ANALYSIS OF EMPLOYEE INNOVATIVE BEHAVIOR IN SRI LANKAN SOFTWARE COMPANIES

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Abstract

Along with the advancement of the technology, software companies have to face a huge competition in the global and the local market. To face this competition innovations can be used as a strategic weapon. As employees are the main driving forces of innovation, their behavior can be a crucial factor in boosting innovation. Innovative behavior is referred as the introduction and application of new ideas, products, processes, and procedures to a person's work role or an organization. This behavior directly affects innovation performance of an organization. The main aim of this study is to identify the factors that affect employee innovative behavior and their effect in Sri Lankan software companies using a quantitative methodology. Apart from that this study provides a conclusive summary of the current status of innovative behavior of employees. As the initial step mapping study was done to find the past literature related to the research topic. From that study, seventeen papers were identified as primary studies. Factors that have been proved by previously done research were used in this study. So nine factors were considered to cover a broad area of innovative behavior. A model was constructed by considering the above factors to get a clear idea about the study. Findings of the study emphasizes that both individual and organizational factors affect innovative behavior. Results have proven that psychological capital, organizational support, rewards, resource availability, leadership and social capital have a significant impact on employee innovative behavior while organizational structure, organizational commitment and work characteristics haven't any impact. Proposed model was reconstructed according to the results and areas that should be improved were identified.

Keywords: Innovation, Innovation performance, quantitative methodology

Introduction

Sri Lankan software companies have shown a rapid growth since last decades with the advancement of the information technology (Balasooriya, 2010). Because of this many local and global investors are willing to invest on this sector. All these software organizations have to operate in a global market where there is a huge competition (Balasooriya 2010). Innovations are known as a strategic weapon to face this competition. The word innovation refers to something freshly introduced. Innovation is about putting in ideas to make new results. This result may be a new product, a new approach or even a new application of an old product or approach. Innovation emerges due to new competitive demands (Baragde & Baporikar, 2017). Therefore to survive in the modern economic climate, organizations must seek innovation to change processes, create different and more effective processes, or improve existing processes. Organizations may go for different types of innovations such as product innovation,

process innovation, service innovation, business innovation and all contribute to strengthen the competitive advantage of a certain company (Gamal, 2011).

Employees are the main driving force of the innovation in the industry (Li & Zheng, 2014). So the employee innovative behavior is very crucial, which can defined as an act of generating, promoting and application of innovative thinking in the organization for the purpose of personal and organizational performance (Li & Zheng, 2014; Chatchawan1 et al. 2017). Innovative behavior enables to use innovative ways of thinking, quickly and accurately respond to customer demand changes. Influence on employee innovative behavior can be divided mainly into two categories as internal and external factors (Lukes & Stepahan, 2017; Li & Zheng, 2014; Smith et al. 2012). Internal factors refer to innovative personal traits and ability to participate in innovation, and external factors include the team environment (technology, culture, resources and etc.) and the support of leaders (Smith et al. 2012; Chatchawan1 et al. 2017; Monteiro et al. 2016).

The study consists of research problem, review of the relevant literature, methodology, data analysis, results and discussion sections. Final section provides the conclusion of the whole study including the future research possibilities.

Research problem

As software companies are constantly evolving, it is important to know how a companies' ability to innovate can be improved. All the innovative activities can be traced back to the behavior of employees. This absolutely makes employee the center point of attention. It is difficult for innovation to be forged by an individual alone. Because of these reasons, a great deal of attention should be paid to the factors affecting innovative work behavior. (Chatchawan et al. 2017). Therefore, the organizations have to take measures to stimulate the innovation willingness of employees and promote their innovative behavior. (Kabasheva et al. 2015).

Researchers who studied innovation in software organizations have focused on the characteristics of the organization as the main source of innovation success. They have given a little focus on the behavior of employees. Very few studies were there investigating the effect of employee characteristics and behaviors on processing the organizational strategies and innovative changes (Hamdy, 2015). The findings of Monteiro's review showed that there were incomplete and incomparable results, lack of established models or theories and very few studies which were focused on software engineers and software organizations (Monteiro et al. 2016, Hamdy, 2015).

Most of the research have been done on investigating the effect on individual or organizational factors that affect innovative behavior of employees in organizations. Only few research were there addressing both individual and organizational factors in the same research. And another problem was that, most of the research were qualitative and conclusive studies and they have not been focused on finding the current state of the employee innovative behavior. In the Sri Lankan context, no any research was published addressing the employee innovative behavior in software companies. Some of research were found regarding innovations in organizations. Therefore there is a need of comprehensive study regarding this research topic. This study is aimed to identify the factors that affect employee innovative behavior and their effect by identifying the current status of employee innovative behavior in Sri Lankan software companies. Furthermore this study helps to identify measures to stimulate the innovation willingness of employees and promote their innovative behavior.

Review of the relevant literature

Mapping study

As the initial step a mapping study was done to identify the current literature and factors affecting the innovative behavior of employees in organizations. Furthermore, the impact of those factors on employee innovative behavior is also examined. This study provides a broad overview of the research in order to determine whether there is past research evidence on the topic. And also, this helps to identify the research gap for future improvements and provide direction for new research activities. From the results of this study, 17 papers were identified as primary papers related to the research topic.

Innovative behavior of employees

Innovative Work Behavior is defined as the intentional behavior of an individual to introduce or apply new ideas to their assigned work role. Successful innovation requires both generation and implementation of novel ideas. Employees in organizations are rarely able to implement ideas on their own and often receive permission from their managers to implement them. Lukes has stated that an important aspect of innovative behavior is to communicate ideas with colleagues and managers to receive their feedback (Lukes, 2016). Dorner in his research has explained that employees' innovative work behavior is very crucial in many contemporary management principles, such as continuous improvement, corporate, entrepreneurship and suggestion programs. Therefore, innovative firms consider their employees to be an important source of innovation (Dorner, 2012). Chatchawan has stated that there are four main factors that affect the innovative behavior of an employee as opportunity exploration, idea generation, championing (sharing) and application (Chatchawan et al. 2017). Not only the individual factors but also organizational factors have a big influence in the employee innovative thinking.

If we consider individual factors, organizational commitment is a kind of mental state which employees are willing to maintain membership in organizations, showing the purposes of the employees why stay working. The added value of such employees is that they tend to be more determined in their work, show relatively high productivity and are more proactive in offering their support. There are three types of organizational commitment they are as follows. (1) Affective Commitment refers to the employee's emotional behavior, identification, attachment and involvement with their organization. (2) Continuance Commitment refers to the employee's commitment based on the value associated with their organization. (3) Normative Commitment refers to the employee's responsibility for the job and thus makes them stay with the same organization (Chelliah et al. 2015). Another individual factor is psychological capital, it means employees are willing to take the risk of innovation failure and actively participate in innovation within the organization. These are closely related to their psychological characteristics. (Li & Zheng, 2014). Psychological capital focuses on personal psychological sources with their basic four components as mentioned below. (1) Self-efficacy (confidence). (2) Hope. (3) Optimism (positive attitude). (4) Resiliency (capacity of recovery). (Cavus & Gokcen, 2015).

Under organizational factors, the organizational innovation atmosphere can be defined as the degree of supporting for creativity and innovation felt by members of the organization on the work environment. It considers the perception of the individual whether the organization provides environment which is conducive learning and innovation, and its degree (Li & Zheng, 2014). This includes the concept of advocacy, market guidance, evaluation and incentive, training, communication, cooperation, resource availability, model and authorization. This will directly affects the employee's innovative behavior, capability and performance in the organization (Pratoom & Savatsomboon, 2010; Li & Zheng, 2014).

Considering above factors organizational innovation atmosphere can be sub divided into organizational strategy, organizational support, rewards (incentives) and resource availability (Smith et al. 2012; Chatchawan et al. 2017).

And the relationship between organizational culture and strategy is highly complex and it is often difficult to separate the effects of strategy and culture have on each other. (Smith et al. 2012). Organizational strategy can be considered as one of the key component in boosting innovation. Therefore lot of strategies are used to acquire and manage innovative ideas from employees. Using simple and agile structures have a positive impact on innovation while on the other side, heavy and hierarchical structures have a negative impact on innovation (Hamdy, 2015). This also can be referred to aspects of the corporate and innovation strategies of the organization and how they impact on the management of innovation (Smith et al. 2012).

Organizational factors are usually related to the internal organization culture. Therefore factors such as the reward system, management support, culture of trust and risk taking, allocation of resources and specially the free time and finally the organizational structure and the related centralization of decision are directly related to the employees' idea generation (Smith et al. 2012; Monteiro et al. 2016). Hamdy has pointed out that, an appropriate reward system is a key factor that affects innovation and he has also showed that economic compensation positively affects the innovative behavior of an employee (Hamdy, 2015). Usually reward mechanisms motivate employees to develop new ideas and shared vision on the organizational level (Lukes, 2016). Chatchawan in his research has mentioned that organizational supportiveness helps to motivate employees towards more innovative ideas (Chatchawan et al. 2017; Monteiro et al. 2016). Also, he has pointed out three components of organizational supportiveness as 1) supervisory encouragement which refers to the management support to motivate employees, 2) sufficient resources, which refers to the ability to access sufficient resources provided by the organization, 3) recognition, which refers to the process of recognizing, valuing, or awarding achievement of the employees (Chatchawan et al. 2017). Li and Zeng have also stated that the employees who are willing to share knowledge with others will increase their knowledge reserve and more likely produce the innovative behavior (Li & Zeng, 2014). Therefore, inter relationship between employees affects their innovative behavior and also relationship between employees and customers also will have an impact on the employees' innovative behavior (Li & Zeng, 2014). And work characterizes which includes work experience and job characteristics also has a great influence on employee innovative behavior (Li & Zeng, 2014).

Methods

Research methodology

In order to examine the effect of organizational and individual factors on employee's innovative behavior of Sri Lankan software companies, a conclusive research design based on the quantitative approach was used. The objective this study is to identify the current status of innovative behavior of employees in Sri Lankan software companies. To do this, information should be gathered from different groups of employees who are engaging in activities related to software development in companies. Information should be collected from the management level and both senior and junior software developers to understand their motivation, obstacles, dissatisfactions, expectations, opinions and experiences regarding their work role and behavior inside the company.

The quantitative survey method was chosen since it allows the collection of a large amount of data from a large population with a cost-effective manner (Rizkallah, et al. 2015). In order to do that, a

questionnaire was used with proper scale and scope. Then the responses were statistically analyzed using SPSS version 20.

Before making the questionnaire, nine hypothesis have been formulated to cover the scope of the study and to measure the innovative behavior of employees in software companies. They were formulated by considering previously done research as: **H1** - Organizational commitment influences on employee innovative behavior, **H2** - Psychological capital influences on employee innovative behavior, **H3** - Organizational strategy influences on employee innovative behavior, **H4** - Organizational support influences on employee innovative behavior, **H5** – Personal rewards influence on employee innovative behavior, **H6** – Resource availability influences on employee innovative behavior, **H7** – Leadership influences on employee innovative behavior, **H8** – Social capital influences on employee innovative behavior, **H9** – Work characteristics influence on employee innovative behavior.

Questionnaire design

Questionnaire was designed under two main factors and nine sub factors based on the hypothesis. Figure 1 shows the research model developed in order to a get clear idea about the relationship between those factors (Dorner, 2012; Chatchawan et al. 2017; Monteiro et al. 2016). Here innovative behavior (IB) acts as the dependent variable and all others are independent variables (Shahzad et al. 2007; Hamdy, 2015). In the questionnaire, first respondent has to fill his name, age, designation and experience in his position. Then the rest of questions were provided with several options. Five-point Likert-type scale was used to capture responses from the employees which allowed them to make their level of agreement such as strongly agree, agree, no idea, disagree, and strongly disagree. Respectively scores of 5, 4, 3, 2, and 1 were assigned for the above mentioned categories. Therefore considering Likert-type scale, all items can be divided in to three main categories as values over 3, and values below 3 and values equal to exactly 3. (Shahzad et al. 2017) They can represent positive negative and neither positive or negative respectively. Value 3 is the mean value and it would be the decision criteria for this survey.

The preliminary designed questionnaire was given to some of experts in software engineering filed to ensure the content validity. All the questions were examined and checked that the survey items achieve the research objectives. And after the confirmation of the questionnaire pilot test was done by giving the questionnaire to 25 individuals in the field. They were invited to complete the survey, to comment on whether the questionnaire is legible, understandable and any other comments to improve the design and content of the questionnaire. After that some modifications were done according to the comments, more designations were added when selecting position and also option to select gender was added. Then the reliability of the questionnaire was checked using Cronbach's alpha technique (Shahzad et al. 2017). Then four questions were changed again and rechecked the reliability. After the final confirmation, the questionnaire was developed in google forms and link was provided to employees in software companies through internet (Vasanthapriyan et al. 2017). One hundred responses were collected from ten software companies, covering small, medium and large sized software companies in Sri Lanka.

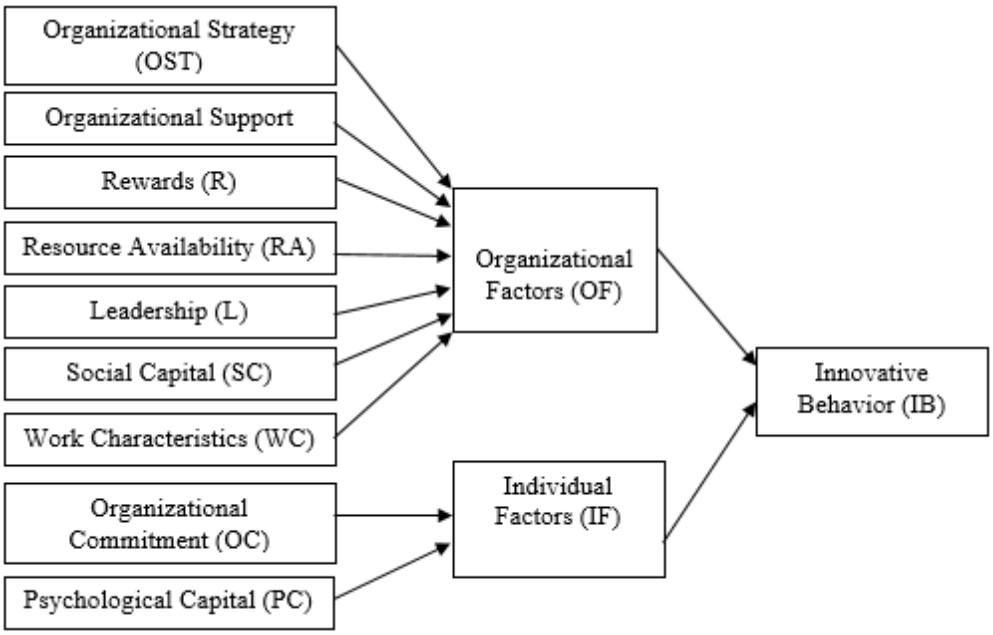

Figure 1: The Research Model

Data analysis and results

The dataset was analyzed by SPSS version 20 using various statistical tools. Demographic analysis was done while considering the frequencies of demographic variables. A dataset consisted of 100 valid responses was used to carry out the analysis part. Out of 100 responses, 62% and 38% represented male and female respondents respectively. Most of the respondents were young individuals between 25-35 years of age which was 70% of total responses. Rest of 30% was below 35 years of age. When considering the current position of employees, majority were software engineers which was 61% of the total responses, 16% were quality assurance engineers, 7% were business analysts and 6 % were software designers. All other positions were covered by the rest of responses including the high level management positions. Almost 50% of the respondents have got 6 months or less experience, 20 % have got 1-2 years of experience and rest 30% have got above 2 years of experience in their positions.

Measurement model assessment

Before doing descriptive, correlation and regression analysis, it is important to assess the measurement model. For that reliability and validity of the questionnaire was checked. Validity of the questionnaire was tested using Kaiser–Meyer–Olkin (KMO) coefficient and Bartlett's test of sphericity (BTS). Sampling adequacy is measured by using KMO value. BTS is a statistical test used to test overall significance of correlation. Criteria: 0.90s-marvellous, 0.80s-meritorious, 0.70s-middling, 0.60-medicore, 0.5s-miserable and below 0.5 is unacceptable. Table 2 shows that KMO value is above 0.79 which is an acceptable value and BTS is also a strong value. Reliability was checked using Cronbach's alpha technique (Shahzad et al. 2007; Vasanthapriyan et al. 2017; Hamdy, 2015). The value 0.50 was used as the threshold value to indicate adequate reliability for this study (Vasanthapriyan et al. 2017). The values of Cronbach's alpha were; OC= 0.71, PC= 0.62, OST= 0.87, OSU= 0.74, R= 0.52, RA= 0.60, L=

0.50, SC= 0.59, WC= 0.74 and IB= 0.54 as in the Table 2. As all the values were above 0.5, it was confirmed that reliability of the questionnaire was in a good state.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.798
Bartlett's Test of Sphericity	Approx. Chi-Square	3310.348
	df	780
	Sig.	.000

Table 1: KMO and Bartlett's Test

Table 2: Descriptive Statistics and Reliability

According to the Table 2, work characteristics and psychological capital has the highest mean values and rewards and innovative behavior has lowest mean values. Table 2 shows mean, standard deviation and Cronbach's alpha for each variable.

Factors	No of Items	Mean	Std. Deviation	Cronbach's Alpha
OC	4	3.73	0.61	0.71
PC	6	3.96	0.48	0.62
OST	6	3.88	0.63	0.87
OSU	4	3.71	0.74	0.74
R	2	3.66	0.85	0.52
RA	4	3.76	0.63	0.60
L	4	3.80	0.62	0.50
SC	6	3.75	0.55	0.59
WC	4	4.06	0.64	0.74
IB	2	3.68	0.72	0.54

Correlation analysis

To analyze the relationship between organizational factors, individual factors and Innovative Behavior (IB) Pearson Correlation matrix was used as shown in Table 3. Many indicators were used to determine influence of factors over innovative behavior of employees. From the data it was found that all the variables have got positive correlation between each other with $\rho < 0.05$ significant value. The

correlation of organizational support (OST) and innovative behavior (IB) was found as the highest correlation ($r = 0.88$, $\rho < 0.01$). Significant positive correlation was found between leadership (L) and innovative behavior (IB) ($r = 0.79$, $\rho < 0.01$). Next highest was between innovative behavior (IB) and psychological capital (PC) ($r = 0.66$, $\rho < 0.01$). Least correlation coefficient was found between organizational support (OST) and rewards (R) ($r = 0.27$, $\rho < 0.01$).

Table 3: Correlations

	OC	PC	OST	OSU	R	RA	L	SC	WC	IB
OC	1									
PC	0.57**	1								
OST	0.41**	0.48**	1							
OSU	0.33**	0.53**	0.27**	1						
R	0.44**	0.53**	0.66**	0.32**	1					
RA	0.35**	0.47**	0.39**	0.34**	0.58**	1				
L	0.38**	0.61**	0.41**	0.69**	0.53**	0.45**	1			
SC	0.39**	0.41**	0.40**	0.43**	0.55**	0.46**	0.56**	1		
WC	0.40**	0.49**	0.46**	0.48**	0.38**	0.28**	0.44**	0.33**	1	
IB	0.41**	0.66**	0.36**	0.88**	0.52**	0.52**	0.79**	0.58**	0.47**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Regression analysis

The Linear regression model has been developed in order to test hypothesis. (Shahzad et al. 2007; Edison et al., 2013). Multiple correlation coefficient $R = 0.94$ indicates that there is a strong correlation between the innovative behavior (IB) with other variables. The most significant independent variables were in order: organizational support (OSU) ($\rho = 0.000$), leadership (L) ($\rho = 0.003$), psychological capital (PC) ($\rho = 0.007$), resource availability (RA) ($\rho = 0.033$), social capital (SC) ($\rho = 0.039$), and rewards (R) ($\rho = 0.040$). Other three variables, organizational commitment (OC), organizational strategy (OS), work characteristics (WC) were not significant in the regression model as their ρ values were over '0.05'. Therefore according to the data H1, H3 and H9 were removed because they haven't got any relationship with innovative behavior (IB). And H2, H4, H5, H6, H7 and H8 were identified as supported hypothesis. They showed a positive influence as their regression coefficient and t values were positive ($\beta > 0$, $t > 0$). In terms of variability of the, the R2 of 0.89 indicates that 89 percent of variability of the innovative behavior can be discussed by the 6 most significant variables (SC, L, OSU, RA, PC, and R).

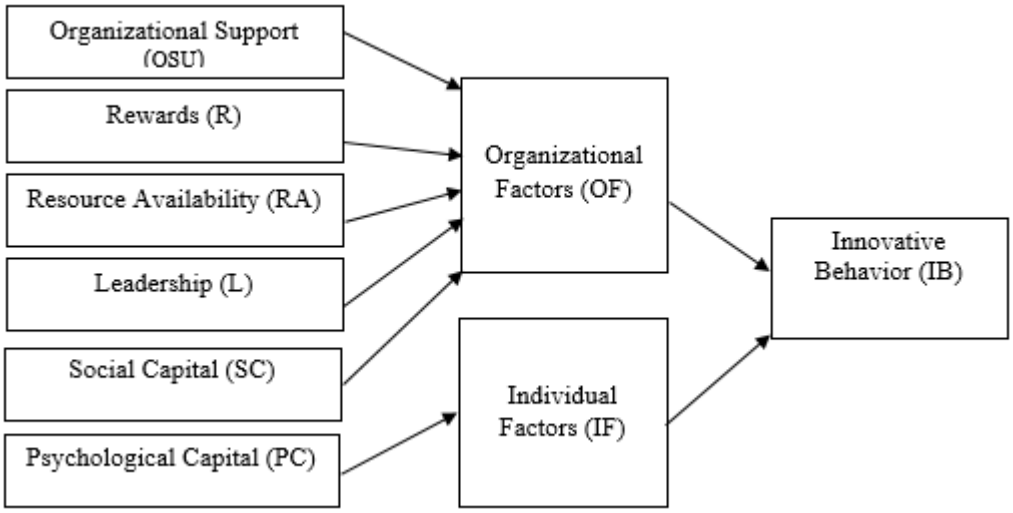

Figure 2: Reconstructed Research Model

Model was reconstructed according to proven results as shown in Figure 2. Results of regression analysis are shown in table 4.

Table 4: Coefficients[a]

Model		Unstandardized Coefficients (B)	Standardized (β)	Coefficientst	Sig.
	(Constant)	-.842		-3.299	.001
	OC	-.006	.005	.118	.906
	PC	.207	.140	2.742	.007
	OST	-.092	-.081	-1.656	.101
	OSU	.591	.611	11.827	.000
	R	.100	.118	2.082	.040
	RA	.111	.098	2.163	.033
	L	.198	.171	3.002	.003
	SC	.124	.096	2.091	.039
	WC	-.040	-.036	-.808	.421

a. Dependent Variable: Avg_Innovative behavior

Discussion

In this study, innovative behavior was measured via nine possible dimensions which were briefly discussed in the literature. Past research have considered only limited factors, and most of the studies have followed a qualitative methodology. But in this study quantitative research methodology was used. Analysis of the results showed that almost 75% of respondents have engaged in innovative

activities in software companies. From them about 20% of respondents have frequently engaged in innovative activities. In this study both individual and organizational factors that affect innovative behavior have been considered and also hypothesis related them have been proven. Monterio in his research has mentioned that both these factors affect employee innovative behavior (Monteiro et al. 2016).

Psychological capital comprises of confidence, attitude, hope, recovery (tolerance) which are crucial factors that affect innovative behavior of an employee. Results have proven that it has a significant relationship with innovative behavior. Correlation between psychological capital and innovative behavior is relatively high comparing with other values. Therefore importance of this factor can be proven using above results. These results are also consistent with Dorner's results (2012). Hamdy's study (2015) has stated that tolerance for risk has no relationship with innovative behavior, but in this study we have considered tolerance for risk combining with some other factors. Results have highlighted that social capital which can be described as interaction and trust between employees and customers has a significant positive influence on innovative behavior. Shahzad (2017) in his research has proven that team work has a positive relationship with innovation performance. This study's results also showed that social capital has a significant relationship with innovative behavior. Results of the regression analysis indicated that leadership is positively influencing the innovative behavior of employees. Hamdy (2015) in his research has proven this relationship. Usually employees get motivated if manager is evaluating their ideas (Li & Zeng, 2014). Monteiro (2016) in his research has discussed this. Resources are important to improve innovative behavior of employees. Results prove that resources are limited in Sri Lankan software companies as it has considerably a low mean value. But it has significant positive effect on innovative behavior.

Organizational support also has a positive relationship with innovative behavior according to the results. It has the highest correlation with innovative behavior. Chatchawan (2017) has mentioned this factor as an important one in his proposed model. So according to the results, innovative behavior of employees are highly depending on factors such as social capital, leadership and organizational support under the Sri Lankan context because they have the most significant relationship with innovative behavior. The results of this research indicated that reward also has positive relationship with innovative behavior. The correlation between reward systems and innovative behavior is significant. These results are consistent with results of Hamdy's (2015) and Shahzad's (2017) studies. In the Sri Lankan context it is very important to motivate employees. Hamdy (2015) also have highlighted that higher rewards will lead to more innovative behaviors demonstrated by employees.

Organizational commitment, work characteristics and organizational strategy have been pointed out as factors that affect innovative behavior from previously done research (Li & Zeng, 2014; Smith, 2008), but according to the results of this study, they have no relationship with innovative behavior. Therefore in Sri Lankan software companies there is no need to concern above three factors. This study provides six factors that affect employee innovative behavior in Sri Lankan software companies and their degree of effect and interrelationship. Most of the research have been done by checking less number of factors. But this study covers a broad area using many factors. As this research also examined both individual and organizational factors, research gap is covered considerably.

Conclusion

Innovative behavior of employees is a crucial factor which leads to drive towards innovation. The aim of this study is to identify the organizational and individual factors that affect employee innovative behavior and their effect in Sri Lankan software companies. In conclusion, psychological capital, organizational support, rewards, resource availability, leadership and social capital are proved as the

most important factors influencing employee innovative behavior in Sri Lankan software companies. This research has provided a strong evidence to prove their relationship. The research model has been reconstructed according to the findings. Also the results emphasize that both individual and organizational factors effect on employee innovative behavior. According to the results individual's psychological characteristics have a significant effect on employee innovative behavior. And from the organizational view point it is important to have good support from the company and adequate resources must be there for employees. Strong management support should be provided in order to evaluate employee ideas and to motivate them. Another important thing is encouragement and appreciation of employees who engage in innovative activities in companies by giving rewards for them. So employee innovative behavior can be improved by positively influencing the factors that have been identified by this research study. This study also have found that organizational structure, organizational commitment and work characteristics have no relationship with innovative behavior of employees. Therefore future research should be done on investigating above factors to find more evidence to say that. And this study only focused on employees in Sri Lankan software companies. Therefore more studies should be done by covering other organizations also. As a conclusion finding of this study emphasize that psychological capital, organizational support, rewards, resource availability, leadership and social capital positively influence on employee innovative behavior in Sri Lankan software companies.

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