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Development and Testing of a Business Process Efficiency Scale

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Abstract

This study examines the significance of business processes in achieving performance. The objectives of the study are twofold. The first section focuses on developing and validating a business process efficiency scale. Prior literature informs the initial items that comprise the efficiency scale. After developing the prototype scale, the authors then approached local and foreign experts in the field for feedback on individual items. Omitting some items incorporated the expert advice, along with modifying other items to fit with the local culture. We subsequently examined the impact of business process efficiency on employee performance. Using simple random sampling, the research team distributed 252 survey questionnaires to the attendees of a workshop arranged by a local university for its employees. Analysis of 103 valid questionnaires reveals the inefficiency of the overall business processes in the organization. The results of the study show that business process efficiency has a significant impact on employee performance.

Keywords: Business process efficiency, employee performance, process efficiency scale

1. Introduction

As a result of vicious competition, enterprises constantly engage in improving performance. Business processes have been the focus of business research for the last two decades and this research has guided executives and managers to improve organizational performance. Academics and theorists have varying explanations for the importance of business processes and the literature coins several concepts to describe and improve business processes. TQM, business process reengineering, business process improvement, and business process orientation are some of the techniques that are used extensively by organizations to improve operational efficiency. All of these management tools emphasize analyzing bottlenecks and inefficiencies in business processes to identify areas for performance improvement (Cook, 1996; Davenport and Short, 1990; Davenport, 1993b; Evans, 1993; Fields, 2007; Muthu, Whitman and Cheraghi, 1999; Parys and Thijs, 2003; Roy, 2005; Teng et al., 1994).

Most organizations (public sector firms in particular and private enterprises in general) still depend on a steam-age bureaucratic management style. Bureaucratic processes are those that add no value to the organization or the customer. Yet, these procedures continue to exist due to inescapable factors like checking, rechecking, approving, authorizing, storing, and recording. In the name of control and effectiveness, these business processes add inefficiencies that reduce employee and organization performance. In companies and government organizations where business processes ultimately rely on people rather than technology (Leghari 2003), the large number of clerks working on a tremendous amount of paperwork overburdens offices. Such a working environment eventually affects employees' ability to respond quickly to their customers. This study develops a scale that can empirically identify such inefficiencies in business processes and identify the effect of organizational processes on employee performance.

2. Literature Review

Davenport (1993a) defines business process as “a structured, measured set of activities designed to produce a specified output for a particular customer or market”. The process, thus, consists of definite ordered work activities having a certain beginning and an end. Well-defined input intended to produce output defines the scope and structure of process.

The business process is a set of activities and tasks that takes resources as input to produce valuable output for the customer (Fields, 2007; Hammer and Champy, 1993; McCormack and Johnson, 2001). Employees perform the business processes that link different activities and tasks in order to satisfy internal, as well as external, customers (Harrison and Pratt, 1993; Snee, 1993). The business processes define patterns to perform work across departments and hierarchies in the organizations (Sethi and King, 2003). The departments perform different processes. Student admissions, teacher recruitment, and employee payment are examples of different processes in an educational institution. Similarly, in a banking environment, opening accounts, cash and check deposit, and pay order issuance are other examples of processes. Processes of a similar nature define the procedural pattern of work in all organizations.

Analysis of business processes is vital to identify bottlenecks in the systems. Knowledge-based economies render the business processes efficient and attain operational efficiency by reducing the time and cost of doing work (Davenport, 1993b; Day, 1994; Roy, 2005; Wang and Ahmed, 2003).

2.1. Business Process Efficiency

Business process efficiency determines process performance. Prior literature identifies different efficiency parameters for business processes, where process time plays a vital role in determining process performance and efficiency (Arveson, 1999; Davenport, 1993a; Hammer and Champy, 1993; Harrison and Pratt, 1993; Sethi and King, 2003; Tenner and DeToro, 2000).

Fließ and Kleinaltenkamp (2004) identify service process efficiency as an important area of business process management. Information management, factor combination management, and property rights management are three important factors in managing service efficiency. Information management involves improving the flow of information between the customer and the service provider at an affordable cost. Information management also refers to better interpersonal and interdepartmental interactions that guarantee a steady flow of information. Factor combinations lead to efficiency by meeting customer needs in a timely manner and at an affordable cost. Well-defined property rights are crucial for determining service efficiency (Fließ and Kleinaltenkamp, 2004).

Cycle time refers to the amount of time between the business process execution and its completion, or the time taken by the conversion of inputs into outputs to deliver value to customers (Harrington, 1991; Sethi and King, 2003; Tenner and DeToro, 2000).

Cost is another vital factor that can affect process efficiency (Davenport, 1993; Hammer and Champy, 1993; Harrison and Pratt, 1993; Tenner and DeToro, 2000). Process cost refers to the

monetary resources used during the initiation and completion of the business process (Tenner and DeToro, 2000). Cost reduction improves efficiency (Lang and Chowdhury, 1996). Reduced costs may, however, have adverse effects if the quality of business processes to serve customers deteriorates. Unsatisfied customers damage an organization's long-term viability and performance (Gronroo and Ojasalo, 2004).

The number of people involved in a process also affects business process efficiency (Arveson, 1999; Snee, 1993; Stalk and Hout, 1993). Large numbers of people and clerical staff hamper productivity, resulting in delays (Keen, 1991). Ginn and Barlog (1994) identify the involvement of multiple people at different levels as process bottlenecks that increase complexity. Large amounts of paperwork in business processes impede efficiency and performance (Arveson, 1999; Keen, 1991). A highly bureaucratic work style and heavy reliance on paperwork lessens innovation and productivity (Keen, 1991).

Quality processes emphasize the use of technology and robustness to minimize manual and filing work (Snee, 1993). The use of information technology (IT) is vital to automate business process activities and render processes efficient and robust (Davenport, 1993a; Sethi and King, 2003; Venkatraman, 1994). IT promotes process flexibility and competency by reducing paperwork and encouraging the better use of people during process execution (Keen, 1991). Use of IT therefore serves as a strategic bullet to leverage processes (Venkatraman, 1994), although blind use of IT sometimes generates adverse results due to costly investments. The true spirit of IT does not lie just in automating obsolete processes. Rather, streamlining and redesigning old processes prior to the use of technology is essential to achieve enhanced performance (Furey, 1993; Hammer, 1990; Talwar, 1993).

2.2. Business Processes and Employee Performance

Researchers frequently discuss employee performance as they try to understand how to mold employee behavior for better output. Job performance is defined as the "kind of individual behavior for fulfilling the expectations, regulations of organizations and the needs of his or her formal roles when he or she is the member of the organization" (Campell, 1990). Improvement in employee productivity and efficiency serves as a short-term goal for a positive turnaround in organizational performance (Lang and Chowdhury, 1996). Employee performance depends on the strength of the organizational processes.

Prior literature illustrates the existence of a relationship between business processes and employee performance (Certo, 2001; Luthans, 1997; Roy, 2005). Organizational focus on business processes has a significant impact on various dimensions of employee performance (Ginn and Barlog, 1994; McCormack, 1999; McCormack, 2001; Martenette, Johnson and Obenchain, 2003; Susan and Johnson, 2003; Sethi and King, 2003; Skrinjar, Stemberger and Hernaus, 2007). Business processes that are characterized by bureaucracy have a negative effect on an organization's employees. Tight controls, lack of participation in decision making, inappropriate performance appraisal systems, and downward communication are among the many factors in business processes that cause job stress and thereby affect employee performance (Luthans, 1997).

Certo (2001) recommends the development of an environment in the organizations that supports their employees. An organizational climate characterized by little employee flexibility hinders performance. Further, the adoption of bureaucratic working styles, especially in the form of rigid and formal structures, creates considerable job stress that hampers the performance of employees and the organization. Organizations must therefore streamline business processes to enhance employee performance. Efficient processes facilitate improvements in employee performance (Roy, 2005).

Organizations are obligated to focus on business processes in order to address key performance issues. Streamlined business processes lead to interdepartmental cooperation (Day, 1994; Fields, 2007; McCormack, 1999). In this way, organizational goals can be achieved through process goals. Better business processes strengthen employees' ability to perform tasks in an efficient manner through knowledge sharing (Fields, 2007).

The researchers acknowledge the lack of empirical research in business process management discipline (McCormack, 1999; Skringer, Stemberger and Hernaus, 2007). Empirical testing accentuates the validity of a research method (Fitzgerald and Murphy, 1996). This study, therefore, focuses on an empirical examination of business processes.

3. Objectives of the Study

The purpose of the study is twofold. First, the study focuses on developing and validating a scale of business process efficiency. Various dimensions and variables are identified in the prior literature to capture the construct. This study then develops and validates questionnaire items through advice from local and foreign experts. After validation, the questionnaire is tested for reliability using the collected data. The latter part of the study is focused on examining the impact of business process efficiency on organizational performance.

4. Method

Prior literature on business processes identifies seven key dimensions and conceptual domains of business process efficiency. The first dimension, *paperwork*, refers to the amount of manual filing work and other tasks involved in the business processes. The second dimension, *people*, refers to the number of people involved at various activities of business processes. The third factor, *duplications*, refers to similar repeated efforts while performing the business process activities. The fourth dimension, *approvals*, measures the level of *approvals* and authorization involved at different stages. The fifth dimension, *cost*, refers to the cost incurred by different activities during a process. Inefficient processes are costly. The sixth dimension, *time*, refers to time taken by processes to deliver desired output to customers. Inefficient processes cause unusual delays. The seventh and last core dimension, *IT use*, refers to technology that automates business processes.

4.1. Validating the Scale

Initially, the survey used twenty-three items extracted from a pool of items based on preliminary discussions with local experts. These literature-based survey items were measurements of the seven key dimensions of business process efficiency. The research team then devised a questionnaire to validate the items and assess expert agreement with the items. Items on the questionnaire were measured on a five point Likert scale ranging from “strongly agree” to “strongly disagree.” For each item, sufficient space was provided for suggestions/modifications. The first part of the questionnaire included the operational definition of business process efficiency. Three items, PW-1 to PW-3, were related to the paperwork dimension of the construct. The next three items, PP-1 through PP-3, measured the level of involvement of people in the business processes. Three items, DP-1 to DP-3, assessed the duplications involved in organizational processes. Three items, AP-1 to AP-3, appraised the approval dimension of business process efficiency. Five items, TM-1 to TM-5, measured the time factor to assess delay in processes. Three items, CS-1 to CS-3, determined the cost of business processes. The last three items, IS-1 to IS-3, measured the level of information systems and usage of IT in business processes. The authors extracted all the items based on prior literature (Cook, 1996; DeToro, 1996; Doll, 2002; Ginn and Barlog, 1994; Keen, 1991; Reijers, 2006; Sethi, 2003; Stalk and Hout, 1990; Tenner and DeToro, 2000; Harrison and Pratt; 1993; The University of New Mexico [UNM], n.d.).

The research team distributed the questionnaire to the participants of the second International Congress on Entrepreneurship, held in Kyrgyzstan, for validation and suggestions. The research team disseminated information to the attendees who held doctorates and possessed sufficient knowledge in the area. The research team received twenty questionnaires. Two questionnaires were excluded due to incompleteness. More than 70% of respondents either agreed or strongly agreed that 20 items on the

questionnaire were fit for the study’s purpose. In the case of three items, less than 70% agreed that the items were fit for inclusion. The lowest percentage of participants who either agreed or strongly agreed with any particular item was 50%. The research team decided to keep all items for further evaluation. Three attendees added suggestions in the provided space. The authors incorporated the valid suggestions that fit with the objectives by making minor modifications in the wording of the items.

At the final stage, the authors sought suggestions from 17 local and foreign experts. Four experts, two local and two foreign, responded with suggestions. All of the experts either agreed or strongly agreed with the entire questionnaire items and provided suggestions in only a few cases. The authors incorporated all the evocations to ascertain a validated scale for business process efficiency.

4.2. Data Collection and Reliability of Scale

To test the instrument in the field, the authors distributed the business process efficiency questionnaire, totaling twenty-three items, to the attendees of a workshop arranged by the local university for its employees. All the participants had sufficient knowledge about business process management concepts as they all previously attended a separate session arranged in the workshop. The questionnaire also included 14 items to measure employee performance. Among the workshop participants, 252 questionnaires were distributed using simple random sampling. The authors received 103 valid responses (a response rate of 40.9%) that fulfilled the minimum criteria of 100 responses needed for factor analysis and 10 times the number of regression variables (Hair, Anderson and Tatham, 1992; Roscoe, 1975). The authors entered the data into SPSS 15.0 for analysis. Table 1 reports the demographic characteristics of the respondents.

Table 1: Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage
Gender			
	Male	81	78.6
	Female	22	21.4
Age			
	25 or below	51	49.5
	26-35	37	35.9
	36-45	14	13.6
	46 or above	1	1
Education			
	Graduate	78	75.7
	Masters	25	24.3
Job Experience			
	5 years or less	62	60.2
	6-10	24	23.3
	11-15	14	13.6
	More than 15 years	3	2.9

The authors recoded the business process efficiency measures to be coded consistently. By summing up the respective questions for each dimension, the authors generated the variables (paperwork, people, duplication, approvals, time, cost, and information system). These variables did not initially need recoding as they were already consistently coded. The authors developed the business process efficiency construct by recoding all the construct’s variables and then summing up the individual scores of recoded variables. The authors measure employee performance through *esprit de corps* and *organizational commitment* by using scales developed by Javorski and Kohli (1993). Both measures consist of 7 items each. Two items, EP_EDC_6 of *esprit de corps* and EP_OC_6 of *organizational commitment*, are reversely coded to be consistent with other variables. The authors generated employee performance variables-*esprit de corps* and *organizational commitment*- by

summing up the individual scores after recoding. By summing up the scores for *organizational commitment* and *esprit de corps*, the employee performance construct was developed. McCormack (1999) uses a similar approach to measure performance.

The authors further examined the scales by calculating the reliability coefficient in order to improve internal consistency. Only the scale measuring the time variable of business process efficiency revealed a very low Cronbach’s alpha reliability coefficient. The authors omitted three of five items due to reliability problems. After eliminating the three items, the reliability coefficient of the remaining two items is .83. The information systems variable has the highest alpha value at .91. Table 2 reports alpha values for all the measures.

Table 2: Reliability Coefficient of Measures

Scale	No. of Items	Alpha
Paperwork	3	.90
People	3	.88
Duplications	3	.87
Approvals	3	.89
Time	2	.83
Cost	3	.90
Information Systems	3	.91
Esprit de Corps	7	.78
Organizational Commitment	7	.73

Nunnally (1978) proposes that for the preliminary phase of any research, a reliability of .50-.60 is sufficient. All the alpha values are well above the accepted level.

4.3. Factor Analysis

This study uses a factor analysis technique to reduce the data and to ensure the items’ structure for measuring the relevant concepts. Only one item is omitted from the organizational commitment construct for the factor analysis. Out of 34 items, 33 items are carried forward for communalities and rotated component matrices. The authors tested the principal component analysis assumptions for all the constructs. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is greater than .5 for all the individual variables in the constructs. The probability associated with Bartlett's Test of Sphericity is less than .001 for all the constructs. Only one component is extracted for the individual variables in the relevant constructs, based on initial eigenvalues. The extraction sums of squared loadings show that the extracted components satisfy the criterion of explaining more than 60% of the total variance. The communality value for all the variables is higher than .5. The authors eliminated one item from the organizational commitment construct due to the complex structure of the communalities.

5. Examining the Relationship between Business Process Efficiency and Employee Performance

The second phase of this study investigates the relationship between business process efficiency and employee performance. The authors computed bivariate correlation coefficients at two different levels of significance (i.e., highly significant level ($p < .01$) and significant level ($p < .05$)). Table 3 reports correlation coefficients of measures of business process efficiency and employee performance.

Table 3: Pearson correlation between Business Process Efficiency and employee performance

	Business Process Efficiency	Employee Performance
Business Process Efficiency	-	0.70**
Employee Performance	0.70**	-

* $p < .05$, ** $p < .01$

Table 3 reports a high positive correlation ($r=.70$) between business process efficiency and employee performance. The two variables significantly correlate with each other at both the .05 and .01 level of significance. The authors used simple linear regression analysis to judge any significant linear relationship between business process efficiency and employee performance, independent variable and dependent variable, respectively. The coefficient of determination (R-square) computes a measure of goodness of fit as shown in table 4.

Table 4: Regression Model Summary

Model 1	R	R-Squared	Adjusted R Squared	Std. Error of the Estimate
	.70	.49	.49	.54

Predictor: constant, BPE

The value of R-square is .49, which indicates that changes in business process efficiency account for 49.1% of the variation in employee performance.

Table 5: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Model 1	Regression	28.76	1	28.76	97.61	0.00**
	Residual	29.76	101	.30		
	Total	28.52	102			

* $p<.05$, ** $p<.01$

Table 5 reports an analysis of variance to judge the appropriateness of linear relationship assumption. The large F-statistic (97.61) indicates that the business process efficiency helps to explain the variation in employee performance. The linear relationship between business process efficiency and employee performance is significant ($p<.05$, $p<.01$).

Table 6: Regression Coefficients

Model 1		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		β	Std. Error	Beta		
	Constant	1.52	.16		9.64	0.00 **
	BPE	.19	.02	.70	9.88	0.00 **

* $p<.05$, ** $p<.01$

Table 6 reports estimates of the model coefficients. The estimated model is Employee performance = 1.520 + 0.189 (Business Process Efficiency). The value of test statistic for the slope (9.88) indicates a statistically significant relationship between employee performance and business process efficiency ($p<.05$, $p<.01$).

6. Conclusion

This study develops and validates a scale of business process efficiency. Further, it empirically tests the relationship between business process efficiency and employee performance. The findings suggest that business process efficiency is an important determinant of employee performance and the relationship is direct. Business process efficiency has a significant positive impact on employee performance. The results support the evidence in the literature that business processes efficiency enhances employee performance.

7. Contribution to the Existing Literature

Several studies support the importance of examining business processes. The researchers acknowledge the lack of research focusing on empirical investigation of business processes and their impact on performance (McCormack, 1999; Skringer, Stemberger and Hernaus, 2007). Researchers acknowledge the importance of key business process dimensions such as cost, time, paperwork, manual work, approvals, duplications, and so on, for their influence on performance. The literature, however, does not empirically analyze business processes in identifying key bottlenecks and the affect on employee performance. This study, thereby, contributes significantly to the existing literature on the topic.

8. Future Research Directions

The authors acknowledge the limited scope and generalizability of the study and recommend further testing with a larger sample size. The scale can be used, however, to generally analyze the overall business processes in the organizations. The authors recommend testing for different types of business processes in the organizations to examine its appropriateness for diversified business processes in the organizations.

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