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Factors Influencing Individual's Innovation Performance: A Study on the Academics of the Public Universities in Mymensingh District, Bangladesh

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Abstract

The term innovation performance is defined as the use of an ideas or creativity to improve the processes and procedures that increase the significance, usefulness and performance of the products and services. For example, when we think about innovating in production and distribution of water we do not think only in the amount of water that people want, but also what the use that it will have (drink, wash, swimming, showering, feel, etc.). In organizations it is very much important to identify and develop new and innovative ideas in order to reach its goals.

Keywords: Drink; Wash; Swimming; Showering; Feel

Introduction

The term innovation performance is defined as the use of an ideas or creativity to improve the processes and procedures that increase the significance, usefulness and performance of the products and services. For example, when we think about innovating in production and distribution of water we do not think only in the amount of water that people want, but also what the use that it will have (drink, wash, swimming, showering, feel, etc.). In organizations it is very much important to identify and develop new and innovative ideas in order to reach its goals. We know that in recent years, innovation become increasingly important in all organizations all over the world including the teaching organizations. Innovation enables organizations to be able to respond rapidly and flexibly adapts to changes in the environment and respond better to the actual needs of consumers or users. Accordingly, the innovative ideas, thinking and strategies of the university teachers which will help offer creative teaching learning environment for the students; to achieve competitive advantage and increase their performance.

Literature Review

A wide body of literature has arisen that identifies the common factors shared by innovative organizations and the factors that impact on the ability to manage innovation. The general management literature often prescribes that organizations should increase their organizational innovativeness to remain competitive, but the literature often neglects to address how organizations can impact on their ability to manage innovation [1-3]. Using this body of literature, we conduct a structured literature review that identifies the organizational factors that influence the ability to manage innovation at the firm level. Such a systematic approach to the innovation literature is missing from the current body of literature. By identifying and analyzing the factors, we identify where relationships between the factors exist, this is achieved though identification of the relationships that are commonly cited in the literature. This will enable academics and practitioners alike to understand what factors can be manipulated by organizations to increase their ability to manage innovation. Although this paper does not provide a prescriptive method for organizations to follow

to become innovative, it does identify what factors and relationships are important in impacting an organizations ability to manage innovation. The aim of this paper is to provide a comprehensive view of the factors which influence an organizations ability to manage innovation. Often studies regarding success factors for innovation considers these factors independent of each other, we argue in this paper that the factors are not independent of each other and are in fact interrelated [4]. We therefore put forward the proposition that innovation management needs to be considered in a holistic manner. To rationalize the factors influencing an organization's ability to manage innovation a strategy was used that has been described in different ways by different authors. Uses 'Nominal Group' technique, i.e. a physical gathering where the participants use brain-storming techniques, and private ranking of ideas and tabulation [5,6]. In pursuit of clarity we have described what each of the factors mean in the context of this research as they can often have different meanings in different contexts.

Technology is often discussed as an output of innovation but in this research we are concerned with its role as an influencing factor [7]. Technology discussed in this paper is concerned with the utilization of technology to facilitate innovation and innovative behavior within and between organizations. Although a few authors discuss the impact of operational processes on organizational innovativeness, in the context of this paper processes relate to the generation, development and implementation of innovations [8-11]. Strategy is a wide subject area and the definition can often be confusing. Strategy in this research refers to aspects of the corporate and innovation strategies of the organization and how they impact on the management of innovation [12,13]. It also refers to the dissemination of the strategic vision throughout the organization. Organizational structure has received much attention in the general management literature and often covers more than the simple configuration of the organization [14]. However, within this research organizational structure relates to the way the various parts of an organization are configured and how this impacts on an organizations ability to manage innovation. Culture here refers to the culture of the organization, although organizational culture has been discussed widely in general management literature [15]. In the context of this research it relates to the values and beliefs of the organization and how these impact the ability to manage innovation within the organization. It takes into consideration the organization's approach to collaboration, communication and risk. Employees refers to the non-management employees of the organization and the role they play in affecting innovation management. This factor takes into account the various personal characteristics associated with employees and the motivation of employees to become innovative [16,17]. Resources relates to all the resources that the organization has, human, financial and physical, but they are discussed in relation to the level of slack resources and how resources are managed to impact on an organizations ability to manage innovation [18-20]. Knowledge management in this research refers to the management and utilization of knowledge for innovation management. This covers all aspects of knowledge, both internal and external to the organization. This factor will also take organizational learning into consideration as it plays a key role in knowledge management [21]. Management style and leadership refers to the employees that have responsibility for the management of the organization. This factor is concerned with a number of aspects to the way management influences the management of innovation. For example it takes into account the management style within the organization and how management can motivate employees to become more innovative [22-25]. Although our findings do share some common factors with other studies we have provided a more comprehensive view of the literature concerning the factors that influence innovation management. The work carried out in this research encompasses different academic fields and organizational contexts. The value in this work is not in the identification of the factors but the examination of the important relationships between the factors. This provides a more complete view of how these factors and relationships impact on innovation management. This research aims to open up the debate on innovation management as a systemic approach by organizations and not merely focused on singular factors. Frequently innovation management literature discusses the factors that affect organizations' ability to innovate in a way that treats the factors as mutually exclusive, meaning that each factor has an individual impact on innovation. However, the relationships between the factors and the impact these relationships have on innovation are largely ignored. This means that the cumulative effect of the factors and their relationships are not fully understood. This paper has shown that there are a number of important relationships that need to be examined in greater detail to understand how their effects impact on an organization's ability to manage innovation. Many studies have been carried out in the field of innovation performance but there is a visible gap that most of them showed only the theoretical clarification of the concept, and a few of them have tried to explore the factors that determine the innovation performance of the university teachers. So this project is an effort to disclose the above crucial issue and to make the authorities aware about. Another prominent issue is that only a few works has been carried out in the perspective of Bangladesh to uncover this crucial issue, so this project is an effective effort to fulfil the gap.

The objectives of the study are

- To show the perception of the respondents regarding the determinants of the innovation performance of individuals;

- To find out prominent factors that influence innovation performance in teaching in universities.

Methodology

Data collection tools, samples and sampling technique

The data for this study was collected through a questionnaire survey, which from the university teachers of two public universities in the Mymensingh district of Bangladesh. A well-structured questionnaire with five point Likert-type scale, where 1= strongly disagree and 5= strongly agree was used for the questions. The questionnaire was distributed to the respondents through hand to hand and through mail survey. Based on the previous literature, the researcher described and accumulated 37 different issues (factors), or elements that indicate the innovation performance of an individual (see appendix). The questionnaire consists of those elements with the above stated five point scaling.

Data analysis tools

The study analyzed 185 data collected through the questionnaire survey. To analyze the collected data from the respondents, SPSS version 25 software and several sets of statistical analyses were used. Descriptive statistics and the exploratory factors analysis were used to analyze the collected data from the respondents.

Reliability of data

The reliability of the data was assessed by measuring the Cronbach's alpha. The alpha value of the 30 items questionnaire was .942 (Table 1). The detailed reliability statistics are shown in the table 1 in the Appendix I. It shows the individual item reliability value and the scale value if any of the items is deleted.

Table 1: *Reliability Statistics.*

Cronbach's Alpha	N of Items
.942	30

Table 2: *KMO and Bartlett's Test.*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.705
Bartlett's Test of Sphericity	Approx. Chi-Square	6302.012
	df	435
	Sig.	.000

Analysis of Findings

Demographic profile of the respondents Kaiser-Meyer-olkin (KMO) and bartlett's test

The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis is to proceed. If any pair of variables has a value less than this, consider dropping one of them from the analysis. The off-diagonal elements should all be very small (close to zero) in a good model. Looking at the table (Table 2) below, the KMO measure is 0.705. The value 0.5 for KMO test is minimum and barely accepted, values between 0.7-0.8 are acceptable, and values above 0.9 are superb. Bartlett's test is another indication of the strength of the relationship among variables. This tests the null hypothesis that the correlation matrix is an identity matrix. An identity matrix is matrix in which all of the diagonal elements are 1 and all off diagonal elements are 0. From the same table, we can see that the Bartlett's test of sphericity is significant That is, its associated probability is less than 0.05. In fact, it is actually 0.000, i.e. the significance level is small enough to reject the null hypothesis. This means that correlation matrix is not an identity matrix.

Descriptive statistics and communalities

Following table 4 shows the descriptive statistics and communalities (variances) of all of the items uses in this study for factor analysis. The table shows that the item knowledge of teaching and learning methods has the highest mean value (4.46) where the item sufficient resources has the lowest mean value (2.51). Standard deviation measures the variability of data. Following (Table 3) shows that the item rewords and recognition has the highest variability of responses (1.108) on the other hand the item knowledge of teaching and learning methods had the lowest variability of responses (.571). The communalities are commonly used in factor analysis to show how much of the variance in the variables has been accounted for by the extracted factors (Alam and Bhuiyan, 2014). For instance in the above table 4, over 88% of the variance in innovative work behavior, over 87% of the variance in collaboration is accounted for while 46.5% of the variance in Utilization of knowledge and skills is accounted for.

Number of factors to be extracted

Total variance explained and the scree plot are commonly used to identify the number of factors extractable from the analysis. The factor (component) which has the eigen value (the scree plot in the Appendix II shows all the components with their eigen values in a single graph) more than 1 is normally considered to be extracted as factor (Alam and Bhuiyan, 2014; Talukder et al, 2014). In the following (Table 4), it is seen that only 8 of the factors have the eigenvalues over 1 and all other remaining are not significant (>1). So 8 factors can be extracted in this study.

Factor (Component) Matrix

The table (Table 5) below shows the loadings of the 30 variables on the 8 factors extracted. The higher the absolute value of the loading, the more the item contributes to the factor. The gap on the table represent loadings that are less than 0.4, this makes reading the table easier. The researchers suppressed all loadings less than 0.4. The following (Table 6) shows that nine items are loaded in the factor 1, six items are loaded in factor 2 and four items are loaded in the factor 3, 4, 5, and 6. The table also shows that some of the items are loaded in several factors such as the item application of management/leadership styles is loaded in both the factors 1 and 6; item quality of educational system is loaded in both the factors 5 and 8. These types of items are extracted based on their highest loaded value in a particular factor. For example, the item application of management/leadership styles has the higher loading value in the factor 1, so it is extracted as an item of the factor 1.

Table 3: *Descriptive statistics and communalities.*

Descriptive statistics			**Communalities**	
	Mean	Std. Deviation	Initial	Extraction (%)
Innovation capabilities	4.41	.602	1.000	.866
Knowledge of external environment	4.36	.583	1.000	.686
Utilization of technology	4.12	.742	1.000	.853
Knowledge of teaching-learning methods	4.46	.571	1.000	.805
Strategic decision making	4.28	.733	1.000	.808
Good communication	4.45	.589	1.000	.834
Collaboration	4.10	.964	1.000	.915
Application of management/leadership styles	4.09	.845	1.000	.835
Quality of educational system	3.98	.881	1.000	.825
Fostering creative talents	4.12	.720	1.000	.885
Organizing and team building	4.17	.693	1.000	.794
Innovative work behavior	4.13	.817	1.000	.857
Organizational supportiveness	3.99	.903	1.000	.842
Teaching-learning orientation	4.06	.767	1.000	.878
Sufficiency of physical and intellectual efforts	4.09	.839	1.000	.866
Social networking capabilities	4.02	.679	1.000	.602
Appropriate teaching skills and abilities	4.41	.782	1.000	.762
Time management	4.44	.786	1.000	.808
Classroom management	4.02	.926	1.000	.736
Development of study skills	4.29	.691	1.000	.878
Approachability	4.09	.649	1.000	.789
Professionalism	4.34	.721	1.000	.856
Autonomy	3.70	1.049	1.000	.803
Accepting challenge	4.04	.817	1.000	.695

Personal work satisfaction	4.24	.879	1.000	.829
Sufficient resources	2.51	1.104	1.000	.602
Rewards and recognition	3.74	1.108	1.000	.871
Capability to involve students	4.16	.775	1.000	.761
counseling and guidance services	4.05	.778	1.000	.776
Attitude to accept risk	3.73	.849	1.000	.887

Table 4: *Total variance explained.*

Factors (Components)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.037	43.457	43.457	13.037	43.457	43.457
2	2.266	7.555	51.012	2.266	7.555	51.012
3	2.122	7.073	58.084	2.122	7.073	58.084
4	1.741	5.803	63.887	1.741	5.803	63.887
5	1.469	4.897	68.784	1.469	4.897	68.784
6	1.355	4.517	73.301	1.355	4.517	73.301
7	1.180	3.935	77.236	1.180	3.935	77.236
8	1.033	3.443	80.678	1.033	3.443	80.678
9	.905	3.015	83.694			

Table 5: *Component (Factor) Matrix.*

Items	Factors							
	1	2	3	4	5	6	7	8
Innovation capabilities				.762				
Knowledge of external environment		.619						
Utilization of technology		.773						
Knowledge of teaching-learning methods	.822							
Strategic decision making	.653							
Good communication	.611							
Collaboration		.864						
Application of management/leadership styles	.507					.491		
Quality of educational system					.734			.678
Fostering creative talents				.645				
Organizing and team building	.618						.504	
Innovative work behavior				.646				
Organizational supportiveness					.756			
Teaching-learning orientation		.536	.641					
Sufficiency of physical and intellectual efforts			.774					
Social networking capabilities	.511							
Appropriate teaching skills and abilities	.494							

Time management			.736					
Classroom management			.705					
Development of study skills	.706							
Approachability	.566							
Professionalism						.746		
Autonomy						.659		
Accepting challenge		.745						
Personal work satisfaction					.695			.534
Sufficient resources							-.667	
Rewards and recognition					.824			
Capability to involve students				.480			.436	
counseling and guidance services						.510		
Attitude to accept risk		.889						

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 16 iterations.

Table 6: *Naming of factors.*

Loaded items in each factor	**Factor names**
1. Knowledge of teaching learning methods 2. Appropriate teaching skills and abilities 3. Development of study skills 4. Approachability 5. Application of management/leadership styles 6. Strategic decision-making 7. Good communication 8. Organizing and team building 9. Social networking capabilities	1. **Leadership and teaching abilities**
1. Knowledge of external environment 2. Collaboration 3. Utilization of technology 4. Accepting Challenge 5. Attitude to accept risk	2. **Adaptability and embracing challenge**
1. Teaching-Learning orientation 2. Sufficiency of physical and intellectual efforts 3. Time management 4. Classroom management	3. **Classroom management ability**

1. Innovative work behavior 2. Innovation capabilities 3. Fostering creative talents 4. Capability to involve students	4. **Innovativeness and students involvement**
1. Organizational supportiveness 2. Rewards and recognition 3. Quality of educational system 4. Personal work satisfaction	**5. Organizational support**
1. Professionalism 2. Counseling and guidance services 3. Autonomy	**6. Professionalism and Autonomy**

Naming of the factors

Based on the factor matrix in the above table 6 the researchers named the factors considering the loaded items in each of the factors. The following table 6 shows the loaded items in each factor and their names.

Practical Implications

The study explored the prominent factors (and the corresponding items in each factor) that determine the innovation performance of the university teachers in the public universities of Bangladesh. Therefore, the findings of the study will have both theoretical and practical values among the concerns such as the university authorities, faculty members and the academic researchers. The result of the study will add value to the body of the literature on innovation performance. It will help concerned authorities of the universities be aware about the research factors that determine the innovation performance of the faculty members. The findings will bring awareness among the faculty members working in different public as well as private universities of Bangladesh. Moreover, the results from this investigation will help the university teachers achieve the strong sense of innovation performance and to adopt more teaching-learning styles and strategies.

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