Science and Technology of China, No.96, Jinzhai Road Baohe District, Hefei, Anhui, 230026,P.R.China
* E-mail of the corresponding author: fasmie@mail.ustc.edu.cn

Abstract
The current study is to understand the following aspects of IPR in Pakistan: (1) the readiness of IT skilled workforce to adopt and understand IPR policies in their business environment. (2) The legislative structure available in the country to implement and adopt IPR policies in IT related business environment. The key market players are realizing the importance of IPR for international and nationwide acceptance and growth. The software industry in Pakistan can contribute with much more impressive manner if the IPR policies will be adopted timely by the industry, and the facilities and encouragement provided by the administrative authorities immediately.
Keywords: Intellectual Property Rights, Software Industry, Pakistan, IT skilled workforce, Software Protection, Information Technology, IPR Policy

1. Introduction

In the economic world, the powerful intangible property is driven as the by-product of human's art or science to express thought, idea, method, and process, which is broadly coined as 'Intellectual Property' (IP). The current era of post-structural world restricts any single argument to completely justify any phenomena in the real world solely. However, different dimensional arguments encourage the scientists to get the deeper insight of any phenomena (Wilkof, 2014). In terms of 'Intellectual Property Rights' (IPR), the three different forms of philosophies are intensively observed in the literature. The 'Utilitarian' encourages the use of IPR for social welfare and for the progress of the society. Labor theorists argue the IPR as a tool to offer fruit for the individuals whose labor worked on the resource to create or identify value. The Personality theory defines IPR as the critical support for human's satisfaction in the form of self-actualization (Wilkof, 2014). In the legal and political terms, the first practice to protect IPR was observed in Sybaris (the Greek colony) in the 500 BC (Moore, 2009). Moreover, a few legal initiatives are also recorded in the Roman times. However, the first structured legislative ruling recorded in the year 1421 which was issued by Florentine republic (Moore, 2009). In the current passage of time, multiple contemporary treaties and agreements like the 'Berne convention' (1886) and TRIPS agreement (1995) are reshaping the IPR practices across the world by dealing with the challenges related to patent, copyrights, industrial design rights, integrated circuit designs, trademark, dress and secrets (Moore, 2009).

1.1 Information Technology (IT) sector – software industry

In the last three decades, the inter-disciplinary diffusion of 'Computer Sciences' and 'Telecommunication' have produced the endless possibilities to support the social and economic development. In the year 2014, the IT and ITES (IT based Enterprise Solution) as a sector globally earned the revenue of $617.5bn which is majorly comprised of the software industry (Smith, 2015). Specifically, the software as an industry which includes the internet, system, application, and middleware software applications which are currently facing the great challenge of unlicensed usage and piracy (Bouchoux, 2001). On the brighter side, the lesser entry barrier and operational cost, and the availability of IT skilled workforce in the developing countries are strengthening the countries from emerging market to perform well in the economic terms. The essences of 'technology', 'transportability' and the 'tradability' in the service sector are encouraging the market players from the emerging economies to perform, that's how the 'service sector' accounts for more than the 70% of the global GDP (Lanz, 2015). In other words, the power of the internet (World Wide Web) enhanced the ability of 'outsourcing' in the service sector. The South and East Asian nations like China, India, Pakistan and Bangladesh in the world's economy are holding 'skill intensive youth' as the major segment of their society which are reshaping the business economics globally (Asian Development Bank, 2013). In the case of Pakistan, the IT-based service sector development can be reviewed in the dimensions of 'pre and post Dot-Com Bubble' or 'Product vs service focused IT and ITES'. The software industry in Pakistan is majorly comprised of local and foreign firms which

are serving the local and international market. However, the existing literature highlights the 'quality of workforce', 'cost of operations', 'legislative policies (i.e. IPR and taxation)' and 'security' as the major critical success factors in the country (Ghauri, 2013; Zafar, 2013).

1.2Aim of the study

Primarily, the aim of this piece of art is to understand the current supply side perspective by reviewing 'current legal frameworks' and 'IPR related challenges' in the software industry of Pakistan. In the meanwhile, the behavior of the IT skilled workforce will be studied to understand their intentions and behavior and perceived value of 'Intellectual Property Rights in the software industry'. In the nutshell, the legislative and macroeconomic issues will be summarized to raise the immediate importance of composite IPR framework for the software industry and the country, which can help the new IT-software based start-ups and policy makers in the country.

2. Literature Review

This section will discuss the existing literature, frameworks, and perspectives to analyze the software industry. It will be followed by business and legal environment which will help to define and explain the IPR related issues and challenges in the domestic and international markets. In the sum-up, the existing socio-psychological behavioral model will be selected to understand the perception of the IT-skilled workforce in Pakistan about IPR.

2.1 Existing approaches to analyze software industry

The economists usually use the macroeconomic terms like exchange rates, governmental policies, interest rate, market competitive national advantage to study the industry success in any country (Carmel, 2003b). The success of any industry is measured through the national competitive advantage by studying the inter-related dynamics of national circumstances to support firms, factors conditions of available infrastructure and resources, demand conditions and the relevant indexes of growth and performances (Porter, 1990). In The software industry, the economic strength demands the quality of life, human resource, and offshore motivational factors like wages, national vision, policies and strategies of the governing bodies in the country and the availability of technical infrastructure as critical success factors (Gengler, 2003; Nicholson, 2003). As the existing academic literature, different tools and frameworks are available to understand software market. For example: the Oval model (Carmel, 2003b), Software Export Success Model (SESM) (Heeks & Nicholson, 2002), Tier system to classify world's software market (Carmel, 2003a), two-dimensional framework to define any national software industry focus (Heeks, 1999), quality standardization practices in software industry (Weston, 2004). Furthermore, the country-wise software industry analysis is also intensively observed in the South and East Asian region, i.e. India (D'Costa, 2002; Singh, 2014), China (Rovere, 2015; Zhang, 2008) and Pakistan (Butt, 2013; S. Hassan, 1998; S. Z. Hassan, 2000). Most of the current research is focusing the importance of management styles, quality standardization, financial and human resources, trust and national strategy are highlighted more in-depth in contrast of the legal perspective which includes the IPR, contraction, offshoring and outsourcing related challenges and conflicts (Correa, 1996). The IPR related concerns in the software industry are usually provoked by the 'Practices in the business sphere', 'the nature of the innovation and technology' and 'the legal policies in the local and international market' (Mathew, Hegde, & Garge, 2004).

2.2 Software's dynamic nature and IPR

The world witnessed the first software-IP related legislative policy by 'the national Commission on New Technology Use' (CONTU) in the United States by late 1970's which declared computer software as 'literacy work' and 'copyrightable' material (Weckert, 1997). The multidimensional view of every computer software decomposes the single entity (a software) into 'program functions', 'external design', user interfaces' and 'program code'. The development life cycle, transfer to the client, and the usage of any software raises different IPR challenges (D'Costa, 2002; Kumar B.R, 2012; Mathew et al., 2004). In the legal terms, the copyright helps the developers to protect their creativity and expressions and to gain reward and appreciation for their work by avoiding piracy. Usually, the process to get 'copyrights' is less complicated, though the scope of 'copyrights' in the field of 'software engineering' is still under the limelight for the IPR policy makers (Gibbons, 1990; Mathew et al., 2004). In the offshoring and outsourcing process within the development and maintaining computer implemented innovation, the 'trade secret' help the firm to protect unwilling disclosure of the information, methods, and algorithms used in the software (D'Costa, 2002; Weston, 2004). After the development and the transfer of the software to the end-user(s), the authentic use and application of software demand the software to be patented for providing exclusive rights. However, the patenting process in the case of software (innovation) demands the non-obviousness nature to assure the usefulness and the novelty of the software (Freibrun, 1993; Mathew et al., 2004).

2.3 Role of WIPO in Software IPR protection

Five decades ago, the 'World Intellectual Property Organization' (WIPO) started the efforts of providing IPR protection to software by proposing 'sui generis' system which raised the importance to protect different formats of single software (expression(s)) i.e. human readable 'source code', the machine understandable 'object code' and supporting documentation (WIPO, 1983). In the middle of 1980's, WIPO and UNESCO initiated international copyright law by involving key IT industry players, WIPO further contributed by proposing 'soft law', 'WIPO Copyright treaty' (WCT) and 'TRIPS agreement' which classified computer software as a part of literary work under 'Berne convention' (WIPO, 1995). The dynamic nature of the software still adopts the different combination of IPR protection forms to deal with challenges in the traditional hood. For example a single software can protect interfaces as visual, video as cinematographic, fixed images as photographic work under Berne Convention to avoid 'Copyright' and 'Piracy'.

2.4 IPR challenges in the present Software industry

In the software industry, the IPR practices are still controversial and non-standardized across the globe, however, the market leaders in the technologically advanced industries are keeping the legal skills at the right pace to secure their values and deliverables (Kumar B.R, 2012; Shen, 2005). The unsynchronized software industry and IPR legislative authorities have different unanswered and incomplete debate and need to be addressed in the harmonized manner i.e. (1) every idea in the software's world includes the object code which is only the arrangement of the mathematical algorithm only. (2) Every database includes the pre-existing load of information to process and reproduced in an informative manner. (3) The user interfaces are naturally un-copyrightable as inheritable functional. (4) The pirated and unlicensed copies of the commercial software is being used by the majority of users worldwide. The profitability of the industry and the dependent economies is demanding highly standardized communication and business models to cope the emerging unaddressed IPR challenges in the software world. The IPR protection in 'Software industry' still having the blur scope of actions in dejure and defacto manner as current policies and IPR frameworks hardly accommodate the 'computer-implemented innovations' and 'computer software's' in the traditional hood (Bagheri & Casprini, 2013; Gibbons, 1990). Furthermore, the pace of innovation in the software industry is astonishingly high as compared to the IPR protection policy making by the concerned authorities, especially in the developing countries (Gibbons, 1990; Marcus, 2012).

2.5 Objectives of the study

The literature review demands the immediate attention of the policy makers, technocrats and the concerned authorities to understand the importance and the weakness in the existing structures to governing bodies to cope with the challenges of IPR in the software industry, specifically in the developing countries where software industry can play the major role in the economic development. This piece of the document will highlight two perspectives. (1) To study the present supply side by reviewing legal structure which provides systematic support to the Software industry in Pakistan (a quick overview will be sketched), (2) To address the demand side perspective, the behaviour and intentions of the existing IT skilled workforce will be studied, the framework of Icek Ajzen's 'Theory of Planned behaviour' will be adapted to analyse the behaviour of workforce to understand their needs, challenges and expectation to adopt IPR in their business. The graphical representation of the adapted model for the quantitative section is shown in figure 1.

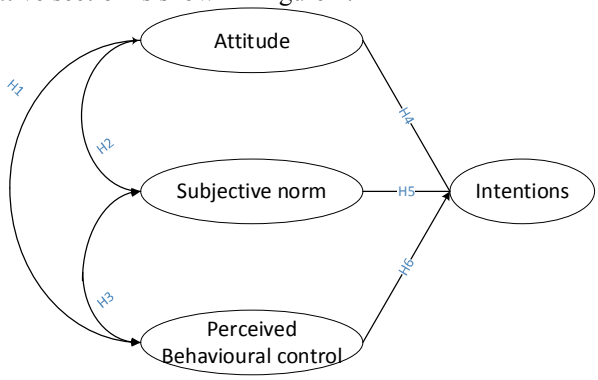

Figure 1: Adapted model of 'Theory of Planned Behaviour' by Icek Ajzen (adapted by Ajzen, 1991)

Specifically, the impact of 'attitude', 'subjective norms', and 'perceived behavioral control' will be studied and rated the domination of these variables on the collective behavior of the IT skilled workforce in Pakistan towards IPR. In the literal meanings, the 'Subjective norms' (SN) defined as the perceived pressure from the society to adopt or reject to perform such behavior (Ajzen, 1991). In psychological terms, the

individual's 'attitude' defines as his positive or the negative expressions towards the things, and the 'perceived behavior control' includes the individuals believe to have active management of his actions. Specifically, the list of hypothesis for the current study will be following:

I. The 'Attitude' (A) towards IPR in IT skilled workforce is positively associated with their 'Perceived Behavioural Control' (PBC).
II. The 'Attitude' (A) towards IPR in IT skilled workforce is positively associated with their 'Social Norm' (SN).
III. The 'Subjective norm' (SN) towards IPR in IT skilled workforce is positively associated with their 'Perceived Behavioural Control' (PBC).
IV. The 'Attitude' (A) towards IPR in IT skilled workforce is positively influenced the 'Intentions' to follow and adopt IPR related practices.
V. The 'Perceived Behavioural Control' (PBC) towards IPR in IT skilled workforce is positively influenced the 'Intentions' to follow and adopt IPR related practices.
VI. The 'Subjective Norm' (SN) towards IPR in IT skilled workforce is positively influenced the 'Intentions' to follow and adopt IPR related practices.

3. Methodology

To understand the ground realities, the social constructionism method as a part of interpretive philosophy will be followed. For understanding the logical reasoning of the behavior and to interpret the current situation, the phenomenology will be considered to study, where the triangulated approach will be followed by adopting cross-sectional quantitative and longitudinal qualitative. During the longitudinal qualitative approach, the IPR related development in the software industry of Pakistan has been studied on the historic factual data which includes the ordinances and protocols available from the supplier side to be followed by the software houses in the country. In the quantitative section, the structured questionnaire with the likert scale was adopted. Furthermore, the random sampling method was adopted where the questionnaires were dispersed in the software houses as the target audience was the IT-skilled workforce within the country as it will cover the demand side of the issue. The preference of the sample were the IT business start-ups and the entrepreneurs in the field of IT, however, the employees in the software industry are also considered as the individual cases in the sample data for the current study. The H1 – H3 are studied through the bivariate correlation analysis among independent variables and the H4 – H6 hypothesis will use regression coefficient to analyze the situation and. In total, 150 questionnaires in the electronic and printed formatted were circulated, however only 97 respondents replied and 72 were considered for the analysis. Conclusively, the personal, behavioral and the environmental factors were considered as the scale of measurement during the study.

4. Analysis and Findings

4.1Demand side perspective (behavior of IT-skilled workforce) – Primary data

To understand the perspective of demand side perspective, the quantitative survey was conducted, the detailed profile of the sample is shown in table 1.

Table 1: The profile of the sample population for the primary survey.

Features and attributes	Distribution	Observed Values
Age (years)	Below 25	21%
	25 – 30	47%
	30 – 35	16%
	Others	16%
Gender	Male	73%
	Female	27%
Education	Diploma	21%
	Undergraduate	68%
	Postgraduate	11%
Nature of Company	Online application	58%
	Desktop application	22%
	Network solution	4%
	SEO / Customer services	16%

As a quick description of the sample profile, more than 65% cases are younger than 30 years of age and mostly male, however, the females are also actively participating in the software industrial growth. Interestingly, almost 70% of cases are graduated and holding IT related professional degrees and skills. Most of the sample audience is from the urban cities of the country. Moreover, the collected sample is mostly serving online to the international market.

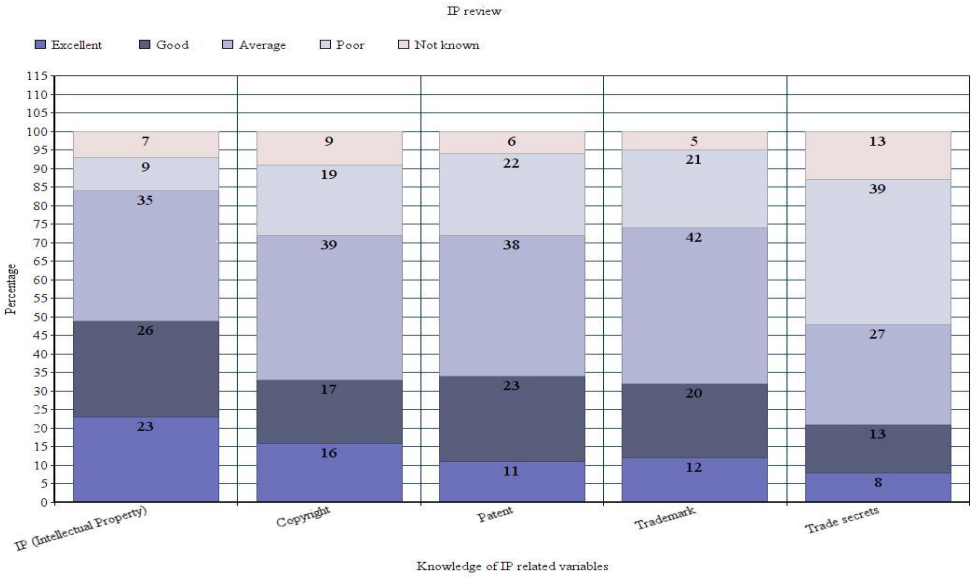

Figure 2: Knowledge claimed by the surveyed population about IPR related terms (in percentage).

It is observed during the primary survey that most of the people have good knowledge of IPR, however, the terms like 'Copyright', 'Patent', Trademarks' and 'Trade secrets' are less obvious and less understandable in technical terms. Moreover, a few of the interesting observations from the study are the following:

- Around 60% sample perceive that the patent can't be copied after a certain period of time.
- The 28% sample have doubts about the capability of existing Copyright acts and legislation capability to secure the method or expression in the software industry.
- Around 65% population perceive that the Front-end interfaces can't be protected by the IPR.
- More than 70% IT skilled workforce have copied the code without the permission of the developer once.
- Around 65% workforce accepts that they usually save the code developed by me on the job for the employer.

4.1.1 Reliability testing

The composite reliability of the research measured by discussing the observed values of loadings, Cronbach alpha, AVEs and the composite reliability. Specifically, the lower limit of Cronbach alpha is suggested to be higher than .70 (Nunnally & Bernstein, 1997), wherein the current study is been followed. Similarly, the lower limit of AVE of .50 (Hair, Black, Babin, & Anderson, 2014) and composite reliability with the lower range of .70 (Hair et al., 2014) was monitored in the current study and supportive readings are observed. Interestingly, all the loading factors are also observed closer to the higher range of values. In the sum-up, the reliability is assured as shown in the table 2.

Table 2: Reliability test for the sample

Construct	Items	Mean	Standard Deviation	Factor Loadings	Cronbach Alpha	Average Variance Extracted	Composite Reliability
Attitude	Att1	4.416	1.828	.919	.946	.663	.907
	Att2	4.763	2.010	.763			
	Att3	4.875	1.920	.732			
	Att4	4.986	1.924	.810			
	Att5	4.763	2.058	.834			
Social Norm	SN1	4.152	1.962	.974	.903	.768	.868
	SN2	4.513	1.920	.800			
Perceived Behaviour Control	PBC1	4.486	1.928	.872	.882	.834	.905
	PBC2	4.513	2.162	.953			
Intentions	INT1	5.041	1.887	.756	.818	.539	.700
	INT2	5.250	2.199	.712			

In order to evaluate and challenge the H1, H2, and H3, the bivariate correlation analysis was performed to analyze the relationship and possible strength among independent variables, specifically, each of the hypothesis is discussed below:

H1: The Pearson correlation coefficient computed to evaluate the Hypothesis (H1) where the relationship between 'Attitude' and 'Perceived Behaviour Control' towards IPR related practices in software

industry was challenged. The statistical findings conclude that the 'Attitude' and ''Perceived Behaviour Control' are highly positive correlated. Specifically, the Pearson's r correlation between 'Attitude' and 'Social Norm' is 0.709. The r value closer to 1 concludes the presence of the strong relationship. Furthermore the n=72 and p=0.000, the p-value concludes that the H1 has statistically significant correlation as the value is less than 0.005 as shown in table 4. The findings from the statistical analysis concludes that the strongest positive relationship exists between 'Attitude' (A) and ''Perceived Behaviour Control' (PBC) as compare to the rest of the associations to concludes that the individual's behaviour towards Intellectual property rights in the software industry of Pakistan is highly influenced by the ''Perceived Behaviour Control'.

H2: The Pearson correlation coefficient computed to evaluate the Hypothesis (H2) where the relationship between 'Attitude' and 'Social Norm' towards IPR related practices in software industry was challenged. The statistical findings conclude that the 'Attitude' and 'Social Norms' are highly positive correlated. Specifically, the Pearson's r correlation between 'Attitude' and 'Social Norm' is 0.604. The r value closer to 1 concludes the presence of the strong relationship. Furthermore the n=72 and p=0.000, the p-value concludes that the H2 hypothesis has statistically significant correlation as the value is less than 0.005 as shown in table 3. The findings from the statistical analysis concludes that the moderate positive relationship exists between 'Attitude' (A) and 'Social Norm' (SN) as compare to the rest of the associations to concludes that the individual's behaviour towards Intellectual property rights in the software industry of Pakistan is highly influenced by the 'Social Norms.

Table 3: Correlation analysis for the current study.

		ATTITUDE	SOCIAL	PERCEIVED
ATTITUDE	Pearson Correlation	1	.604**	.709**
	Sig. (2-tailed)		.000	.000
	N	72	72	72
SOCIAL	Pearson Correlation	.604**	1	.592**
	Sig. (2-tailed)	.000		.000
	N	72	72	72
PERCEIVED	Pearson Correlation	.709**	.592**	1
	Sig. (2-tailed)	.000	.000	
	N	72	72	72
**. Correlation is significant at the 0.01 level (2-tailed).				

H3: The Pearson correlation coefficient computed to evaluate the Hypothesis (H3) where the relationship between 'Social Norm' (SN) and 'Perceived Behaviour Control' towards IPR related practices in software industry was challenged. The statistical findings conclude that the 'Social Norm' (SN) and ''Perceived Behaviour Control' are highly positive correlated. Specifically, the Pearson's r correlation between 'Social Norm' (SN) and 'Social Norm' is 0.592. The r value closer to 1 concludes the presence of the strong relationship. Furthermore the n=72 and p=0.000, the p-value concludes that the H3 hypothesis has statistically significant correlation as the value is less than 0.005 as shown in table 3. The findings from the statistical analysis concludes that the positive but comparatively weak relationship exists between 'Social Norm' (SN) and ''Perceived Behaviour Control' (PBC) as compare to the rest of the associations to concludes that the individual's behaviour towards Intellectual property rights in the software industry of Pakistan is highly influenced by the ''Perceived Behaviour Control'.

To assess the strength of the association between the dependent variable (Intentions) and the Independent variables (Attitude, Behaviour, and Perceived Behavioural Control) the regression coefficient is studied as shown in table 4. The signification was observed during regression equation, specifically ($F(3, 68) = 70.128$, $p < .001$), moreover the R2 of .756 was recorded. The intentions of IT skilled workforce to adopt IPR in their business environment was recorded as .487 + .505 (attitude) + .244 (social norms) + .265 (perceived behavioral control) (which can be counted as independent variables measures) as shown in Table 4 and 5. Furthermore, each of the hypotheses is discussed below.

Table 4: Regression model summary for the current study.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.869[a]	.756	.745	.91844
a. Predictors: (Constant), PERCEIVED, SOCIAL, ATTITUDE				

H4, which was challenging the relations between the attitudes of IT skilled workforce towards the intentions was challenged through the collected data sample, it is observed to have the significant positive relation. Specifically the coefficient of .505 ($p<0.001$, $n=72$) with the standard error of 0.096 and t-value of 5.281 as shown in table 6. This concludes that the positive attitude of IT skilled workforce have the positive relationship with intentions to adopt IPR in their business environment.

Table 5: ANOVA recorded for the current study

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	190.610	3	63.537	70.128	.000[b]
	Residual	61.608	68	.906		
	Total	252.219	71			
a. Dependent Variable: INTENTIONS						
b. Predictors: (Constant), PERCEIVED, SOCIAL, ATTITUDE						

H5: The collected quantitative data supported H2. However the standardized coefficient of the path between 'perceived behavioral control' and 'intentions' with the recorded value of .265 as the coefficient ($p<0.005$, $n=72$) with the standard error of 0.086 and t-value of 3.068 as shown in table 6. This concluded 'perceived control behavior' as the second strongest influential factor to define intentions of IT skilled workforce towards IPR adoption for their business practices.

H6: The H3 which was representing the association between subjective norms in the form of social and superior influence from the society and external environment is the weakest indicator among independent variables to define the intentions and behavior of individuals to adopt IPR practices in their business environment. Specifically, the standard path coefficient of 0.244 ($p<0.005$, $n=72$) as shown in table 6 where the standard error is only 0.080 and recorded t-value is 3.058. However, the hypothesis is statistically significant.

Table 6: Coefficient of determination (regression coefficient)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.487	.342		1.427	.158
	ATTITUDE	.505	.096	.474	5.281	.000
	SOCIAL	.244	.080	.240	3.058	.003
	PERCEIVED	.265	.086	.273	3.068	.003
a. Dependent Variable: INTENTIONS						

4.1.2 Challenges and opportunities observed through primary data in the Software industry in Pakistan

Apart from the weak infrastructure and implemented policies of IPR in the IT industry in the country, the people with professional education and awareness of IPR are keenly interested in adopting IPR policies in their business cycle. The impact of attitude to create intentions is much more influential and important as compared to the social norm and the perceived behavioral control of the individuals towards IPR adoption. Similarly, the strength of the relationship between attitude and perceived behavioral control is much more important to understand as compared to the other associations among independent variables. The findings from the quantitative data conclude that the IT entrepreneurs are more open and ready to adopt IPR practices individually, however the lack of legal and technical support from the supply side is critical to make IPR adoption successful in the society.

4.2 Supply side perspective (legal dimension) – Secondary data

As a part of secondary analysis about the developments in Intellectual Property Rights in the software industry of Pakistan, the following legal amendments are observed.

- The Prevention of Electronic Crimes Act, 2015: The legal platform to protect the unauthorised access to the 'information system' is observed, to avoid unwilling distribution of the processed code or load of information, the 'content data' was classified to provide protection and confidence to the 'software houses' to protect themselves. 'Erasing', 'stealing' and 'altering' soft code for the unethical means is classified as the 'data damage'. Furthermore, the terms 'spamming' and 'spoofing' is also addressed to deal the emerging challenges in the IT industry of the country (Haider, 2015).
- The Intellectual Property Organization of Pakistan Act, 2012 and Ordinance, 2009 (Ordinance No. XXXI of 2009): It defined comprehensive IPR based policy to fuel in the foster creativity in the national economy. The whole structural organization was approved with the hierarchy of the institution and to be responsible for forming policies and suggesting federal government about IPR related demands in the country. Moreover, an IP tribunal was also approved to exercise jurisdiction in the country (WIPO, 2012). In terms of IT industry, the Pakistan Software Houses Association (PASHA) and Pakistan Software Export Board (PSEB) are actively participating in providing IT related consultation.
- The Patents (Amendment) Act, 2010: The section 16 and 19 of the Ordinance LXI of 2000 is changed to deal with the issues related to the 'filing of an application and its omitting process was discussed (WIPO, 2010).
- The Export Development Fund (Amendment) Act, 2005: Sections and platform to encourage and increase the awareness of the channels and possibilities to export the IT based products to the

international market and provide support in the form of legal consultation was provided to increase participation in the international market (National Assembly of Pakistan, 2005).

- The Patents (Amendment) Ordinance, 2002: To strengthen the technology-based innovation and providing support, the amendment in the Patent ordinance of the year 2000 was observed to secure technological innovation in the country.

Furthermore, the following IPR related previous practices were observed, (1) The Trade Marks Ordinance, 2001, (2) The Patents Ordinance, 2000, (3) Registered Designs Ordinance, 2000, (4) The Copyright (Amendment) Act, 1992, (5) The Patents and Designs (Amendment) Act, 1997, and (6) The Copyright Ordinance, 1962 (Act No. XXXIV).

4.2.2 Challenges and opportunities observed through secondary data in the Software industry in Pakistan

Although, the Ministry of Information Technology and Telecommunication unveiled for public comment a draft Prevention of Cybercrimes Act, which had been developed by Pakistani law firms in consultation with the Pakistan Software Houses Association and the Internet Service Providers Association of Pakistan. However, the concrete IPR framework for software industry still in the struggling phase where the entrepreneurial small and medium size IT based groups are struggling to enter the international market and to sustain the presentation in the local market (Earp and Raymond, 2015).

Pakistan is still managing to deal with the challenge of piracy when it comes to the software industry. Weak Intellectual Property laws make it almost impossible for any sort of regulation to be effectively put into implementation. This hinders and thus discourages large software companies to shift their business locally or to outsource their work since they are aware of the heavy software piracy penetration levels in Pakistan. Almost 70 % of the population of Pakistan can't afford expensive software which runs into hundreds of dollars. Perhaps dominating players of the software industry should introduce specially subsidized software price packaging scheme which will encourage the population to shift towards authentic software instead of using the pirated version. However, According to Ministry of IT and PASHA, the IT-skilled workforce in Pakistan is still cheaper than all developing countries; it means better economies of scale for the software companies can be achieved by stretching their operations in the country.

5. Discussion and Conclusions

In the country, the weak framework of IPR in IT sector is observed, and in the growth of the sector, it is the serious issue to address. To deal with both, the international and the domestic pressure in the software industry. The availability of IPR protection for databases, software and the digital media is important. Unfortunately, while dealing with copyrights, counterfeiting, and protection of patents, the country is in the list of international bodies and watchdogs and alarmingly highlighting the IPR related challenges in the country (Froman, 2015). Although the government has initiated a governing body to address IPR in the country but still it is in its implementation phase. The educational backgrounds of individuals have the great impact towards the IPR adoption and acceptance in the society and business world. Moreover, the lack of IPR literacy is highly observed in the society. In the IT-software sector, most of the new start-ups are serving the international market in the form of online solution providers. Although most of the start-ups don't concern about IPR-value but the application providers are adopting it as a strategic tool to being accepted in the international and national market.

In the ranking of IPR implementation, Pakistan is having weak infrastructure and resources, especially in the software industry. Therefore, to address the immediate need and attention to this issue in this region is highly worth-full. By creating the supportive environment for software industry to follow IPR policies will benefit the country's economy and will help to avoid failure of the new IT-based business start-ups as most of the ideas and value created by the start-ups usually failed because of the poor IPR related policies.

During the current study, while understand the perception of individuals towards IPR, it is discovered that the attitude is the most controlling variable while creating the perception of IT skilled workforce towards IPR to adopt as compare to ‘social norm’ and ‘perceived control of individual behaviour’ towards adoption and acceptance of IPR related practices in the industry. Moreover, the strong relationship of ‘attitude’, ‘social norm’ and the ‘perceived behavior control' is observed. Through the primary data analysis, it is observed that most of the IT skilled workforce is educated and have basic awareness about IPR. However, the in-depth technical terms and practices are less concerned and less awarded. In the current study, the triangulated quantitative-qualitative approach was performed to understand the attitude, an impact of social norms and the perceived behavioral control in the IT skilled workforce. To improve the findings, the customized model can be developed instead of existing model of ‘Theory of Planned Behaviour’ to study the influence of each factor on the behavioral intentions of the workforce.

References

Asian Development Bank, (2013). ICT and Skills Development in Asia and the Pacific: 12 Things to Know. [online] Asian Development Bank. Available at: http://www.adb.org/features/ict-and-skills-

development-asia-and-pacific-12-things-know [Accessed 17 Feb. 2016].
Bagheri, S. K., & Casprini, E. (2013). Intellectual property paradoxes in developing countries: The case of software IP protection in Iran. Journal of Intellectual Property Rights, 19(1), 33–42.
Bouchoux, D. E. (2001). Protecting Your Company's Intellectual Property: A Practical Guide to Trademarks, Copyrights, Patents & Trade Secrets. AMACOM Div American Mgmt Assn. Retrieved from https://books.google.com/books?id=LEzQiYQmPb8C&pgis=1
Butt, F. (2013). Common factors in the successful software projects in Pakistan's software industry. World Applied Sciences Journal, 23(9), 1176–1185.
Carmel, E. (2003a). Taxonomy of New Software Exporting Nations. University of Nebraska;City University of Honk Kong.
Carmel, E. (2003b). The New Software Exporting Nations: Success Factors. The Electronic Journal of Information Systems in Developing Countries, 13, 1–12. http://doi.org/.
Correa, C. (1996). Strategies for software exports from developing countries. World Development.
D'Costa, A. (2002). Software outsourcing and development policy implications: An Indian perspective. International Journal of Technology Management = Journal International de La Gestion Technologique., 24(7).
Freibrun, E. S. (1993). Intellectual Property Rights in Software: What They Are and How the Law Protects Them. Retrieved February 21, 2016, from http://www.freibrun.com/articles/articl2.htm
Froman, M. B. G. (2015). 2015 Special 301 Report, 1–83. Retrieved from https://ustr.gov/sites/default/files/2015-Special-301-Report-FINAL.pdf
Gengler, E. (2003). Ukraine and Success Criteria for the Software Exports Industry. University of Nebraska;City University of Honk Kong.
Gibbons, J. H. (1990). Computer software & intellectual property. Washington D.C.: Congress of the U.S. Office of Technology Assessment ;For sale by the Supt. of Docs. U.S. G.P.O.
Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). Multivariate data analysis (7th ed.). Upper Saddle River, N.J.: Pearson Education.
Hassan, S. (1998). A Framework for IT Industry Development: A Case Study of Pakistan. Journal of Global Information Technology Management, 1(4), 38–55.
Hassan, S. Z. (2000). Software industry evolution in a developing country: an in depth study. System Sciences, 2000. Proceedings of the 33rd Annual Hawaii International Conference on, 0(c), 10 pp. vol.2. http://doi.org/10.1109/HICSS.2000.926918
Heeks, R. (1999). Software strategies in developing countries. Manchester: Institute for Development Policy and Management.
Heeks, R., & Nicholson, B. (2002). Software export success factors and strategies in developng and transitional economies, 8(3).
Kumar B.R, A. (2012). Issues of Cyber Laws and IPR in Software Industry and Software Process Model. International Journal of Computer Applications, 44(16), 16–21. http://doi.org/10.5120/6346-8544
Lanz, R. (2015). Services and global value chains some evidence on servicification of manufacturing and services networks. Geneva: World Trade Organization Economic Research and Statistics Div.
Marcus, M. (2012). How do foreign firms patent in emerging economies with weak appropriability regimes? Archetypes and motives. Elsevier.
Mathew, M., Hegde, M., & Garge, G. (2004). Intellectual Property in Software: Insights for Indian Business. Journal of Intellectual Property Rights, 9(November), 515–532.
Moore, A. D. (2009). Intellectual Property And Information Control: Philosophic Foundations and Contemporary Issues. Transaction Publishers. Retrieved from https://books.google.com/books?id=JqE115_Y9v0C&pgis=1
Nicholson, B. (2003). Building Iran's software industry : an assessment of plans and prospects using the software export success model. Manchester: Institute for Development Policy and Management University of Manchester.
Nunnally, J. C., & Bernstein, I. H. (1997). Psychometric theory (3rd ed.). New York: McGraw-Hill.
Porter, M. (1990). The competitive advantage of nations. New York: Free Press.
Rovere, R. (2015). Entrepreneurship in BRICS : policy and research to support entrepreneurs.
Shen, X. (2005). Developing Country Perspectives Software: Intellectual Property and Open Source. International Journal of IT Standards and Standardization Research, 3(1), 21–43.
Singh, N. (2014). Information technology and its role in India's economic development a review. Santa Cruz, Calif.: Univ. of California at Santa Cruz, Dep. of Economics.
Weckert, J. (1997). Intellectual Property Rights and Computer Software. Business Ethics: A European Review, 6(2), 101–109. http://doi.org/10.1111/1467-8608.00057
Weston, R. (2004). Double Standards. Managing Offshore : Strategy and Tactics for Global Sourcing, 1.01(10),

72–76. Retrieved from http://search.proquest.com/docview/200021630?accountid=14549\nhttp://hl5yy6xn2p.search.serialssolutions.com/?genre=article&sid=ProQ:&atitle=Managing+offshore+outsourcing&title=FDM&issn=10986812&date=2001-08-01&volume=73&issue=10&spage=72&author=Aves,+John

Wilkof, N. (2014). Theories of intellectual property: Is it worth the effort? Journal of Intellectual Property Law & Practice, 9(4).

WIPO. (1983). WIPO : legal protection of computer software. Journal of World Trade Law.

WIPO. (1995). WIPO Worldwide Symposium on Copyright in the Global Information Infrastructure. Geneva: WIPO.

Zhang, N. (2008). An Analysis Framework of Factors Influencing China Software and Information Service Offshore Outsourcing. In Fifth International Conference on Information Technology: New Generations (itng 2008) (pp. 875–880). IEEE. http://doi.org/10.1109/ITNG.2008.8

Zafar, K. (2013). Sizing up Pakistan IT Industry Exports and Domestic Spend. [online] Techies.pk. Available at: http://techies.pk/articles/sizing-pakistan-it-industry-exports-domestic-spend/ [Accessed 17 Feb. 2016].