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The Impact of Technological and Human Requirements on Process Reengineering to Improve Efficiency

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Abstract

This research examines the impact of technological and human requirements on the reengineering processes to improve efficiency. The study's target population consists of 400 employees from North Drilling Company who are well-informed about the research subject. The sample size, calculated using Cochran's formula, is 196 individuals, and random sampling was employed. Library and field research methods were used for data collection. The data collection tool was a 16-item standard questionnaire. Content validity was assessed for validity, and Cronbach's alpha was used for reliability, yielding a value of 0.779. The Kolmogorov-Smirnov test was used to check for normality, and Structural Equation Modeling (SEM) and path analysis were conducted in the subsequent step. For computations, SPSS and PLS software were utilized. The results indicate that technological and human requirements in the processes of reengineering have an impact on efficiency improvement.

Keywords: Technological and human requirements, Reengineering processes, Efficiency improvemen.

1 | Introduction

In today's fiercely competitive world, there's no doubt that the key to an organization's survival and continuity lies in improving efficiency. This, in turn, hinges on the meticulous adherence to proper and scientific principles and methods in task execution, given that organizations operating in competitive environments are compelled to prioritize and implement efficiency. While it may be challenging to set a specific limit on achieving efficiency, what truly matters is striving for the optimal execution of organizational activities and functions. Among the various factors contributing to production, the human resource component is one of the most pivotal levers for enhancing or diminishing organizational efficiency. Therefore, it holds a unique and crucial position, deserving of special attention.

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Efficiency is optimizing resources, including human labor, skills, talents, machinery, capital, time, and more, to achieve the maximum possible benefits [1]. Today's pace of transformation is unprecedented. It's characterized by rapid, unconventional, and fundamental changes, surpassing any previous era. This rapid transformation is driven by technological advancements, competitive pressures, and cultural shifts, creating a whirlwind that can engulf any organization. Organizations are compelled to embrace change and transformation to survive and thrive in this environment. Reengineering, through its process-centric approach and the fundamental changes it introduces in organizational processes, replaces activities within an organization that do not create added value with new processes.

The extent of transformations in reengineering requires the involvement of various factors [2]. Organizations worldwide have come to realize that gradual changes may not always be the solution to current organizational challenges. Sometimes, for an organization to survive, it is essential to bring about fundamental and foundational changes because, among the strategies for enhancing efficiency, paying attention to change is paramount.

These revolutionary changes are globally recognized under reengineering in today's global context. Reengineering moves organizations away from a functional-oriented approach towards a process-centric one. This transition not only accelerates the business process but also leads to cost reduction, thereby making the organization more competitive [3]. In the current era of rapid changes and transformations, reengineering has become a suitable mechanism to adapt to these changes, drawing widespread attention in recent years [4]. Today, most organizations grapple with outdated or inefficient processes, preventing them from achieving their intended initial outcomes. Business process reengineering is a management tool that addresses this issue within organizations.

Despite the proven effectiveness of reengineering, its implementation has often encountered challenges and setbacks. This research investigates how the various components of implementing business process reengineering projects affect their overall success [5]. Process reengineering stands as a highly valuable tool, particularly in the field of industrial engineering. Here, the constant technological advancements, evolving information systems, changing customer demands, and various other factors frequently necessitate fundamental changes in one or more aspects of an organization's operations [6]. Assuming that process reengineering fundamentally alters the method or approach to conducting business, it naturally implies that human resources will be directly impacted when this new philosophy is adopted. Hence, human resources play a vital role in this approach. Success and qualitative transformation in an organization depend on human resources through knowledge, creativity, and the ability to embrace change [7].

New skills can be developed through education, embracing challenges at work, taking on new tasks, working with authorities where human resources are available, and increasing success and productivity [8]. Technology is one of the most potent tools for implementing a process reengineering approach, with significant involvement in making tasks more manageable, redesigning institutions, changing work methods, and providing remarkable and exciting progress [9]. Information technology plays a role in achieving managerial development and organizational growth by providing information that eases executive tasks. Advancements in computer systems, software, data storage, processing, and analysis make it adaptable to the needs of the workplace and individuals [10].

While many researchers have expressed interest in studying process reengineering, only a limited number have delved into the specific requirements of this approach within industrial companies, particularly in terms of its role in their development. However, a lack of similar research focuses on the technological and human requirements for process reengineering to improve efficiency. As a result, this study is one of the few that aims to answer the question of how technological and human requirements for process reengineering impact efficiency improvement.

Recent developments in contemporary management thinking have introduced novel organizational management concepts and methods. Process reengineering is among the most prominent approaches, offering a fresh managerial concept that is applicable to all types of organizations. One of its essential prerequisites encompasses both technological and human requirements. This is crucial because technological requirements must align with ongoing technological advancements, enabling companies to remain competitive by employing the latest work methods and production techniques and seizing large-scale production opportunities. While human requirements are the essentials that provide a company with the skills and capabilities necessary for effective work, human capital remains the most valuable asset for any organization. The presence of a trained and skilled workforce has a significant impact on improving a company's performance and productivity [8]. While several studies have examined the interplay of individual variables, there remains a notable absence of research considering the specific variables explored in this study. This research aims to bridge this gap in the field.

In accordance with discussions held with the organization's management, there is unanimous support for the execution of this research project. They emphasized that this research could clarify many previously unknown aspects of the plan and, if the organization decides to proceed with it, potentially result in substantial cost savings. Furthermore, conducting this research has the potential to lead to improvements in various areas. However, because implementing this program requires time, human resources, and changes to some established organizational procedures and processes, this research can demonstrate the justifiability of these aspects before actual implementation. Moreover, should the results prove compelling, they could also help persuade managers who were initially hesitant about its execution. By completing this research and validating the results, the organization can prioritize its efforts on the primary and influential factors, which will enhance the efficiency of future actions and initiatives. Conversely, neglecting this research would lead to missed opportunities for the organization and hinder the progress in the processes of change and improvement within the organization. This research will promote more effective process reengineering within the company.

2 | Literature Review

Reengineering aims to identify the best way to carry out a specific set of activities by analyzing organizational processes. Its initial application dates back to the 1980s, and since then, various efforts have been made to enhance processes and establish more efficient workflows. The primary outcomes of process reengineering include reductions in human resources, shorter production and service cycle times, and increased organizational flexibility. The main credibility of enterprise resource planning systems stems from their commitment to the philosophy of reengineering in the redesign of organizational processes and information flows. These systems transcend being just integrated information systems; they propel organizations towards reevaluating and revising their processes and structures. Through the transfer of best practices in operational and infrastructural processes, these systems have guided organizations toward enhancing process efficiency and organizational flexibility.

Enterprise resource planning systems reconfigure processes to enhance the organization's capacity to respond to evolving customer demands and establish operational consistency across all business processes. This, in turn, boosts the organization's efficiency. Process reengineering stands out as a prominent approach, with technological and human requirements being among its most essential elements. Technological requirements ensure that companies stay updated with technological advancements, allowing them to remain competitive by adopting the latest work and production methods. Additionally, these systems offer companies opportunities for large-scale production, leading to cost reduction. On the other hand, human requirements encompass essential requirements that provide organizations with the expertise and capabilities needed for efficient and effective operations. Having a well-trained and highly skilled workforce enhances companies' performance and productivity.

While many researchers have shown interest in the study of process reengineering, only a limited number have explored the requirements of this approach, particularly within industrial companies, and its impact on their development [8].

2.1 | The Theoretical Framework of the Requirements for the Process Reengineering Approach

Recent research reveals that shifts in the economic environment have sparked a growing interest in business process reengineering among companies worldwide. According to one study, about 87% of the surveyed companies have either been actively involved in business process reengineering projects or intend to undertake such projects in the future [11].

Research provides evidence that organizations that have carried out process reengineering projects have reported substantial benefits from their experience with business process reengineering in various areas such as customer satisfaction, efficiency, and profitability [12], [13]. In general, many experts advocate for business process reengineering as an essential strategy to attain higher levels of performance and effectiveness [14]–[17].

In studies [18]–[20] have mentioned that technological requirements are one of the elements of the process reengineering approach. Additionally, Qawie [21] and Haines and Petit [22] concluded that human resources are also one of the most significant requirements for the success of this approach. Ibrahim and FarajAllah [23] and Motwani et al. [24] have also found that the primary needs for implementing the reengineering approach in business processes fall into two main categories: Technological requirements and human requirements [8].

2.2 | The Technological Requirements for Process Reengineering

Information technology is a powerful asset for implementing the business process reengineering approach. It significantly eases tasks, facilitates process redesign, enables changes in work methodologies, and delivers substantial improvements [25]. Bujoreanu [26] asserts that by simplifying administrative work, information technology plays a pivotal role in achieving management development and organizational growth. Advances in computer systems, software, data storage, and processing are tailored to meet the workplace's and individuals' needs [8].

Ramezani and Daliri [27] research findings highlight organizations' difficulties when implementing non-mechanized processes. The most significant challenges include the potential for human errors, slow and costly process execution, delays in implementing process improvements, the inability to extract real-time time and cost data, challenges in monitoring individual performance, and the failure to generate instant reports.

Additionally, research conducted by Dumas et al. [28] reveals that, in general, new technology can offer a wide range of positive effects. For instance, software can significantly reduce the time required for electronic routing. A document management system provides all participants access to file information, potentially enhancing service quality. New technology can also transform traditional business approaches by introducing novel opportunities to participants.

2.3 | Human Requirements in Process Reengineering

Success and qualitative transformation within an organization hinge on its human resources knowledge, creativity, and readiness to adapt to change [29]. New skills can be cultivated in individuals through training, embracing challenges in new roles, delegating responsibilities to human resources for task execution, fostering creativity, instilling a sense of accomplishment, and ultimately increasing productivity [8]. Looking at change from a positive perspective can present numerous opportunities for growth and development. However, it can also result in substantial costs related to establishing new relationships, acquiring new skills, and adapting to different work patterns. In cases of multiple and ongoing changes, these costs accumulate. Therefore, it’s reasonable to assert that organizational change yields a spectrum of advantages and disadvantages, impacting both employees and organizations [30].

Process reengineering involves transforming roles, norms, standards, procedures, and workflow within an organization, affecting various aspects such as work processes, financial and governance structures, organizational culture, designs, and traditional organizational behaviors. Resistance to process reengineering projects primarily arises from the fear of job cuts or changes in power dynamics. Consequently, changes in organizational structures and processes and personnel changes can be distressing for employees, primarily until the new order becomes completely normalized [31].

2.4|Improving Efficiency through Reengineering

Noory et al. [32] conducted a study on operations reengineering and its impact on enhancing the efficiency of small-scale projects through improved reliability. They carried out a case study at the Al-Nour factory, which is involved in the production of various types of sand and gravel. The current research focuses on operations reengineering to measure its influence on enhancing the efficiency of small projects by improving work reliability in these projects. The study utilized a case study approach and quantitative analysis of failures, sales, and costs based on data obtained from the Al-Nour factory research sample.

Reengineering the screening and crushing processes within the sand factory has demonstrated its impact on improving work reliability and reducing breakdowns. This reengineering effort increased production, including higher sales and profits, and decreased production of damaged materials. Moreover, it contributed to a reduction in input costs, particularly transportation expenses. Based on the achieved results, the laboratory played a pivotal role in adopting the redesigned work approach.

Bhaskar et al. [8] conducted a study on business process reengineering. The researchers used a descriptive-analytical method. The study employed a stratified random sampling method to select a sample of 95 companies, which accounted for 40% of the population. The collected and validated questionnaires, which accounted for 85% (89.5%) of the total, were obtained from an exploratory sample of 30 companies within the study's sample. Statistical analysis was conducted to confirm the Validity and reliability of the questionnaires. The results of this study include high access to process engineering requirements, with an efficiency rate of 76.8%; human requirements at 75.8%; a level of 76.4% in technology; and an indication of the role of reengineering processes in improving efficiency.

Khadem et al. [4] conducted a study to examine the impact of process reengineering on enhancing organizational productivity. The present research aims to investigate the influence of process reengineering on enhancing organizational productivity in the Fars region's Oil and Telecommunications Pipelines Company. The present study is descriptive and correlational in nature. The required data was collected through a combined questionnaire completed by a sample of 94 participants. Statistical methods such as descriptive statistics, correlation analysis, and regression analysis were employed to test the hypotheses. The data was analyzed using SPSS 18 software, and the results of the statistical tests revealed a significant relationship between process reengineering variables and organizational productivity. Among the factors of process reengineering in this company, information technology and organizational structure, respectively, have the most significant impact on improving organizational productivity.

Table 1. Literature review.

Author	Year	Subject	Result
Mekala et al. [33]	2021	The implementation of industrial engineering concepts in the textile industry to enhance efficiency and reduce costs	This article explores existing production unit methods and how they enhance efficiency by utilizing recent techniques. These techniques encompass capacity studies, job analysis, performance monitoring, operator performance, and established procedures for improving productivity across various industries.

Table 1. Continued.

Author	Year	Subject	Result
Calderón-Andrade et al. [6]	2020	Productivity improvement through reengineering and simulation: A case study in a footwear-industry	The results showed that the new design increased the production rate using the same resources by approximately 29%. Additionally, utilizing the OptQuest tool in Arena software indicated that, with the new process, production levels can be increased by up to 41% compared to the current process.
Lopez-Arredondo et al. [9]	2020	Reengineering of the software development process in a technology services company	This simulation scheme allows business owners to visualize the potential changes and their positive impact on the company before initiating operational changes in the organization.
Noory et al. [32]	2019	Operations re-engineering and its impact on increasing the productivity of small projects by improving reliability: A case study in Al-Nour Factory for the production of gravel and sand of kinds	Increasing production (Sales, profits, reducing damaged production) and reducing resources (Transportation costs) led to increased factory efficiency, prompting the laboratory to adopt a work redesign based on the results obtained.
Bhaskar et al. [8]	2014	Business process reengineering: A recent review	The conclusion was drawn based on previous research studies, indicating that using Business Process Reengineering (BPR) in the Indian manufacturing sector is not challenging despite differing conditions and adaptation reasons. However, there is still a need for a unique and globally acceptable BPR model and a common implementable approach.
Khadem et al. [4]	2014	Investigating the impact of reengineering on organizational productivity	The results of the statistical sample indicate a significant relationship between the variables of process reengineering and organizational efficiency. Information technology and organizational structure have the most impact on improving organizational efficiency among the factors of process reengineering in this company.

2.5 | Conceptual Model

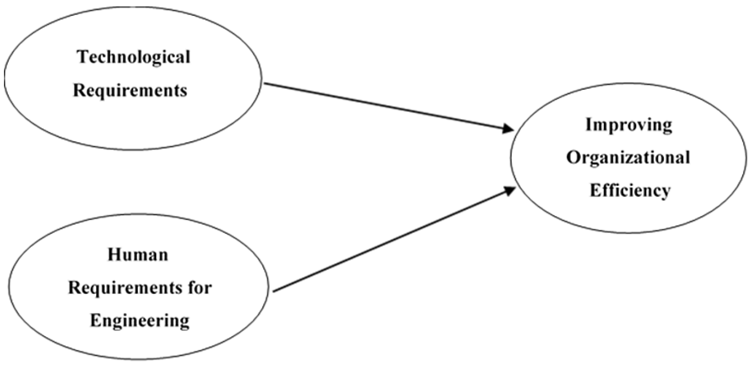

Fig. 1. The conceptual model by Calderón-Andrade et al. [6].

3 | Methodology

This research falls under the applied research category because it holds practical value for future decision-making and planning. It adopts a cross-sectional approach in terms of timing and employs a descriptive survey methodology. Based on its objectives, the study encompasses a statistical population of 400 employees from the Northern Drilling Company, all of whom are well-informed about the research topic. Experts in the relevant field are judged to assess content validity. In this research, both qualitative and quantitative methods, including the Content Validity Ratio (CVR), were utilized:

I. In the qualitative assessment of content validity, experts were requested to provide feedback on the quality of the questionnaire's content after reviewing it qualitatively. Following this evaluation, modifications to the questions were made based on the input of one of the experts.

II. The CVR has been employed to assess content validity using a quantitative approach. To determine CVR, experts were asked to assess each item on a 5-point scale ranging from "strongly disagree" to "disagree" to "neutral" to "agree" to "strongly agree." Subsequently, the responses were calculated according to the CVR formula. The Lawshe method was utilized for content validity assessment.

Table 2. Content validity coefficients of questionnaire items.

Questions	Ne	CVR
1	16	0.6
2	17	0.7
3	18	0.8
4	19	0.9
5	15	0.5
6	16	0.6
7	16	0.6
8	17	0.7
9	18	0.8
10	19	0.9
11	16	0.6
12	16	0.6
13	17	0.7
14	18	0.8
15	19	0.9
16	16	0.6

Table 3. Content validity coefficients.

The Minimum Acceptable CVR Based on the Number of Rating Specialists					
Number of Specialists	CVR Value	Number of Specialists	CVR Value	Number of Specialists	CVR Value
5	0.99	11	0.59	25	0.37
6	0.99	12	0.56	30	0.33
7	0.99	13	0.54	35	0.31
8	0.75	14	0.51	40	0.29
9	0.78	15	0.49		
10	0.62	20	0.42		

In the current research, the retest or test-retest method refers to administering a test more than once to the same group of participants under the same conditions. The measurement tool is first administered to a group of participants to calculate the reliability coefficient using this method. Then, within a short time frame, the test is administered to the same group under the same conditions. The scores obtained from the two tests are then collected, and the correlation coefficient is calculated. This coefficient reflects the instrument's reliability. The test-retest method is used to assess the stability of the components of a measurement instrument. However, it should be noted that the results obtained from the retest can be influenced by practice and the participants' memory, potentially leading to changes in the measurement instrument's reliability [34].

Cronbach's alpha coefficient ranges from 0 to 1, and the closer this coefficient is to the number 1, the more it indicates the homogeneity of the items on a scale. As a general rule, the threshold or the required alpha value for an index is considered 0.7. If Cronbach's alpha value is greater than or equal to 0.7, the measurement tool is considered highly reliable, and one can have confidence in its results. A pilot test was conducted with 30 questionnaires distributed among the participants, and Cronbach's alpha was calculated to assess this. As observed, all Cronbach’s alpha values obtained are higher than 0.7. Therefore, the questionnaire in this research exhibits high reliability.

$$\propto = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} S_i^2}{S_t^2}\right).$$

Table 4. Cronbach alpha value of the questionnaire.

Questionnaire	Cronbach’s Alpha Value
Technological requirements for reengineering processes	0.799
Human requirements for reengineering processes	0.765
Efficiency	0.781
Total Alpha	0.799

3.1 | Data Analysis Method

In this study, both descriptive and inferential statistics are used for data analysis. Initially, descriptive methods are employed to understand the population characteristics of the study variables after extracting questionnaire data. Then, inferential statistics will be used to address the research questions. Before applying parametric tests, the assumption of data normality needs to be validated. According to the Kolmogorov-Smirnov test, parametric tests will be conducted if the null hypothesis indicating data normality is confirmed. Structural Equation Modeling (SEM) will also be used for calculations. SPSS and PLS software will be utilized for data analysis due to the potential non-normality of the data.

3.2 | Data Analysis Methodology

One of the most fundamental aspects of scientific research is statistical data analysis, which encompasses the entire process from data collection to hypothesis testing. Data analysis, utilizing the science of statistics, involves examining numerical data to address research hypotheses based on the evidence gathered. The collected data and information are raw resources that must be appropriately analyzed and interpreted using suitable methods to convey their informational value. In this type of research, statistical analyses are the most appropriate means for analyzing the obtained data and information. Statistical analyses reveal the relationships between various variables and answer the research questions.

There are multiple data analysis methods in research, which can be categorized under the titles of descriptive analysis methods and inferential analysis methods. Descriptive analysis methods solely describe the existing conditions and are allocated to a sample group, while inferential analysis methods generalize the results obtained from the analysis to a larger population. This chapter covers the analysis of statistical data and hypothesis testing. In the descriptive section, information related to the individual characteristics of the sample group and details of the variables associated with the research were first presented, and then the research variables were analyzed. Finally, the research hypotheses were examined. Data analysis was performed in descriptive and inferential statistics sections using "PLS" software packages.

In this research, considering the sub-questions posed in the first chapter regarding research questions 1 and 2, the impacts of technological and human requirements in business process reengineering were systematically reviewed in the literature review. The effects were integrated into the conceptual model using software. Furthermore, the effectiveness of the independent variables, "technological requirements" and "human requirements," on process reengineering and organizational efficiency improvement was examined.

4 | Descriptive Statistics

4.1 | Description of the Demographic Variables of the Respondents

These features are divided into the following categories:

I. Sex.

II. Education level.

III. Age of individuals.

Table 5. Individuals' sex.

Sex	Frequency	Percentage Frequency
Male	34	17
Female	162	83
Total	196	100%

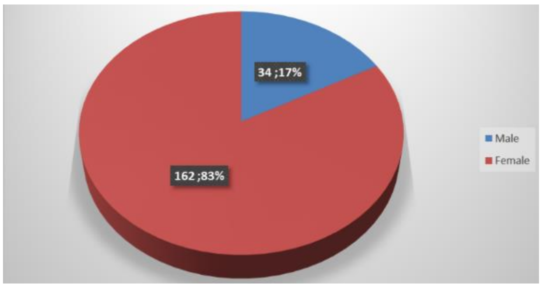

Fig. 2. Individuals' sex.

Table 6. Individuals' age.

Age	Frequency	Percentage Frequency
<25 years	54	27
26-30 years	64	33
31-35 years	39	20
36-40 years	21	11
41-45 years	11	6
45-50 years	7	3
Total	196	100%

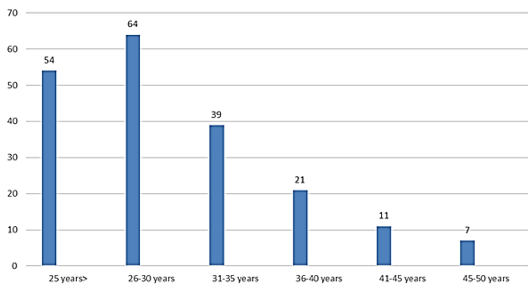

Fig. 3. Chart of individuals' age.

Table 7. Educational levels.

Level	Frequency	Percentage Frequency
PhD	4	4
MA	82	42
BA	110	56
Total	196	100%

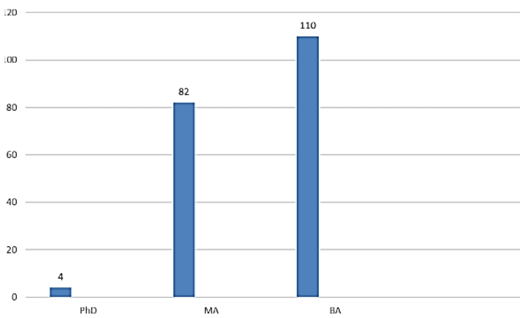

Fig. 4. Chart of educational levels.

4.2 | Inferential Statistics

Kolmogorov-Smirnov test for assessing the normality of research hypotheses

H0 = The data distribution is normal.

H1 = The data distribution is not normal.

Table 8. K-S test.

Variable	Significance Level	Alpha	Test Result
Technological requirements for reengineering processes	0.001	0.05	Not normal
Human requirements for reengineering processes	0.005	0.05	Not normal
Efficiency improvement	0.007	0.05	Not normal

If, as observed in the above table, the significance level of the variables is less than 0.05, it can be confidently claimed that with 95% confidence, hypothesis H0 is rejected. In other words, hypothesis H0, which assumes the normality of the data, is dismissed for all variables.

Reliability assessment

Table 9. Cronbach's alpha for research variables.

Variable	Cronbach's Alpha	Variable Status
Technological requirements for process reengineering	0.931	Acceptable
Human requirements for process reengineering	0.903	Acceptable
Improvement of efficiency	0.900	Acceptable

Given that all values are above 0.7, Cronbach's alpha for the research variables is confirmed.

4.3 | Validity Assessment

Convergent validity

Table 10. Convergent validity table.

Structure	Technological Requirements for Process Reengineering	Human Requirements for Process Reengineering	Efficiency Improvement
AVE	0.881	0.900	0.839

Based on the AVE table, all constructs are greater than 0.5. Therefore, the convergent validity of the model and the appropriateness of the fit of measurement models are confirmed.

4.4 | Indicators of Structural Model Fitness

Table 11. Fit of the structural model.

Structure	Efficiency Improvement
R^2	0.964
Q^2	0.866

When the R^2 values for the constructs within a model are higher (Typically above 0.3), it indicates a better fit of the model. Based on the goodness-of-fit table, a strong structural model fit is confirmed. Similarly, when the Q^2 values for the constructs within a model are higher (Usually above 0.3), it indicates better predictive power of the model. Considering the table and the obtained values for the model's constructs, the strong fit of the research structural model is confirmed once again.

Table 12. SRMR and NFI indices.

Estimated Model	Structural Model	
0.071	0.070	SRMR
0.784	0.807	NFI

In the SRMR table, values below 0.08 indicate model suitability. On the other hand, NFI values closer to 1 indicate model suitability.

4.5 | Structural Equations and Path Analysis

This research examines the effects of technological and human needs on process reengineering through an integrated conceptual model using software, path analysis, and testing. Furthermore, it analyzes the impact of independent variables, "technological and human requirements," on improving organizational productivity.

Path analysis aims to identify causality (Effect) between variables in the research's conceptual model. It's important to note that the confirmation or rejection of hypotheses (Relationships) is determined statistically. In other words, if the significance value is greater than 1/96 or less than 1/96, the hypothesis is confirmed. For hypotheses without mediator variables, the path coefficients and t-values in *Figs. 5* and *6* are used, and these values are directly entered into *Table 13* (Path analysis). However, for paths that involve mediator variables (Provided that the path from the independent variable to the mediator and the path from the mediator to the dependent variable are individually significant, meaning the absolute value of t is greater than 1.96), the inclusion of variance (VIF) is used instead of the beta coefficient. Sobel's test is used to determine the t-value.

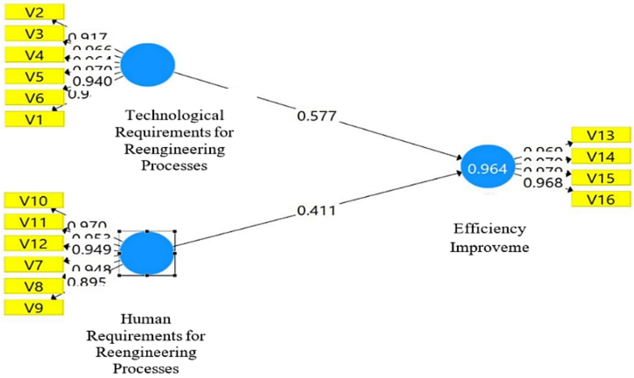

Fig. 5. Standardized coefficients.

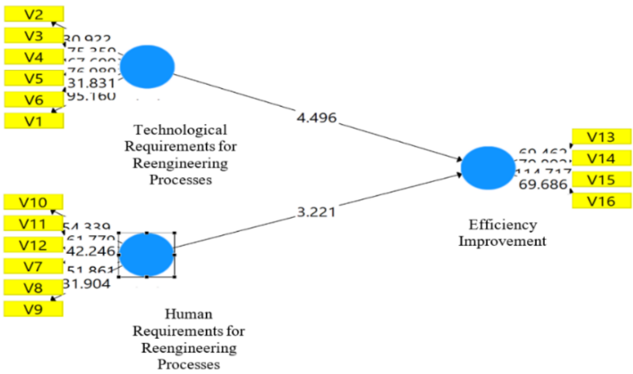

Fig. 6. Significance coefficients.

The coefficients of the path and t-values (Sobel for hypotheses with a mediator variable) represent the strength and significance of the relationship, respectively. All research hypotheses have been confirmed, and the results of the research hypotheses are shown in the table below:

Table 13. Path analysis.

Hypothesis	Path of Hypothesis Testing	β Coefficient	t	Hypothesis Result
1	Technological requirements affect the improvement of efficiency in process reengineering	0.577	4.496	Confirmation
2	Human requirements affect the improvement of efficiency in process reengineering	0.411	3.221	Confirmation

About the first hypothesis, the beta coefficient was equal to 0.577, and the t-value was equal to 4.496, which indicates that the hypothesis in question has been confirmed.

About the second hypothesis, the beta coefficient was equal to 0.411, and the t-value was equal to 3.221, which indicates that the second hypothesis has also been confirmed.

5 | Conclusion

5.1 | Comparison with Previous Research

Mekala et al. [33] focused on implementing industrial engineering concepts in the clothing industry to enhance productivity and reduce costs. In the clothing sector, to improve efficiency and quality, an individual should concentrate on machinery, methods, materials, and human factors. Therefore, industrial engineering concepts encompass and manage all of the above factors, contributing to improving efficiency and product quality that meets consumer needs and aligning with the research findings.

Calderón-Andrade et al. [6] conducted a study on improving efficiency through process reengineering and simulation in the footwear industry. The results demonstrated that using the same resources, the new design increases the production rate by nearly 29%. Furthermore, using the OptQuest tool in the Arena software, it was determined that with new processes, production can be increased by up to 41% compared to current processes, aligning with the findings of this research.

5.2 | Practical Recommendations and Suggestions

Technology-based recommendations

This company plans to enhance its knowledge in line with technological advancements and align it with its goals. In this regard, a technology roadmap is necessary.

The company should implement and execute its internal processes within the information technology framework.

The company should implement and execute operational controls within the information technology framework.

The company should utilize specialized software to redesign its processes.

The company should conduct training needs assessment for its employees related to information technology and execute the training process.

Recommendations based on human requirements

This company should provide the necessary operational training for employees to work on most of the company's equipment and machinery.

The company should increase the alignment of its human resources with information technology through training and knowledge transfer.

The company should train and educate its experts in process engineering or utilize process engineering specialists.

The company should take effective leadership from senior managers to create the necessary culture, promote modern thinking, and develop a positive vision.

5.3 | Research Limitations

In the execution of this research, the researcher encountered limitations, some of which are inevitable due to the nature of such scientific research conducted in the human sciences field:

I. Since this research was conducted in a small segment of a larger population, generalizing its results to other similar sections or institutions is not readily achievable and should be done cautiously.

II. In any study conducted using questionnaires, there is a possibility of incorrect or differing interpretations of the questionnaire's questions, potentially distorting the research results.

5.4 | Suggestions for Future Research

Since the present research was conducted within the North Drilling Company, a similar study in a government or private organization could yield different results. Comparing the results obtained from government organizations and private companies allows us to draw conclusions about the existing differences.

Funding

This research received no external funding.

Data Availability Statement

Data will be made available on request.

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