BUSINESS PROCESS IMPROVEMENT (BPI) IN AN ENTERPRISE COMPANY

NORASIKIN BINTI SALIM

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I dedicate this work to my children, Syahmi & Zharif

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ABSTRACT

To stay competitive and sustain long term profitability, Business Process Improvement (BPI) methodologies has become strategically important for many enterprise company in recent years. This research therefore explored business process improvement methodology in the areas of quality management as an essential work to create a successful and competitive enterprise. Managing customer complaint is the major challenges for quality department. Slow respond to customer complaint due to product failure has a big implication to the entire organization such as embark or increase customer dissatisfaction, lose customer trust, tarnish company reputation, and decrease in sales and revenue. However, the process of identifying failure or defect root cause(s) and defining the corrective and preventive actions consumes considerable amount of precious time and effort of engineers. In this research, we deployed BPI methodology called Tabular Application Development (TAD) for business process improvement. The TAD business improvement method has resulted the development of prototype dynamic web-based application of an integrated information system and defect knowledge central as a solution. Based on process simulation, the improvement solution can help to reduce 23% of average cycle time for treating one customer complaint.

ABSTRAK

Untuk kekal berdaya saing dan mengekalkan keuntungan jangka panjang, Peningkatan Proses Perniagaan (BPI) metodologi telah menjadi faktor penting bagi banyak syarikat perusahaan dalam tahun-tahun kebelakangan ini. Oleh itu, kajian ini dijalankan untuk menerokai Peningkatan Proses Perniagaan (BPI) metodologi dalam meningkatkan bidang pengurusan kualiti sebagai kerja yang penting untuk mewujudkan perusahaan yang berjaya dan berdaya saing. Urusan aduan pelanggan adalah cabaran utama bagi jabatan Kualiti. Lambat respon terhadap aduan pelanggan akibat daripada kegagalan produk mempunyai implikasi yang besar kepada seluruh organisasi seperti meningkatkan rasa tidak puas hati pelanggan, kehilangan kepercayaan pelanggan, mencemarkan reputasi syarikat, dan penurunan jualan dan juga hasil tahunan. Walau bagaimanapun, proses mengenal pasti kegagalan atau punca kecacatan dan menentukan tindakan pembetulan dan pencegahan manggunakan jumlah besar masa berharga dan usaha jurutera. Dalam kajian ini, kami menggunakan kaedah BPI yang di panggil TAD, iaitu Pembangunan Aplikasi Jadual digunakan untuk penambahbaikan proses perniagaan. Kaedah peningkatan perniagaan TAD telah menghasilkan pembangunan prototip aplikasi dinamik berasaskan sistem maklumat web bersepadu dengan pusat data bagi pengetahuan kecacatan sebagai penyelesaian. Berdasarkan proses simulasi, penyelesaian dapat mengurangkan 23% dalam purata masa kitaran untuk merawat satu aduan pelanggan.

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LIST OF ABBREVIATIONS

BP	-	Business Process
BPI	-	Business Process Improvement
BPM	-	Business Process Management
BPR	-	Business Process Reengineering
CAPA	-	Corrective and Preventive Action
CAR	-	Corrective Action Request
CI	-	Continuous Improvement
CM	-	Contract Manufacturer
CQE	-	Customer Quality Engineer
CSS	-	Cascading Style Sheets
CTQ	-	Critical to Quality
DMAIC	-	Define Measure Analyze Improve Control
DOE	-	Design of Experiment
EOL	-	End of Line
ES	-	Expert System
FA	-	Failure Analysis
FMEA	-	Failure Mode Effect Analysis
HTML	-	Hypertext Markup Language
HTTP	-	Hypertext Transfer Protocol
ICOR	-	Input Constraint Output Resource
IS	-	Information System
IT	-	Information Technology
KBS	-	Knowledge-based system
KM	-	Knowledge Management

LIST OF ABBREVIATIONS

KPI	-	Key Performance Index
NVA	-	Non-value Add
PLM	-	Product Lifecycle Management
QA	-	Quality Admin
QE	-	Quality Engineer
QM	-	Quality Manager
SIPOC	-	Supplier Input Process Output Customer
TAD	-	Tabular Application Development
TQM	-	Total Quality Management
VOC	-	Voice of Customers
WWW	-	World Wide Web

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CHAPTER 1

INTRODUCTION

1.1 Background

Today's business environment demands faster responses, better service, and increased agility. Unstable economics and unpredictable markets further pressurize an enterprise company to develop new product faster and manage their business process effectively and efficiently in order to win the competition to be the first in market and to become price leader. And therefore in 21st century, business process improvement (BPI) has gaining popularity among enterprises which seek to continuously optimize their underlying processes to achieve higher quality at reduces cost and cycle time [1].

In an enterprise company, there are number of business processes which defines the way of an enterprise achieved its goals [2]. Hammer and Champy [3] define business process as a collection of activities that takes one or more kinds of input and creates an output that is of a value to the customer. For instant, examples of business processes for quality function in an enterprise company are supplier qualification, in-coming quality inspection, process and product audit, in-process quality control, out-going quality assurance inspection, handling customer complaint and so forth. Quality function has played strategically important element in supply chain which supporting the organization to have ability to succeed.

A supply chain is a global network of organizations and activities that supply a firm with goods and service. An organization cannot provide a high-quality product or service if it gets substandard quality products or services from their supply chain. Many organizations found, quality is a wonderful tonic for improving operations and supply chain. Managing quality helps build successful strategies of differentiation, low cost and response. For instance, defining customer quality expectations has helped Dyson, successfully differentiate its vacuum cleaner and bladeless fan as among the best in world. Nucor has learned to produce quality steel at low cost by developing efficient processes that produce consistent quality. And Dell Computers rapidly responds to customer orders because quality systems, with little rework, have allowed it to achieve rapid throughput in its plants. Indeed, quality may be the keys success factor for these firms [4].

Managing customer complaint is considered as one of important business process for quality function in an enterprise company. The process involves various entities along the supply chain. Customer complaint management is the process of dissemination of information aimed at identifying and correcting various causes of customer dissatisfaction [5]. It defines strategies used by companies to solve and learn from the previous mistakes in order to restore customer confidence in organizational reliability [6]. Slow respond to customer complaint has a big implication to the entire organization such that will spark or increase customer dissatisfaction. Alina [7] research proves that dissatisfaction leads customers to both migration behavior and negative referrals to other potential buyers, adversely affecting retention rates, profitability and organizational image.

However, to gain and fast respond to customer complaint is always a challenge for any organization. The process of identifying failure or defect root cause(s) and defining the corrective and preventive actions consumes considerable amount of precious time and effort of engineers and technical expertise who are involved in the production and quality activities. In order to gain a correct and fast respond to product failures, the entire processing data or information must be

recorded and controlled in every step of the manufacturing process [8]. Knowing the root causes of a defective or failed product, need a special skills, experiences and knowledge from experts in the manufacturing area. Therefore, knowledge and lesson learn related to product failure or defect such as customer complaint information, failure / defect symptom, failure / defect root causes, corrective preventive actions, product defect knowledge and lessons learned shall be recorded and maintain effectively and efficiently.

By having this information readily available at any point of time, organizations will gain accurate and fast failure investigation in order to respond to customer complaint. Besides that, organizations also will have the opportunity to learn from customer feedback and to exploit this information in order to take preventive measure, improve weaknesses, increase business process performance, avoid future negative experiences, and consequently reestablish customer satisfaction, loyalty and relationship commitment. Unfortunately, not many companies have effective and efficient to manage and provide this information fast. In many cases, information is not centralized and stored in different platforms and locations such as product history and traceability information located in various contract manufacturers (CM). This system design disables fast information retrieval and will caused delay in failure investigation and responding to customer complaint. Therefore, it is essential for the organization to overcome this problem to prevent catastrophic event by continuously improve and optimize customer complaint management business process.

1.2 Objective

In order to improve problem discussed, the organization need to understand the underlying causes that caused the delay delivering fast respond to the customer complaint and provide solution for identified root causes. Therefore, the objective of this research is to reduce the average cycle time for treating one customer complaint in an enterprise company. Due to problem discussed is more related to information management, therefore, Tabular Application Development (TAD), one of business process improvement (BPI) methodology which is invaluable in developing an efficient information system deployed in aid to reduce process or cycle time in treating one customer complaint. In this research, the prototype, dynamic web-based applications of an integrated product information system and defect knowledge base propose as a solution. The develop systems expected to helps users to accelerate the searches and retrieval of defective or failed product historical or traceability information based on entered product serial number. The propose application also expected to equip with knowledge management concept which allowed users to capture, store, search, retrieve and display product failure or defect knowledge [8].

1.3 Scope

This research is positioned in the areas of Business Process Improvement (BPI) and Information System (IS) development. The research scope outlines are as per following:

1. This research will focus on business process improvement for quality function of an enterprise company discussed in the areas of customer complaint management business process. Customer complaint management business process defined as a process to treat single customer complaint

start from receiving the customer complaint until problem's root cause identified, solved and corrective action report (CAR) closure. This is also considered as one cycle of customer complaint management business process.

2. Tabular Application Development BPI method will be deployed to model business process and develop information system (IS) which will ease data or information searches and retrieval process of product history, failure or defect knowledge and lesson learned.
3. The customer complaint management business process model will focuses on customer complaint related to manufacturing process.
4. The BPI measure which will be used in this research is the differences percentage of current process cycle time with new simulation business process model. The formula to calculate the improvement measure in this research given as,

$$Cycle\ Time\ Differences\ Percentage\ (\%) = \frac{New\ Cycle\ Time - Current\ Cycle\ Time}{Current\ Cycle\ Time}\ x\ 100$$

The positive "+" result denoted increase in cycle time and negative "-" result denoted decrease in cycle time.

In summary, this chapter explained that organization must ensure they have a program in place to effectively and efficiently respond to product failures. Failed to immediately to respond to customer can have serious consequences to the organization. However, this problem can be overcome by using suitable business process improvement methodology. The next chapter is a literature review.

REFERENCES

[1] G. Zellner, A structured evaluation of business process improvement approaches, Business Process Management Journal 17(2), 2011, pp. 203-237

[2] Nadja Damij, Talib Damij, Janez Grad, Franc Jelenc, A methodology for business process improvement and IS development, Information and Software Technology 50, 2008, pg 1127 – 1141

[3] M. Hammer, J. Champy, Reengineering the Corporation. A manifesto for Business Revolution, New York, USA, 1993.

[4] Jay Heizer, Barry Render, Operations Management Sustainability and Supply Chain Management, 11th Global Edition, Pearson Education Inc, 2014.

[5] Fornell, C., & Westbrook, R.A., The vicious circle of consumer complaints. Journal of Marketing 48, 1984, pg 68-78.

[6] Hart, C.W.L., Heskett, J.L., & Sasser, W.E., The profitable art of service recovery. Harvard Business Review 68, 1990, pg 148-156.

[7] Alina Filip, Complaint management: A customer satisfaction learning process, Procedia - Social and Behavioral Sciences 93, 2013, pg 271 – 275.

[8] Kuan Yew Wong et al., A knowledge diagnostic system for product defects, Innovative Production Machines and Systems, 2008.

[9] Davenport, Thomas H., "Saving IT's Soul: Human Centered Information Management". Harvard Business Review 72 (2), 1994, pg 119–131

[10] M. Laguna, J. Marlund, Business Process Modelling, Simulationa and Design, Pearson Education, Inc, New Jersey, 2005.

[11] R. Aguilar-Saven, Business process modeling: review and framework, Internatioanl Journal of Production Economics 90 (2), 2003, pg 129-149.

[12] H. James Harrington (1991), Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity, and Competitiveness, McGraw-Hill, ISBN 0-07-026768-5

[13] Wendri Syahreza Nasution, Albarda, “Improvement of business process in order to manage the quality of information”, School of Electrical Engineering & Informatics, Institute Technology Bandung, Indonesia.

[14] Tristan Boutros, Tom Purdie, The Process Improvement Handbook: A blueprint for managing change and increasing organizational performance, 2013, McGraw-Hill, ISBN 9780071817660

[15] Geary A. Rummler, Alan P. Brache, Improving Performance: How to Manage the White Space on the Organization Chart, John Wiley & Sons, 1990, ISBN 978-1118143704

[16] Sanjay Goel, Vicky Chen, Integrating the global enterprise using Six Sigma: Business process reengineering at General Electric Wind Energy, Internation Journal Production Economics 113, 2008, pg 914 – 927

[17] Robyn L. Raschke, Sagnika Sen, A value-based approach to the ex-ante evaluation of IT enabled business process improvement projects, Informatioon & Management 50, 2013, pg 446 – 456.

[18] Chong Un Pyon, Ji Young Woo, Sang Chan Park, Service improvement by business process management using customer complaint in financial service industry, Expert Systems with Application 38, 2011, pg 3267 – 3279

[19] K.T. Phalp, CAP framework for business process modelling, information and software technology 40(13), 1998, pg 731 – 744.

[20] Nattapan Buavaraporn, Business Process Improvement Methodology Adoption for Improving Service Quality: Case studies of financial institutions in Thailand, 2010.

[21] Robyn L. Raschke, Sagnika Sen, A value-based approach to the ex-ante evaluation of IT enabled business process improvement projects, Informatioon & Management 50, 2013, pg 446 – 456.

[22] Jessup, Leonard M.; Joseph S. Valacich (2008). Information Systems Today Aidan Earl created the first Information System in Dublin, Ireland (3rd Ed.) Pearson Publishing.

[23] W.H. DeLone, E. R. McLean, Information system success: the quest for the dependent variable, Information Systems Research 3(1), 1992, 60-95

[24] S. Guha, V. Grover, W.J. Kettinger, J.T.C. Teng, Business process change and organizational performance, Journal of MIS 14(1), 1997, 119-154

[25] Eric W. Stein, Mark C. Pauster, David May, A knowledge-based system to improve the quality and efficiency of titanium melting, Expert Systems with Applications 24 (2003) 239–246.

[26] Dimitris A. Kalogeropoulos et al. Towards knowledge-based systems in clinical practice: Development of an integrated clinical information and knowledge management support system, Computer Methods and Programs in Biomedicine 72, 2003,pg 65-80.

[27] Kuan Yew Wong et al., A knowledge diagnostic system for product defects, Innovative Production Machines and Systems, 2008.

[28] M.G. Abou-Ali, M. Khamis, TIREDDX: an integrated intelligent defects diagnostic system for tire production and service, Expert Systems with Applications 24, 2003, pg 247–259

[29] Hugh J. Watson, Dael L. Goodhue, Barbara H. Wixom, The benefits of data warehousing: why some organization realize exceptional payoffs, Information and Management 39, 2002, 491-502

[30] Yeong-Ho Ho, Huei-Sen Wang, Hei-Chia Wang, Developing an Expert System of Failure Analysis, Applied Mechanics and Materials Vols. 284-287, 2013, pp 2375-2379

[31] Somjit Arch,int, Dentcho N. Batanov, Development of industrial information systems on the web using business components, Computers in Industry 50, 2003, pg 231 – 250

[32] Li Nan et al., Developing a knowledge-based early warning system for fish desease/health via water quality management, Expert Systems with Applications 36, 2009, pg 6500 – 6511

[33] Shu-hsien Liao, Knowledge management technologies and applications – literature review from 1995 to 2002, Expert Systems with Application 25 (2003), 155-164

[34] Developing Web Application, www.syngress.com

[35] Snee, R. (2004) “Six Sigma: the Evolution of 100 years of Business Improvement Methodology”, International Journal of Six Sigma and Competitive Advantage, Vol. 1 No. 1, pp. 4-20.Tomkins, R. (1997) “GE Beats Expected 13% Rise”, Financial Times,pp. 22, October 10.

[36] B.M. Li, S.Q. Xie, X.Xu, Recent development of knowledge-based systems, methods and tools for one-of-a-kind production, Knowledge-based Systems 24 (2011), 1108-1119

[37] Martinsons, M. G., Human resource management applications of knowledge-based systems. International Journal of Information Management 17(1), 1997, Pg 35–53.

[38] Cauvin, S., Dynamic application of action plans in the Alexip knowledge-based system. Control Engineering Practice 4(1), 1996, Pg 99–104

[39] Kang, B. S., Lee, J. H., Shin, C. K., Yu, S. J., & Park, S. C., Hybrid machine learning system for integrated yield management in semiconductor manufacturing. Expert Systems With Applications 15, 1998, pg 123–132

[40] Stein, E. W., & Miscikowski, D. K., FAILSAFE: supporting product quality with knowledge-based systems. Expert Systems With Applications 16, 1999, Pg 365–377

[41] Liao, S. H., Problem solving and knowledge inertia. Expert Systems with Applications 22, 2002, pg 21–31.

[42] Kang, B. S., Lee, J. H., Shin, C. K., Yu, S. J., & Park, S. C., Hybrid machine learning system for integrated yield management in semiconductor manufacturing. Expert Systems With Applications 15, 1998, pg 123–132

[43] Klara Nelson, Joseph E. McCann, Designing for knowledge worker retention & organization performance, Journal of Management and Marketing Research.

[44] http://www.htm.uoguelph.ca/MJResearch/ResearchProcess/ExploratoryResearch.htm

[45] Lincoln, Y.S., and Guba, E.G. (1985). Naturalistic Inquiry. Beverly Hills, CA: Sage.

[46] Delone W, McLean E. Information systems success: the quest for the dependent variable. Inform Systems, Res 1992; 3(1):60-95

[47] Goodhue D, Klein B, March S. User evaluations of IS as surrogates for objective performance., Information & Management 2000; 38:87-101

[48] H.J. Harrington, E. Esseling, H.van Nimwegen, Business Process Improvement Workbook: Documentation, Analysis, Design and Management of Business Process Improvement, The McGraw-Hill Companies Inc, New York, 1997.

[49] Rizzi, S., Abelló, A., Lechtenbörger, J., Trujillo, J., Research in data warehouse modeling and design: dead or alive. In: DOLAP'06: Proceedings of the 9th ACM International Workshop on Data Warehousing and OLAP. ACM, New York, NY, USA, 2006, pp. 3-10

[50] Nonaka et al., A theory of organizational knowledge creation, International Journal of Technology Management 11 (1996), 833-845