

Optimization of Process Time in the Creation and Updation of Technical Publication Documents Using Business Process Reengineering: Case Study

Karthik Kumar M¹, Sunith Hebbar², Chandeesh R³, Shiva Prasad H.C⁴

¹*Manipal Institute of Technology, Department of Humanities and Management
Manipal, Karnataka 576104, India
Karthik832610@email.com*

^{2,4}*Manipal Institute of Technology, Department of Humanities and Management
Manipal, Karnataka 576104, India*

²*sunithhebbar@rediffmail.com, ⁴hcs.prasad@manipal.edu*

³*TIPL, Team Lead, TSV Business unit Bangalore 560059
cramamurthy@textron.com*

Abstract

The creation of Technical Publication documents in industries is the last hurdle of the Product life cycle, since the engineering details of a product are taken in the beginning of the design stage itself. When design undergoes significant changes in the product life cycle, it is very difficult to reflect the latest engineering details in the technical publication documents as a result enormous amount of rework has to be done which may result in delay in shipping the supporting documents like Parts Manual, Repair Manual, Owners Guide, Installation Instructions to the customers along with the end product. The aim of this study is to present an Davenport Method which is a Business Process Reengineering(BPR) Methodology, where all the documents of XYZ company are standardized using Darwin Information Typing Architecture standard, by incorporating this standard in the document brings drastic reduction in time during the Creation and updation of Technical Publication documents based on the change notice in this company. Paired sample t test is used to determine whether there is significant reduction in time for the creation and Updation of Manuals before and after Reengineering, this is done by using Statistical Package for Social Sciences software(SPSS)

Keywords: Technical Publication documents, Business Process Reengineering (BPR), Change notice (CN), Paired sample t test, Darwin Information Typing Architecture (DITA)

1. Introduction

Technical Publications documents refers to any type of documents that describes the operations, functionality, maintenance and architecture of the end product and enables the end users to understand the intricate engineering details at their reading comprehension level. With the technology world in which we live the manuals like Parts manual(are used to locate the correct replacement part number of a vehicle component), Repair manual(provide instructions for removal an installation of vehicle components.), Owners Guide(provide safety and operating information for the vehicles.) and Installation instructions(Provide instructions for installation of components) are delivered to the customers in many platforms such as offline(pdf) and online(web).so, most of the organizations realizes that user centric documents adds value to the product and in turn increases the customer satisfaction.

The problems of inefficient time in the creation and updation of manuals can be overcome by using a Business Process Reengineering Technique. The reason behind BPR to be successful is that it helps the companies to achieve drastic improvements in performances such as speed, quality, time, and cost.

2. Profile of the Company

XYZ is an American industrial conglomerate known around the world for its powerful brands in Automotive and Aircraft sector with a total revenue of \$13.9 billion and has got a 34000+ employees all around the globe. XYZ is recognized as Outstanding US Company in India. Technical Publication Team of this company mainly creates and update Parts Manual, Repair Manual, Owners Guide and Installation Instruction for the Commercial, Industrial and Golf Vehicles.

3. Literature Review

BPR replaces the age old process in order to stay competitive in the modern world; Information Technology plays a key role as a change enabler for the success of an organization [1]. BPR has been famed as a strategic driven organizational approach of rethinking and redesigning a business process to achieve drastic improvements in performances and in this paper business process Simplification and Improvement is suggested as a creative problem solving Technique[2].Reengineered Telephone Service, GTE [3], the largest Telephone Service provider in USA reengineered it's time to service for the customer complaints, it used customer care advocates who were trained in all the aspects so that they handle all kinds of complaints related to Telephone this results in the elimination of additional steps required to respond to the complaints as a result, time to service reduced from hours to minutes (Hammer and Stanton, 1995).Ford used the single database of all the accounts to reduce the time taken for payment to the supplier [3][4]

Darwin Information Typing Architecture (DITA) “is a data model for authoring and publishing topic-based content”. DITA works on the principle of modular reuse and extensibility. DITA has been used for creating technical documents such as manuals and help files in recent years. In DITA architecture, documents consist of topics and

maps. [5][6]. Consistency plays a very important role in achieving the goals of an Organization. It is very difficult to achieve consistency because employees may perform the same task in different ways as a result variation in the output is high. This problem can be overcome by documenting the work done by an experienced and knowledgeable employee in a proper format and asking the other employees to follow the same as a result variations in the output can be minimized [7]

3. Methodology

The Methodology that is adopted in this study is five-step Method which is suggested by Davenport and Short (1990).

- A. Visioning and goal setting
- B. Identification of Process to be Reengineered
- C. Understanding and Measurement of Existing Process
- D. Usage of Information Technology as a change enabler
- E. Design and Evaluation of Process Prototype

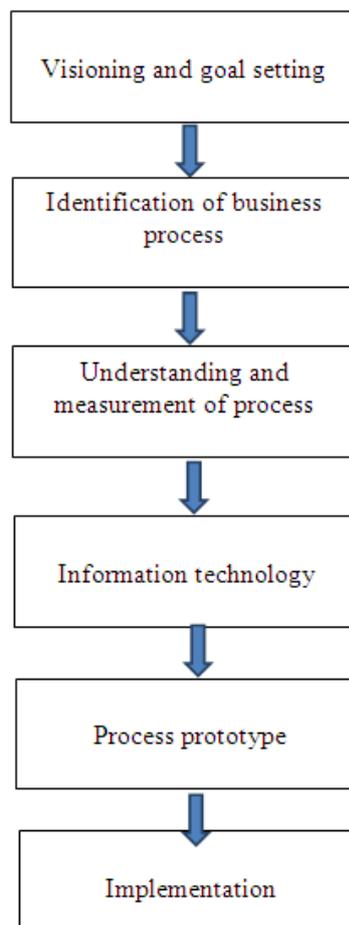


Figure 1: Davenport and Short Methodology (1990)

A. Visioning and Goal setting

The Vision of XYZ Company is Standardization of Technical Publication documents (Parts Manual, Repair Manual, Owners guide and Installation Instructions) there by reducing the process time in Techpubs process.

- i. Componentization (Single Sourcing) of manuals
- ii. Improves productivity and quality by establishing standards for document authoring/collaboration
- iii. Accelerates time-to-market by enabling authors to rapidly author/publish documents and multiple product-related variants
- iv. Reduction in time for the creation and updation of technical publication documents

B. Identification of Business Process

The Business Process which is identified is Updation and Creation of Manuals based on the change notice. Change notice is a central function which is used to change the various aspects of production data like Bill of materials, Documents and so on. Major difficulty that is identified in this step is redundant information located in the multiple manuals and it is found that body section of the manuals constitutes more redundancy in the Technical Publication documents.

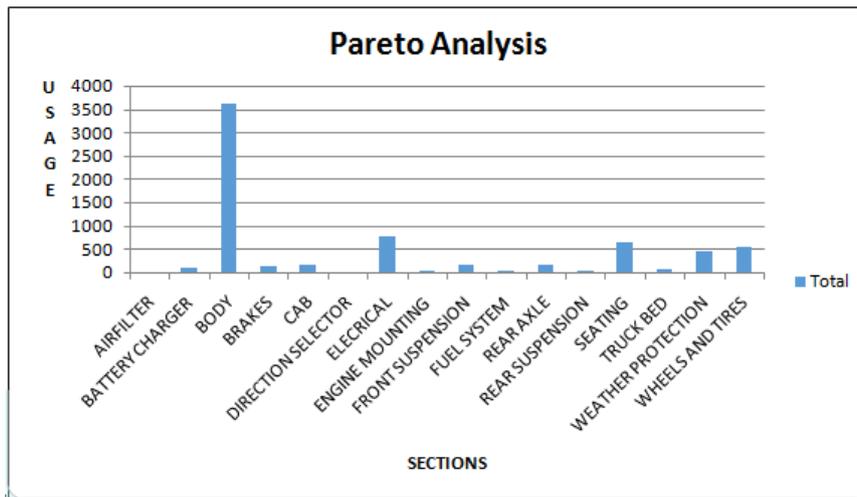


Figure 2: Shows the redundant information located in multiple Vehicles with respect to section wise

C. Understanding and Measurement of the Process

This is explained with the help of the following change notice which has been worked in the XYZ Company, the change notice says the shackle plate in the rear suspension section should be replaced from the old part number to new part number, based on the analysis it was found that change should be made in 26 parts Manuals, and the reason for this change is the cost of the shackle plate with new part number is very less when compared to the old part number. On updating these 26 Manuals it is found that the

same change needs to be done 26 times instead of once as a result it creates inefficient time in this process and also when we refer these 26 manuals it is found that there is no consistent flow of information in these manuals even though the part numbers and the illustrations are same, there is no standardization of Manuals, which clearly says doing this task obviously adds additional time in the process. An activity on node diagram is drawn to show the time taken for the completion of this Change notice where the time is recorded using a stop watch

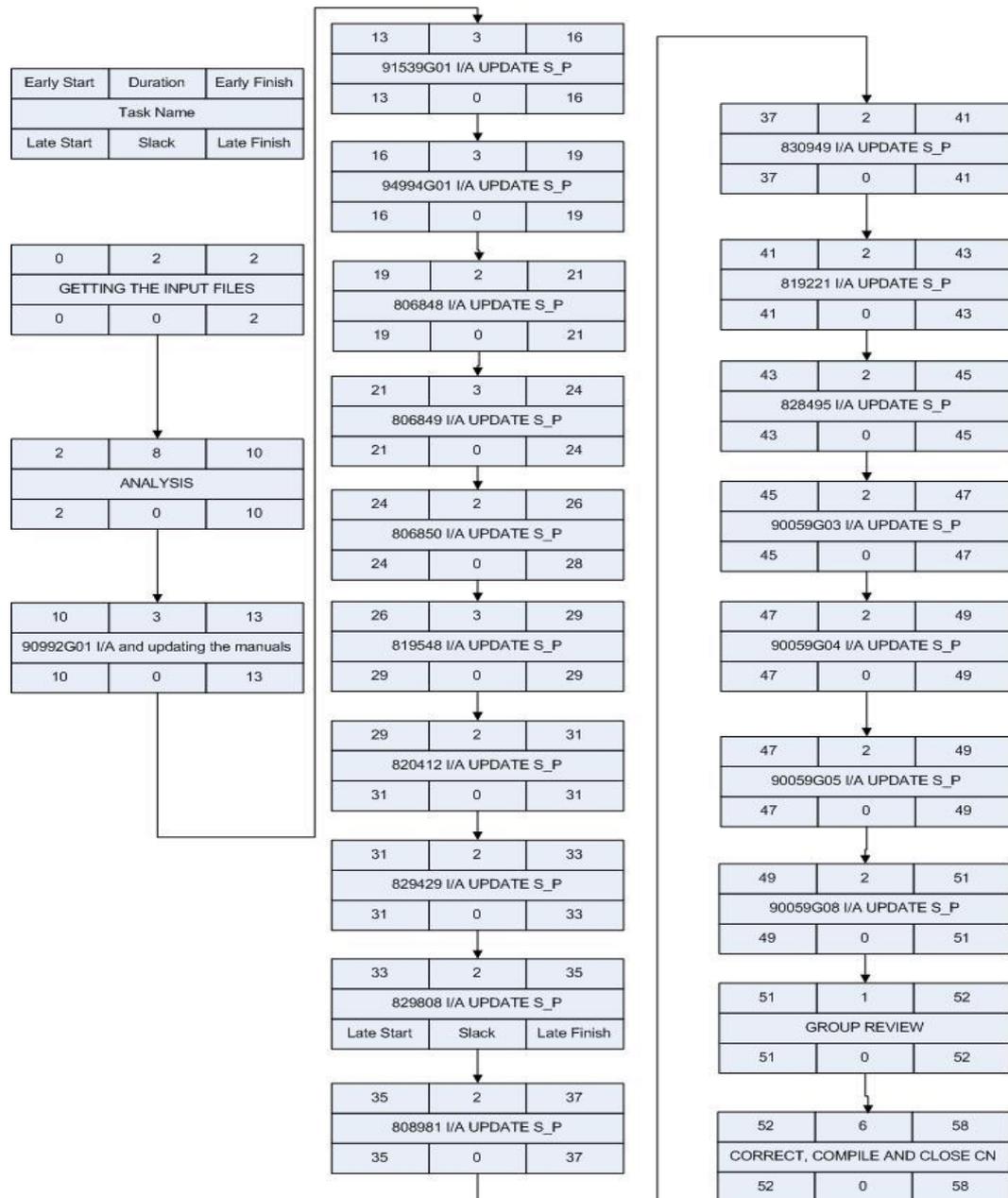


Figure 3: Activity on Node Diagram (End to start relationship) shows the time taken for the completion of the Change notice

The above figure says the time taken to find 90992G01(which is a Module-which includes the ingoing components to form a final assembly) and update according to the change notice in respective Manuals i.e. changing the Part number of Shackle Plate and similarly doing the same for other activities. The Overall time taken for the Completion of this change notice is 58 hours Based on the change notices that I have worked on and the past change notices that were there in the Technical Publication department of XYZ company and also a brainstorming session is done to identify the factors that constitutes inefficient time, as a result cause and effect diagram is drawn

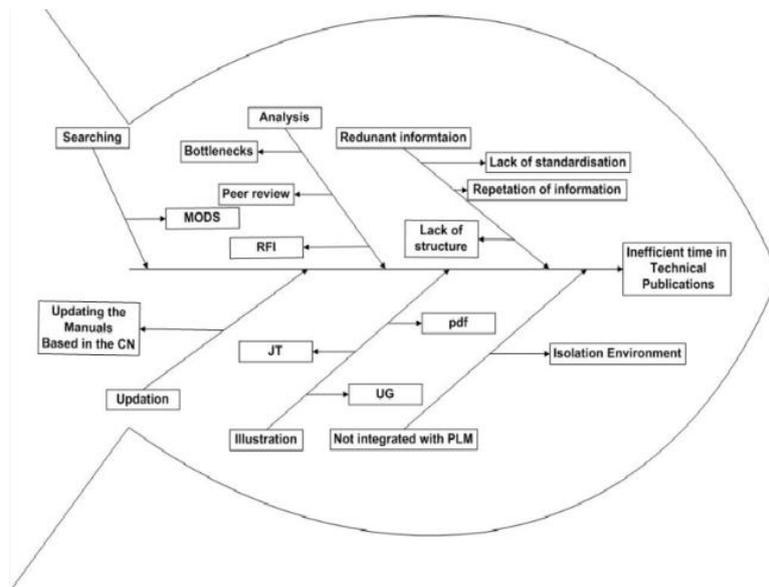


Figure 4: Cause and Effect diagram

Cause 1: Redundant information

- ❖ The same information is used in multiple manuals in different formats
- ❖ Lack of structure (Hierarchy), Inconsistency in the structure of information which is depicted in the multiple similar documents make the content more difficult for the Techpubs authors to locate and update.
- ❖ Even though we use the same Module (ingoing parts of a assembly) for many Manuals, the content of this looks different in different manuals. For example the fuel system Module is used in many vehicles, but if we refer the fuel system section of the manuals using the same Module, there is a lot of difference in terms of numbering, illustrations and overall presentation
- ❖ During the creation of new Manuals, again redundant information in generated in the manuals

Cause 2: Analysis

- ❖ During the analysis stage if any bottle neck come across it has to be discussed within the team, if is not solved means than we have to raise a RFI(Request For Information)

Cause 3: Search

- ❖ Time consuming to find the in which and all manuals that particular Module is used

Cause 4: Updation

- ❖ Duplication of information(Modules/N) result in increasing time for the updation of manuals, suppose if the CN is affecting 10 manuals with same changes in terms of (just change in part number, illustration), instead of doing it once he repeats the same task for 9 times(i.e. he does 10 times separately for 10 manuals)

Cause 5: Illustration:

- ❖ In order to import the graphic in to a documents it has to be converted from Unigraphics to Jupiter Tessellation and then to pdfs and finally save it as AI(Adobe Illustrator file or Computer graphics Metafile)

Cause 6: Not integrated with PLM

- ❖ The documents are created and maintained in the isolated environment
- ❖ Technical Publications work is performed after the engineering stage

D. Information Technology

Today we are in the world of information technology, when the new technology comes the first thing that comes to our mind is how best we can use this technology to our work, in the same way the problem of inefficient time in the process of Technical Publications can be overcome by incorporating standards in to the document, one such standard that is chosen for the present work is Darwin Information Typing Architecture(DITA),which is a Extensible Mark-up Language(XML) based architecture for authoring technical documents. DITA has been used for creating technical documents such as manuals and help files in recent years. In DITA architecture, documents consist of topics and maps. Topics have small amount of information which can be reused. Maps specify components of each document by organizing topics. We can manage all the components in one repository and pick them as necessary. This feature helps us to search fragments of documents which we want to read, and if we modify a fragment, all documents which use the fragment will be modified automatically. Therefore DITA improves document traceability and reduces maintenance costs [6].

E. Prototype

From the Pareto analysis which is done before it was found that more number of redundant modules was found to be in Body section of the manuals, so as a prototype, body section of all the Manuals are incorporated with the DITA standard where the body sections are structured using an XML authoring by eliminating all the redundant information in the body section and made it is a single source of file for the body section. Since we know the time taken for the completion of change notice which pertains to body section of past change notices and the same thing is done using the

newly created Body section which is standardized it was found that there is a drastic reduction in time. Once it is found successful all the sections of the Manuals are standardized using the DITA. The main intention of creating a prototype is it quite less expensive in comparison with a process that fails during Implementation. Once it is found successful the manuals with DITA standard are implemented in the work flow

4. Validation

In order to validate the work which has done, time taken for the past Change notice were noted down that is before reengineering and the same Change notices were worked after the technical Publications documents are reengineered and the time is noted down. In order to validate the results paired sample T-test is done to determine whether there is any significant difference in time before and after the process is reengineered.

Table 1: Time taken for the Completion of Change notice before and after reengineering

Change notices	Time taken for the completion of Change notice before reengineering(Hrs)	Time taken for the completion of Change notice after reengineering(Hrs)
CN.1	58	30
CN.2	90	40
CN.3	40	20
CN.4	25	10
CN.5	120	60
CN.6	140	60
CN.7	60	25
CN.8	42	20
CN.9	24	11
CN.10	26	10
CN.11	52	25
CN.12	94	45

The Hypothesis has been stated as

H1: There is significant difference between time before and after business process reengineering of Technical Publication documents

H0: There is no significant difference between time before and after business process reengineering of Technical Publication documents

The Null hypothesis is rejected at 99% confident level i.e there is no significant difference between time before and after business process reengineering of Technical Publication documents from the below table

Table 2: Paired sample t test result from SPSS software

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Before	64.25	12	38.504	11.115
After	29.67	12	17.926	5.175

	N	Correlation	Sig.
Pair 1 Before & After	12	.989	.000

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Before - After	34.583	20.935	6.043	15.814	53.353	5.723	11	.000

Inference:

1. The P value (.000) is lesser than 0.01 therefore we reject the null hypothesis.
2. There is a significant difference between the time before and after the reengineering of Technical Publication documents

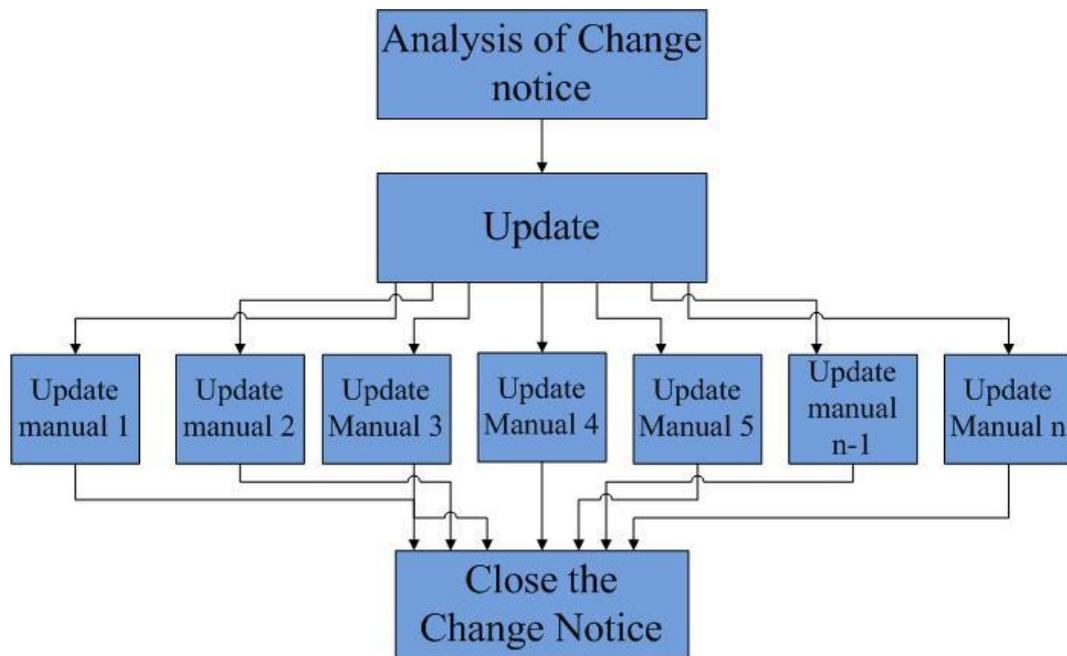


Figure 5: Change notice process flow before reengineering of Technical Publication documents

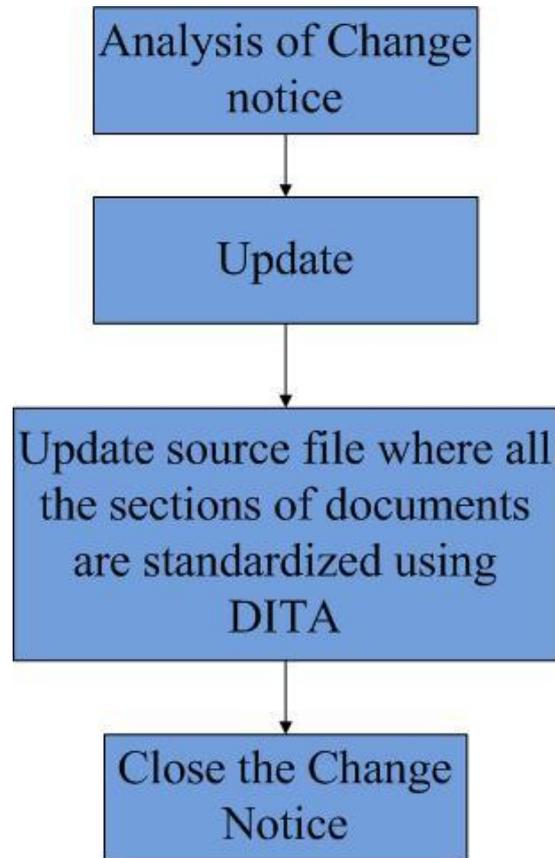


Figure 6: Change notice process flow after reengineering of Technical Publication documents

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