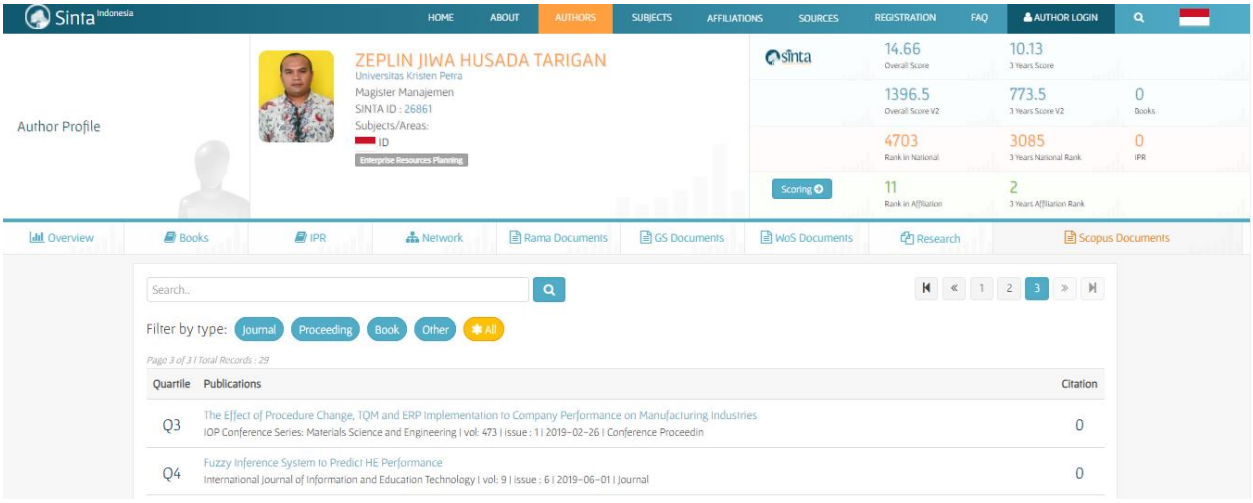
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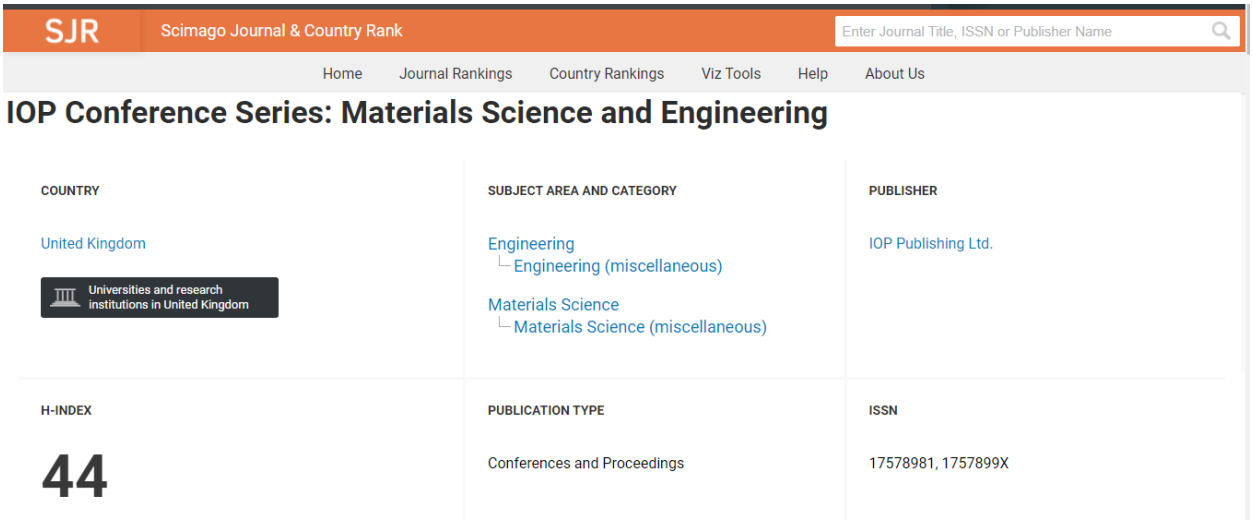
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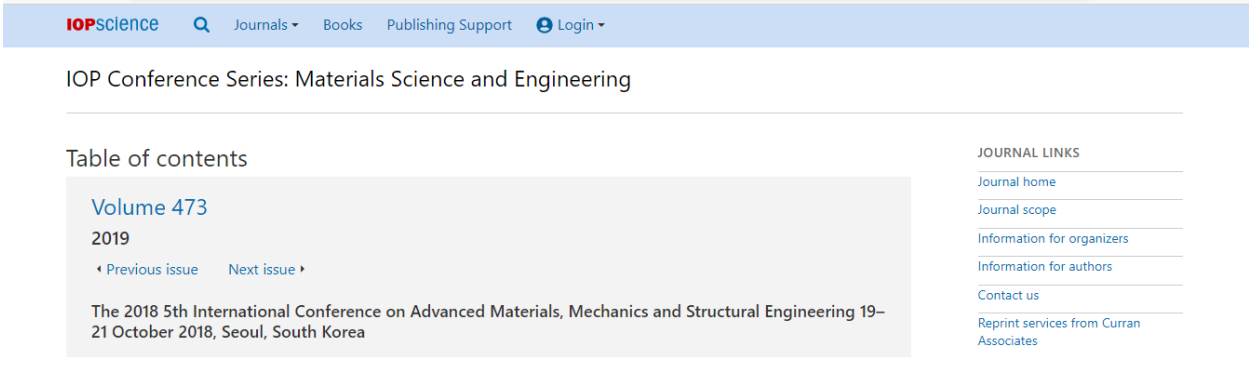
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The 2018 5th International Conference on Advanced Materials, Mechanics and Structural Engineering

Preface

The 5th AMMSE 2018 is the 2018 5th International Conference on Advanced Materials, Mechanics and Structural Engineering (5th AMMSE 2018) took place in Seoul, South Korea, on October 19-21, 2018.

The conference program covered invited, oral, and poster presentations from scientists working in similar areas to establish platforms for collaborative research projects in this field. This conference will bring together leaders from industry and academia to exchange and share their experiences, present research results, explore collaborations and to spark new ideas, with the aim of developing new projects and exploiting new technology in this field.

The committee of AMMSE expresses their sincere thanks to all authors for their high-quality research papers and careful presentations. All reviewers are also thanked for their careful comments and advices. Thanks are finally given to IOP Publication as well for producing this volume.

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Prof. Sreeramamurthy Ankem was giving speech

Prof. Ying Tan was giving speech

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The Effect of Procedure Change, TQM and ERP Implementation to Company Performance on Manufacturing Industries

Zeplin Jiwa Husada Tarigan[1], Widjojo Suprapto[2] and Sautma Ronni Basana[3]

IOP Conference Series: Materials Science and Engineering, Volume 473, The 2018 5th International Conference on Advanced Materials, Mechanics and Structural Engineering 19–21 October 2018, Seoul, South Korea

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The Effect of Procedure Change, TQM and ERP Implementation to Company Performance on Manufacturing Industries

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Abstract. The initial changes in standard procedures made by manufacturing companies when implementing ISO 9000: 2008 system (SNI/ National Indonesia Standard) are establishing procedures related to the system in each department of the companies. These changes are related to the standard operating procedures, work instructions, and forms. The second stage of changes happens during the implementation of the Enterprise Resource Planning (ERP) in which the companies have to integrate various departments into one integrated data system. These processes of changes in the companies are called business process redesign or re-engineering (BPR). The changes are conducted by making adjustments to all procedures in the companies so that they can fit into applying ERP modules. Proper adjustments will increase the employment performance for manufacturing companies. The data are collected from 100 questionnaires distributed to the manufacturing companies in East Java, and can further analyze from 77 questionnaires with a 77% response rate. Data processing is performed by using structural equation modeling of PLS and finds that BPR does not provide a direct improvement to the implementation of ERP in the companies. The changes to the standard procedure of the company, or BPR, give an impact of 0.422 to the implementation of ISO 9001. The implementation of ISO 9001 brings an impact of 0.763 on the implementation of ERP. The implementation of ISO 9001 does not affect the company performance, but the implementation of ISO gives a significant impact to the company's performance of 0.664. The changes in standard procedures performed in the company, often called BPR, can improve the company's performance by 0.2138, obtained through the implementation of ISO 9001 and the implementation of ERP.

1. Introduction

Business competitions among manufacturing industries are extreme, especially in producing competitive goods. The crucial point now for many companies is how they can build their competitive advantage by increasing their target markets and how they can implement changes to develop the business. One change management that is often done by those companies is by applying some business process mapping using the latest information technology. Restructuring business process systems are conducted by doing some rationalization for all related departments to interconnect data and integrate business processes. The radically redesigned business process is conducted to create a fast recovery, to increase business performance, to reduce the cost of production, to stabilize the product quality, to response the customers properly, and the increasing customer satisfaction through customer service. The total change to the whole system done by many companies brings extra values to the company's customers internally and externally. The stiff competition among global companies forces them to build effective and efficient business systems as their competitive advantages. In Indonesia, many companies install Total Quality

management (TQM) systems to improve their standardized processes to guarantee the produced products [1]. The implementation of ISO can also improve the company's performance better and provide the strength for the companies to compete because the implementation of ISO can improve the credibility of the companies in their consumers.

One of the essential business process reengineering is redesigning business process and technology improvement. The implementation of the redesigned business process in the Indonesian manufacturing industries is carried out through the application of TQM (Total Quality Management). This is used to make improvements to product quality and company productivity. TQM is a comprehensive and cross functional system among departments within a company that is continuously controlled in making continuous improvements. TQM integrated with the Enterprise Resource Planning (ERP) system becomes an accelerated process for companies to make rapid system engineering changes. ERP is an integrated information technology system that is able to connect data of all departments in the company in the real time. Both TQM and ERP systems must be designed specifically to match with the appropriate standard operating procedures (SOPs) in order to support each other and to improve company's performance.

The implementation of ISO 9000: 2008 is one form of TQM concept execution in a management system. This management system requires that the organizational management must have the standard (clauses) as required by this ISO standard. These management system clauses consist of management responsibility clauses, resource management clauses, product realization clauses, measurement and evaluation clauses, and documentation system clauses. TQM system is the basis for the management in implementing the ISO 9001: 2008 Quality Management System. The implementation of TQM provides some improvements in the company performance, such as timely company product delivery, improvement in corporate innovation, decreased company overhead costs, and increased sales in the company [2]. Research conducted by Brah et al. [3] is comparing some companies in Singapore that are implementing ISO with the help of consultants and without using any consultants, and the result suggests that companies with ISO consultants perform better. While conducted by Joiner [4] states that consultants used by companies in Australia have a positive impact on the implementation of ISO. The use of tax consultants in companies will provide the accelerating process of financial reporting because the consultants have adequate experiences and understand the taxation rules well [5].

Nowadays, there is a system called TQM (Total Quality Management) with the SNI (Standard Nasional Indonesia) modification ISO 9000:2008 in Indonesia [6]. Often called as the integrated quality management system, this SNI or ISO 9000:2008 is the result of adopting and modifying the previous ISO, the standard ISO 9000:2008. This standard is used by many companies to measure the capability of an organization or manufacturing company to fulfill the customer requirements, the policies, the regulations, and the law in producing and marketing their product in Indonesia. This standard suggests adopting the process approach when planning, implementing and evaluating the effectiveness of the quality management system to meet customer satisfaction by fulfilling the order. The system in manufacturing companies in Indonesia is required by the government of Indonesia to adopt ISO so that the products can comply with the specifications that are set by the government through the Indonesian National Standard (SNI). Manufacturing products and imported goods must be declared to have ISOs so they can be marketed in Indonesia.

Total quality management (TQM) can be considered as the best and most effective way to reach the goals and objectives of educational institutions, as TQM contains the philosophy of continuous improvements which can provide practical tools for the educational institutions to fulfill the needs, wants, and hopes of their customers [7]. TQM is also one of the best ways to improve the competence of human resources and the quality of an organization so that it increases the product quality (both goods and services) that are done by all organization members who do the task [8]. Based on the latter statement, the product quality must be done by the whole organization or institution members, because the TQM cannot be implemented without cooperation with all organizational members.

A proper TQM implementation in manufacturing companies manages to organize interaction processes in the whole company through working procedures, job instructions, and work result forms. Several changes manufacturing companies have to make on their processing procedures, especially in undertaking their business activities processes. First of all, the marketing department has to make some

adjustments to the procedures related to the standardized acceptance of customer order sales, standardized demand schedule management, standardized delivery order, standardized customer satisfaction. Second, the production and planning inventory control (PPIC) departments have to standardize their activities related to the production schedule procedure, inventory control procedure, production reporting procedures, and others. Third, the warehouse departments have to alter their procedures, primarily related to the material retrieval procedures, material return procedures, inventory checking procedures, material storage procedures, standardized inventory level procedures, and others. Fourth, the purchasing departments have to make some adjustment related to the standardized purchase procedure of material, the standardized procedure of material acceptance, the standardized procedure of making the material name. The alterations are also for other departments that are related to the implementation of ISO 9000.

Besides implementing ISO, most companies also implement ERP technology to integrate all data from various departments so that the top management can make an accurate decision. To implement the ERP, a company has to redesign all business processes to match with the software used by the company [9]. The alterations made by the company are tailored to the ERP modules which are used in each department. The intake of data has been done manually, and the entry to the computer software system is still departmental. There are still many manufacturing companies that each department uses information technology systems that cannot be integrated with other departments. The implementation of integrated ERP will result in the adjusted data in each department so that other departments can use the data, and all departments must agree on the data integration so that the implementation can be appropriately conducted. The companies have to ensure that all departments have agreed upon the standard procedures for all processes so that the disputed opinion among departments can be avoided, and this whole process is called business process redesign or re-engineering. ERP is software to integrate all data that are related to production processes in the company [10]. With the implementation of ERP, the top management can build the operating system to monitor the work procedures and can also get the latest integrated data to make accurate and fast decisions. With the right decision making and well-maintained procedures, the top management can boost the company performance. The practical importance of this research is to implement ERP in manufacturing companies. In implementing the ERP, many companies create new problems which are caused by the different ISO system and the abundant numbers of personnel. The personnel pay more attention to the ERP system but neglect the ISO system. Therefore, many standard operating procedures are ignored to implement the ERP. With the two systems are implemented in one company, the synchronization of two systems is needed, especially in documenting systems. The previous researches do not pay much attention to the successful implementations of two systems, ERP and ISO, which will bring impacts to the company's performance.

2. Research hypothesis

To increasing the competitive advantage by improving the company performance can be accomplished by implementing enterprise resources planning (ERP) technology and total quality management (TQM). The ERP implementation is aimed to create efficiency by making decisions accurately and fast, while the TQM implementation is to create standardized and consistent processes. Implementing these two systems are very complex because a company needs to spend plenty of time and money starting from pre to post implementing activities. In preparing to implement both TQM and ERP, the company needs to conduct an appropriate redesign business process or BPR so the operational process can be synchronized with the software in the ERP system. Enterprise Resource Planning (ERP) is one way to manage company's resources using the information technology. The ERP technology can coordinate and integrate data from different business divisions in the company so the given information can be shared entirely to all departments, especially the top management in making appropriate business decisions.

The ERP implementation requires the related documents, primarily the corporate business blueprints, and the quality manual. The ISO quality manual is one document which contains the implementation guidelines of a company and becomes the primary requirement for the ISO implementation. Conducting all activities are described thoroughly in standard operating procedures (SOP), job instructions, and various forms to record quality in the company. Best practices in the companies can be developed from the lessons learned in implementing ISO 9000, which are documented using ERP system so that they can contribute a strong relationship with the indicators to measure the financial performance of the companies.

In preparing to implement both TQM and ERP, the company needs to conduct an appropriate redesign business process or BPR so the operational process can be synchronized with the software in the ERP system. The initial change that the companies have to do is to customize the business practice so that the software system complies with the ERP system. The success of implementing ERP by doing some changes to the adjusted business process system is called BPR [11]. The integrated information technology (ERP) implementation needs alterations to the business process to increase performance [12]. Research conducted by Lee et al. [13] state that BPR brings a positive impact on the implementation of technology in creating business innovations. The BPR (business process re-engineering) in a company will create customized product innovations that possess new standard operating procedures. The changes of the business process are usually conducted by altering procedures, work instructions, and forms to obtain new ISO 9000:2008. SNI is often considered as the Total Quality Management system in manufacturing industries in Indonesia. Research by Costa et al. [14] state that one benefit for a company, that is doing some alterations on the procedures and documents, and is creating new standard operating procedures, is the positive impacts on the changing organizational culture. BPR (Business process re-engineering) is used to redesign the continuous improvement process in companies [15]. A standardized system in a company will ease the end users of ERP to enter the data into the software, so all data are also standardized for the needs of the company. The decision to use the standardized process is used to implement ERP for better company performance and cutting costs [16]. Research by Tsai et al. [17] mentions that the ERP system needs a precise procedure and standardized forms as the integrated data solution. The standardized process with real-time data in an organization can speed up the data integration in a company, so the ERP implementation is faster and smoother [18]. A company must produce standardized goods that comply with the requirement set by the customers. Those products must not violate the law within the jurisdiction areas or regions where the company is located. One research states that the standardized materials ordered by the purchasing department must follow the needs of the production department and bring positive impact to the business performance of the company. ERP is an information technology that can integrate all departments in a company. Kang et al., [19] reveal that the ERP implementation gives a positive impact on the company performance. Zhang et al., [20] mention that the ERP function with the help of application software can aid organizations to control the business because it can reduce inventory, reduce orders, increase work productivity, maximize communication level, and increase profits. Five hypothesis for this research:

H_1: The business process re-engineering influences on the ERP implementation.
H_2: The business process re-engineering influences the ISO 9000:2008 (SNI).
H_3: The SNI ISO 9000:2008 has an impact on the ERP implementation.
H_4: The SNI (ISO 9000:2008) has an impact on the enterprise performance.
H_5: The implementation of ERP brings impacts to the enterprise performance.

3. Research method

The best practice used by manufacturing companies in Indonesia is obtained from the implementation of SNI and ERP. The manufacturing companies concentrate on the quality management system by focusing on product quality. This is causal research that investigates the relationship among BPR, ISO 9000:2008 (SNI), ERP, and the performance in manufacturing companies in East Java. This research is using the quantitative method. The quantitative research is a research that uses empirical approaches to collect, analyzes, and presents the numerical data. According to Cooper and Schindler [21], quantitative research is a research that tries to measure a phenomenon accurately.

To measure accurately, this research is using some analytical tools; among others are the analytical indexing tool and Structural Equation Modeling (SEM) Partial Least Square (PLS). The analytical indexing tool is used to measure every indicator in each variable. Meanwhile, SEM is used to analyze the causal structural relationship with the help of Smart PLS. The questionnaires are directly distributed and collected by the researcher from 100 companies in East Java. The returned questionnaires are 80, but three questionnaires are not valid because they are not entirely marked. Then, the data are collected and further processed from 77 questionnaires, with a 77% response rate.

4. Finding and discussion

Based on the collected questionnaires, it is obtained that the full structural model is reflected inner model in table 1. After doing the whole bootstrapping data, to test the hypothesis comes as follows:

Table 1. The Result of the Inner Model and the Hypothesis Testing.

Effect of Variable	Original sample estimate	Mean of subsamples	Standard deviation	T-Statistic
BPR -> ERP	0.108	0.079	0.094	1.144
SNI -> ERP	0.763	0.783	0.061	12.610
BPR -> SNI	0.422	0.501	0.071	5.983
ERP -> Performance	0.664	0.649	0.180	3.689
SNI -> Performance	0.051	0.112	0.190	0.270

From the results in table 1, the first hypothesis (H1) is rejected because the t-statistic value (1.144) is less than 1.96; therefore, there is no influence between Business Process Re-engineering and Enterprise Resources Planning in manufacturing industries in East Java. This is caused by some certain circumstances happening in the business environment. However, the changes are not adjusted to the ERP system, such as the requests from vendor software are not fully justified, instead the software is merely installed to integrate the system. As the result, the vendor software cannot conduct many analyses that are happening in the company. This research is different from the result of a research conducted by Schniederjans and Kim [22] stating that BPR is essential in implementing ERP because it is useful to integrate all departments to produce an effective and efficient process. This research is also different from the results stating that BPR can have a positive impact on the implementation of information technology [23, 24]. Meanwhile, the second hypothesis (H2) is accepted with the t-statistic value 5.983 greater than 1.96. Therefore Business Process Re-engineering influences ISO 9000:2008 (SNI). This result shows that the working alteration is only changing the working system through altering work procedures, work instructions, and work forms. This condition is caused by the implementation of BPR that has to comply with the minimum requirements of SNI ISO 9000:2008. This minimum requirement of SNI is also acting by the Indonesian government regulation in producing manufacturing goods. This research supports the result of research by Li et al., [25] describing that BPR is central to changes and adjustments to the TQM implementation. BPR is one of the three principles of TQM. The reengineering process is a reflection of an improvement on the company's business process and company procedures to support the company's operations.

The third hypothesis (H3) is accepted with the t-statistic value of 12.610, which is greater than 1.96, so ISO 9000:2008 (SNI) has an influence on Enterprise Resources Planning in manufacturing industries, however, the established standard cannot increase the company performance directly. This condition happens because the business process, standard operating procedures, and various working forms needed by the ERP are available and complete when implementing ISO 9000:2008 (SNI). In building the ERP system, the key users have already understood the system as they are accustomed to construct it in implementing SNI. This research also supports the result of Loukis et al., [24, 25] which states that the implementation of TQM can have a positive impact on the implementation of information and communication technology (ICT), and can increase the added value of the company.

This is confirmed by the rejection of the fourth hypothesis. The fourth hypothesis (H4) is rejected because the t-statistic value is .270, which is less than 1.96. SNI ISO 9000:2008 does not influence enterprise performance in manufacturing industries. This happens because the changing and adjusted business process are merely bringing some paper works which surrender orderliness in the production reports to the top managers. The orderliness of production reports does not surrender better productivity as the production processes in manufacturing industries still rely heavily on manual processes or human resources. The result also supports Flynn and Flynn [28] statements that the implementation of TQM is not capable of impacting the company's performance because its system has not been able to run properly by employees.

The fifth hypothesis (H5) is accepted with the t-statistic value of 3.689, which is higher than 1.96. Therefore, it can be said that the implementation of ERP in manufacturing companies in East Java brings a positive and significant impact to the company performance. The implementation of ERP for manufacturing companies brings many benefits, especially in the quick data analysis so that it speeds up the decision making by the top management. This research is in accordance to some previous researches that the implementation of ERP in manufacturing companies can bring positive impacts to the company performance [18- 20, 22]. Based on the result of hypothesis testing (H1 to H5), it can be summarized in figure 1. That depicts the total research results after conducting all hypothesis tests.

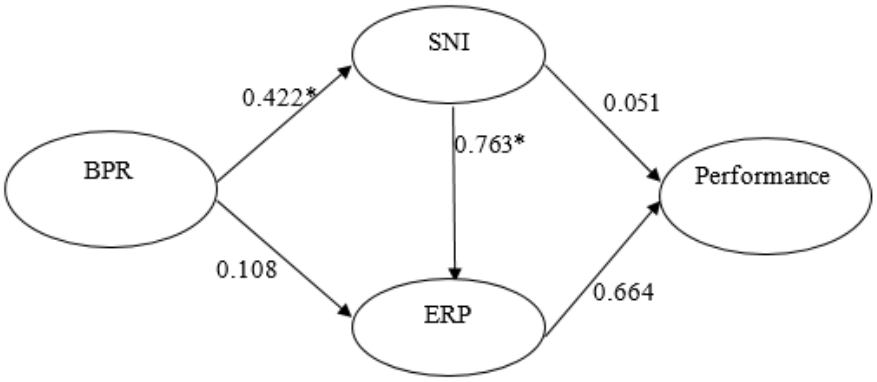

Figure 1. The effect of BPR, SNI, and ERP on Company Performance.

Based on figure 1, it can be concluded that there is no significant influence between BPR and ERP in a company, but there is an influence between BPR and TQM, in this case, is represented by the implementation of ISO 9000:2008 (SNI), which is caused by the alteration of work interaction among departments. TQM through the restructuring work standard, work procedures, work instructions, and work forms can bring a positive and significant impact on the implementation of ERP, but cannot improve the company performance. The companies must be able to restructure and redesign the SNI system so that the documentation systems needed by the ERP implementation are well managed and controlled. The well-managed ERP system can increase the information quality improvements on all business functions in the companies, such as the functions of finance, operations and productions, inventory, marketing, and human resources. Such a condition will create good business networks, increase company efficiency, and business target achievement. Business process re-engineering which is conducted through SNI and BPR will synchronize the data system and will bring the best practices for the companies. Finally, the implementation ERP gives impacts to the improvement of the manufacturing company performance.

5. Conclusion

From the data analysis, it can be concluded that there is no significant influence between BPR and ERP in a company, but there is an influence between BPR and TQM, represented by the implementation of SNI ISO 9000:2008, which is caused by the alteration of work interaction among departments. TQM through the restructuring of work standards, work procedures, work instructions, and work forms can bring a significant positive impact on the implementation of ERP, but cannot improve the company performance. Finally, ERP gives impacts to the improvement of the company performance. The next step for this research will add another variable, that is the organizational culture variable, to investigate the role of the culture in driving the implementations. The implementation of TQM and ERP together will have an impact on the system changes in the company so that the product data obtained by the marketing department can be understood by the engineering design department and the production department as well as in the industrial engineering section. Orders from the customer requests can be granted by the company and can comply to the product specifications and product design requested by the SNI.

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