REVIEW OF RESEARCH

PROCESS CAPABILITY OF LEARNING BY SIX SIGMA BASED RELATIONAL DATABASE MODEL

Dr. R. Hariharan

Assistant Professor , Indira Gandhi National Tribal University , Amarkantak , Madhya Pradesh.

ISSN: 2249-894X
IMPACT FACTOR : 5.7631(UIF)
UGC APPROVED JOURNAL NO. 48514
VOLUME - 8 | ISSUE - 8 | MAY - 2019

ABSTRACT:

Six sigma methods have been extensively used in the industrial units for operational improvement, and its adoption is relatively new to the teacher education process. The six sigma based on the Relational Data Base Model (RDBM) proposed in this research work analyses the critical factors to quality (CTQ) of the knowledge management, resource utilization, teaching methods and academic attainments of the prospective teachers of the both the government aided and private college of education located in the southern part of Tamil Nadu, India. Totally150 prospective teachers enrolled for B.Ed. program were conveniently selected and were requested to respond a survey method based on inventories to analyze the process improvement practices for knowledge management, resource utilization and learning attainments .The achievement test on ICT concepts was also conducted to testify the learning efficiency in the current year (2012-13). Besides this, the data regarding the pass percentage, campus recruitment and selection for higher education of the previous years were collected. The potential failures of the both institutions were analyzed through the Failure Mode and Effect Analysis (FMEA). Furthermore, the results of the't' test reveals that the government aided college surpasses the private institution based on the variation in the process sigma values.

KEYWORDS: *Quality, Teacher Education Process, Six Sigma, Relational Data Base Model.*

THEORETICAL FRAMEWORK

Knowledge management continues to generate practitioner and academic interest (Nonaka and von Krogh, 2009). The renovated interest on the quality perspectives of the teacher education has been impelled as it is the mother of all education and its knowledge process can be analyzed by the quality tool such as six sigma. While Six Sigma is increasingly implemented in industry, little academic research has been done on Six Sigma and its impact on quality management theory and application (Xing xing Zuet al., 2008).

AIM OF THE STUDY:

The main aim of the study is to analyze the quality of the government and private college of education in terms of knowledge management and learning achievement of the prospective teachers by the six sigma based relational data base model. Based on these, the hypotheses have been set for the present investigation.

RESEARCH DESIGN:

150 prospective teachers enrolled for B.Ed. program were conveniently selected from the most familiar government aided institution run by catholic missionaries and from a private college of education located in the southern part of Tamil Nadu, India.

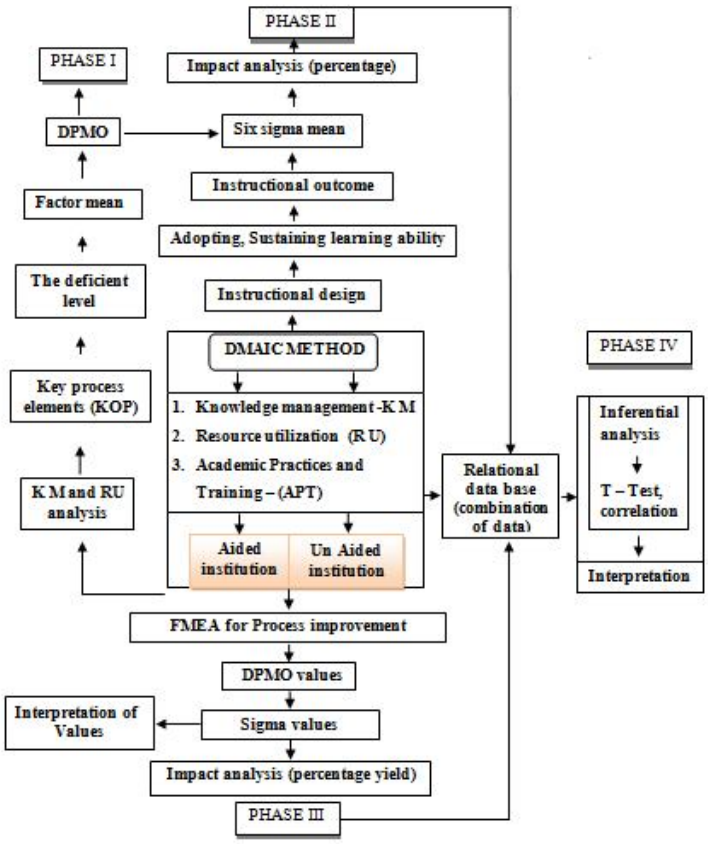

Figure 1 - The relational data base model

The Method

The prospective teachers were requested to respond the inventories to analyze the process improvement practices for knowledge management, resource utilization and for learning attainments. The achievement test was also conducted to the sample to testify the learning attainment in the current year (2012-13**).**

Figure 1 is the six sigma based on the relational data base model (RDBM) proposed in this research work. It analyses the critical factors to quality (CTQ) of the various academic practices. The Defects Per Million opportunities (DPMO) and its corresponding sigma values were calculated. The potential failures of the academic system of the both institutions were analyzed through the Failure Mode and Effect Analysis (FMEA, table 1&2).

Key process elements (KOP) for knowledge management: The knowledge management processes are facing the crucial issues which are

1. Dynamic teaching process (DTP) – lack of ability
2. Resourceful facility process (RFP) – lack of resource facility
3. Best administrative practices (BDP) – poor administrative practices
4. Skill attainment process (SAP) – lack of skill training
5. Continuous evaluation process (CEP) – reluctance for continuous evaluation
6. Well-disciplined process (WDP) – inadequate disciplined practices
7. Effective mentoring process (EMP) – lack of leadership quality
8. Funding allotment process (FAP) – lack of fund distribution

Resource utilization: Using various infrastructural facilities for enhancing the knowledge process and learning achievements.

Failure Mode Effect Analysis (FMEA) of the knowledge management practices

Failure mode and effect analysis, or FMEA, is an attempt to delineate all possible failures, their effect on the system, the likelihood of occurrence, and the probability that the failure will go undetected (Pyzdek, 2010).

Table: 1 - The FMEA of the private institution

Mode of failure	Effect of failure	S.I	Causes of failure	O	Controls	D	R	Recommended action
Reduced knowledge Management practices	Lack of learning attainments and knowledge construction	7	Lack of dynamic ability in molding the students	8	Periodical inspection of authorities	5	240	Resourceful Training to and Payment as per the norms
			Lack of resource facility	7	Periodical visit of authorities	3	147	Creating infrastructural facilities
			Poor administrative practices	7	Effective monitoring	4	196	Implementation of suitable strategies to Improve the leadership qualities
			Lack of skill training	6	Constant Motivation by feedback	4	168	Providing motivational programs–counseling
			Reluctance for continuous evaluation	4	Effective monitoring	4	112	Providing motivational programs–counseling
			Inadequate disciplined practices	8	Effective monitoring	6	336	Continuous and comprehensive assessment
			Lack of leadership quality	7	In service training and skill attainment	7	343	Proper Training for Changing the leadership style
			Lack of fund distribution	6	Efficient fund management system	6	252	Effective monitoring and assessment system
Responsibility	Authorities of nodal agencies, managements, fads of the institutions, Faculty and students							

(S.I – Severity Index; O – opportunity; D – Detection possibility; R- Risk priority number)

Additionally, the FMEA has analysed the existence of organisational failures in the both institutions. But the R value is higher in the unaided institution where the immediate attention is required. The FMEA sustains the effectiveness which is defined as the educator's contribution to the prospective teachers' knowledge, skills and attitudes (Zaščerinska, 2011: 110), and knowledge management is aimed at the same.

Table: 2 - The FMEA of the Government Aided Institution

Mode of failure	Effect of failure	S.I	Causes of failure	O	Controls	D	R	Recommended action
Reduced knowledge Management practices	Lack of learning attainments and knowledge construction	7	Lack of dynamic ability in molding the students	8	Periodical inspection of authorities	5	60	Resourceful Training to and Payment as per the norms
			Lack of resource facility	7	Periodical visit of authorities	3	0	Creating infrastructural facilities
			Poor administrative practices	7	Effective monitoring	4	16	Implementation of suitable strategies to Improve the leadership qualities
			Lack of skill training	6	Constant Motivation by feed back	4	32	Providing motivational programs–counseling
			Reluctance for continuous evaluation	4	Effective monitoring	4	24	Providing motivational programs–counseling
			Inadequate disciplined practices	8	Effective monitoring	6	120	Continuous and comprehensive assessment
			Lack of leadership quality	7	In service training and skill attainment	7	0	Proper Training for Changing the leadership style
			Lack of fund distribution	6	Efficient fund management system	6	72	Effective monitoring and assessment system
Responsibility	Authorities of nodal agencies, managements, heads of the institutions, faculty and students							

(S.I – Severity Index; O – opportunity; D – Detection possibility; R- Risk priority number)

FINDINGS / RESEARCH EXPERIENCES

Six sigma methods are relatively new to the teacher education. Furthermore, the current study also reveals that the government aided teacher training college surpasses the private institution in the knowledge management and in academic attainments.

Table: 3 - The order of priority of key process elements by the prospective teachers

Key process elements (KPE)	mean	S.D	Rank
Dynamic teaching process (DTP)	3.58	1.304	1
Well-disciplined process (WDP)	3.38	1.262	2
Skill attainment process (SAP)	3.15	1.329	3
Effective mentoring process (EMP)	2.97	1.275	4
Continuous evaluation process (CEP)	2.86	1.198	5
Resourceful facility process (RFP)	2.78	1.211	6
Best administrative practices (BAP)	2.74	1.211	7
Funding allotment process (FAP)	2.70	1.124	8

The present study emphasizes the order of priority of the prospective teachers (Table 3) and, accordingly, the FMEA was processed as these key elements may be lacking in the respective institutions (Table 1 & 2)

Hypothetical testing: There is no significant relationship exists between the sigma means of Knowledge Management and Achievement Test of the two kinds of institutions. Similarly, there was no significant relationship between the same in private institution (Table 4)

Table: 4 – The correlation analysis of the Knowledge Management and Achievement Test

Type of institutions	Variables	N	Pearson Correlation	P value	Remarks
Government aided of Education	Knowledge management	75	0.076	0.519	NS
	Achievement Test	75			
Private college of Education	Knowledge management	75	0.178	0.126	NS
	Achievement	75			

[N.S - Not Significant at the 0.05 level (2-tailed) P>0.05 value]

Table: 5– t value of Knowledge Management based on the type of institution

Variable	Type of institutions	N	Sigma Mean	Standard deviation	't' value	P value	Remarks
Knowledge management	Government Aided	75	1.97508	0.338346	8.620	0.000*	S
	Un Aided (Private)	75	1.51151	0.320072			
Resource utilisation	Government Aided	75	1.97925	0.413479	10.096	0.000*	S
	Un Aided (Private)	75	1.41965	0.243840			

(*The t value of two tail significance is less than .05 (p<0.05)

Table: 6 - The total mean of the Key process outcome (KPO)

Key process outcome (KPO)	Aided institution				Unaided institution		
	Expected levels	Knowledge management practices	Resource utilisation	Achievement tests	Knowledge management practices	Resource utilisation	Achievement tests
DPMO	66,811	326666.7	309697.0	341333.3	501333.3	530909.1	403733.3
Sigma values	3.00	1.97508	1.979253	1.92352	1.511507	1.419653	1.7520
Process yield (%)	93.3189	67.334	69.031	65.867	49.867	46.91	59.627

Interpretation

The correlation analysis reveals that the knowledge management practices of the both type of institutions have not been focused towards the process optimisation of learning outcome. Further, the results of the't' test show that the aided institution surpasses the unaided institution in knowledge management and resource utilisation (Table 5). Moreover, the expected level of the three sigma level (3σ) process yield (99.96%) has not been attained in any of the key process of the two types of institutions. Hence, it is predicted that the entire organisational practices must be enhanced in both institutions towards perfect level (Table 6).

Academic six sigma

This study on the knowledge processing of the teacher education is focused on the academic six sigma quality which can be defined as a comprehensive and flexible system of achieving, sustaining and maximizing the process outcome through adopting the societal needs, efficient use of facts, statistical quality control principles and effortful consideration to manage, improve and reinventing the educational process (Hariharan & Mohanasundaram, 2013).

Sigma learning

Furthermore, through this study, it is to be distinctively noted that the flawless academic practices adopted for efficient learning is termed as sigma learning.

CONCLUSION

Additionally, as the private institutes in India are viewed as cynical and disdain, this current investigation seeks the policy makers to adopt the most suitable strategy to uphold the academic vigor of the private colleges of education to enhance the knowledge management.

REFERENCES

1. Hariharan, R. and Mohanasundaram, K. (2013). Impact of Six Sigma – DMAIC Approach in Learning the ICT Concept by the Prospective Teachers. *Book of abstracts of the Association for Teacher Education in Europe Spring Conference 2013: Teacher of the 21st Century: Quality Education for Quality Teaching,* p. 31, Riga, Latvia. May 10-11, 2013.
2. Hariharan, R., (2015). Impact of Six Sigma – DMAIC approach in learning the concepts of ICT education by secondary teacher trainees. An unpublished thesis submitted to Manonmaniam Sundaranar University, Tirunelveli.
3. Hariharan, R., Zascerinska, J., & Swamydhas.,P. (2013). A Comparative Study of Methodologies of Teaching Web Technologies to Prospective Teachers in India and Latvia. *International Journal of Modern Education Forum (IJMEF).*Volume 2 Issue 4, November 2013.p.84-91. U.S.A. Science and Engineering Publishing Company (SEP).

4. Nonaka, I., von Krogh, G. (2009). Tacit knowledge and knowledge conversion: Controversy and advancement in organizational knowledge creation theory. *Organization Science,* 20 (3), 635–652.
5. Pyzdek, T. and Keller, P. A. (2010). *The Six Sigma Handbook – A Complete Guide for Greenbelts, Black belts and Managers at All Levels*. New Delhi, McGraw-Hill, Inc.
6. Xing xing Zua., Lawrence, D. Fredendall., & Thomas J. Douglas (2008). The evolving theory of quality management: The role of Six Sigma. *Journal of Operations Management* 26 (2008) 630–650,doi:10.1016/j.jom.2008.02.001.
7. Zaščerinska, J. (2011). Social Dimension of Web 3.0 in Engineering Education. In Bassus, O.; Ahrens, A.; Lange, C. (Ed.), *Information and Communication Technologies in Engineering and Business*, pp. 101-130, Berlin: Mensch & Buch, Germany.