



QoS Priorities in ERP Implementation – A Study of Manufacturing Industry of Nepal

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Abstract

ERP, or Enterprise Resource Planning systems help business management, which consists of a well-designed interface that incorporates different programs to integrate and manage all company functions at intervals of a company, these sets incorporate applications for human resources, monetary and accounting, sales and distribution, project management, materials management, SCM, or Supply Chain Management and quality management. Currently, organizations are running to improve their ability to survive in the global market competitions of the 21st century. While the organizations try to advance in their level of agility, changing and modifying the process of decision-making to make it more efficient and effective to satisfy the successive variations of the market. Different views are gathered regarding ERP implementation of ERP in manufacturing. Even we have taken certain essential components of ERP for a better understanding of ERP. Ease of use, usefulness, quality, and trust on ERP services have been taken an independent variable that affects user's decision to adopt ERP. The role of ERP technology in manufacturing facilities are broken into more categories for detail concept. Quantitative data analysis methods were usually used for questionnaire data analysis which was utilized to analyze statistical data and after that collection of interview data was done. A researcher has applied different statistical tools like Chi-Square Tests, Anova, etc. to analyze the collected data. A researcher essential portion is to analyze and interpret data that relates to modifying data which explains the solution to the research question with some additional future recommendation for more quality research.



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Introduction

In this rapid changing world, economy has amplified the demand for corporations for supplying the merchandise a lot of swiftly and with better quality whereas decreasing prices to get high consumer satisfaction. For transitory relief regarding hike in costs can only be fixed by downsizing, outsourcing, etc. To run in the race of competition, many of the organizations are making their advance level work process with proper decision from top management committee. Different sized organizations whether it be top grade or mid-size organization they are involving in adopting latest ERP software having broad-minded investments.

ERP is such a system which helps business process in terms of well-designed software with proper integrate within different departments and branches which incorporates HR, monetary, financial, sale & supply, project & material management, SCM, QM (Shehab, Sharp, Supramaniam, & Spedding, 2004). Manufacturing defines a process of remodeling fresh materials to polished merchandise available. It covers the assembling process with assimilation of specified parts for better product (Blanchard, 2012).

Firms should use latest information technology for continuous support with enhancement in business process leads to compete in rapid changing world. For managing organizations in terms of information, ERP has become the latest system of PC tools with excellent features. It combines the processes, information among different units also with different functionalities, branches, companies and also with any geographic locations. Quick response, on-time delivery, inventory management, interaction between customer and suppliers are some of the advantages of ERP. (Gupta & Kohli, 2006) explained their view saying "ERP adopts business processes in the decision-making process and integrates all the useful components of a company, sales, marketing, production, operations, logistics, purchases, finance, new developments and human resources." It helps good electronic commerce facility which ensures proper business growth with great level of client service and good productivity applying less inventory & price (Su & Yang, 2010).

ERP of manufacturing companies has encountered a series of challenges that affect the pursuit of

business objectives including operational strategic positioning and effectiveness. National Association of Manufacturers (NAM, 2011) patent the need for available skilled labor are vacant as nearly 5% of all manufacturing jobs and 82% of all manufacturers have a shortage of skilled production workers. Untimely and fragmented communication among higher management, employees, and different stakeholders contributes to fade productivity and method inefficiencies yet. Sufficient training and education (TED) will maximize the performance of workers by reducing the time needed to find out and operate new systems, however, because of restricted budgets and resource concerns, corporations are usually forced to solely part fulfill coaching desires. The implementation of ERP makes significant changes to the management of business processes. ERP implementation makes modification in business process board. Top management commitment in ERP implementation and equal effort is required for effective system.

For successive variations in the market many organizations are performing highly advanced agility work to enhance capability by changing and modifying verdict making process. During last few decades, a large number of corporate firms and organizations used ERP system in order to expand further as technology takes a hike (Karim, 2011). ERP's systems area unit designed with the hunt to boost productivity by enhancing associate organization's ability whereas generating correct and timely info across the enterprise, and everyone its offer chain. The productive ERP systems implementation will result to lower inventories, cut back development cycle, improve client service, increase potency (productivity), improve gain and improve effectiveness through higher client services (Beheshti & Beheshti, 2010).

Researchers have developed different success model (such as ERP) information systems. After verifying different models, DeLone and McLean are the best choice model by many researchers. A study was conducted by DeLone and McLean on IS success representing qualitative behavior of it, user interaction to information systems (user satisfaction), consumption of the output (use), impact in organization & impact on individual

(Bernroider, 2008). As a result, it was demonstrated inconsistent empirical results with one another.

In a competitive era, there is required of new product having some modification than older one within less time frame which are making many corporations under pressure to shift demand. Similarly, launch of new products is increasing complexity to industries. Due to different functionality and working module of an organization it has become difficult to coordinate with other organization (Gattiker, 2007). There are numerous ways to respond to manufacturing companies. First response, to increase inventory buffer and capacity (Thompson, 1967) (Pagell, Newman, Hanna, & Krause, 2000). The second response, to make easy with production and other processes (Sakakibara, Flynn, Schroeder, & Morris, 1997). (Hauptman & Hirji, 1996) suggests the third one which relates to increasing integration. In Manufacturing-Marketing (MM) interface, ERP delivers large payoffs which answer how and where issues.

Background of the Study

In the 1990s, the term ERP was used for the first time, capable of dealing with other commercial functions such as finance and accounting, engineering. Management of human resources and projects, etc. In 1940's its history began by using calculating machines for business. In 1960's applications were introduced that can easily control and handle inventory management. IT partner IBM & J.I. Case (tractor industrialist & other manufacture machines) performed combined effort which further created software named as Materials Requirements Planning i.e. MRP (Joshi, 2017).

Varieties of elements are incorporated in ERP software package i.e. economics and production, human resources, sales, integration of data depending upon business processes also it can be customized on-demand or specific needs of an organization. ERP system allows sharing databases in different business units with different orientation depending upon divisions like accounting and sales uses same information for their needs (Esteves & Pastor, 2001). As ERP software offers some ways of synchronizing report and automation. To understand the performance of the business environment, dashboard is the primitive feature

of ERP which helps to quick overview of current business situation. To acquire high market place, an enterprise needs to perform work actions in Data Quality. Data Quality (DQ) uses dimensions for better quality are completeness, instance accuracy, accessibility and timeliness (Rothlin, 2016). Data Quality problem is one of the difficult portions to be handled by organization which generally occurs due to Data errors i.e. Conceptual (design) and Operational problem.

Problem Statement

Most of the manufacturers put hard effort to follow complex processes for increasing overall productivity and profitability which makes idea of great profit with time but streamlining long-established processes can be time-consuming endeavor and daunting. From the beginning, precise quality programs and new technologies are placed by manufacturers properly so that it makes easier for them to improve processes & get sudden benefits.

Lack of ERP system quality has a high risk to get employee satisfaction in the business world. Before releasing the ERP system many companies usually conduct different continuous tests. Normally ERP companies have spent lots of time testing and debugging.

It's a huge disadvantage for companies to test the system using project budgets (Rothlin, 2016). Critical ERP implementation, testing, and volume occupy nearly 50% of the total ERP budget due to lack of Quality Assurance and Quality Control methods.

Research Questions

1. How ERP is helping the manufacturing industry to manage and support the value creation of product?
2. What is the efficiency of the ERP system in terms of quality?
3. How is the service provided by ERP?

Purpose of the Research

This research relates to a different aspect of Quality of Services in terms of ERP implementation especially in Manufacturing Industry of Nepal. It also helps to find out the acceptance of good productivity as claim by ERP support team. This research aims

to find out the gaps and challenges while using ERP with its pattern in manufacturing industry in Nepal.

Objectives of the Research

Successful ERP system implementation maintains standardization of product which achieves high quality. Continuous Quality Controlling and Quality Assurance methods help to maintain standard quality (Arachchi, Chong, & Madhushani, 2015). ERP systems face failures, risks because of no proper testing, tangibles, conformance, assurance, responsiveness, courtesy, serviceability, reliability, etc. This survey is going to identify on the following basis:

1. To understand the current ERP usage in the manufacturing industry of Nepal.
2. To find the challenges of ERP implementation in the manufacturing industry.

Scope and Limitation of the Research

The scope of this research is to find the gap of using ERP system between different manufacturing industries of Nepal. The main motive for this research is to look after different ERP system usage feedback by different manufacturing industries i.e. Cigarette factory, Noodles & Alcoholic Factory, Herbal Factory, etc.

Implication of the Research

This research aims to find the difficulties performed before and after ERP (Enterprise Resource Planning) system implementation. Also, to evaluate the different quality of service priorities after ERP implementation. The research tends to result in a beneficial choice of ERP system, especially to the manufacturing industry.

Research Design and Methodology

Research Methodology

It is viewed as one of the leading research tools. It indulges research approach, research strategy, philosophies of research methodology, time limit and choice. The research onion of (Saunders, Lewis, & Thornhill, 2007) is to be formulated for giving comprehension of the research methodology which is going to be used in dissertation. Ontological, epistemological and axiological research are the methodological choices which is to be kept in mind while doing research. In this chapter, we will talk about the research philosophy, approach, strategy, data collection and analysis techniques which were utilized in this research.

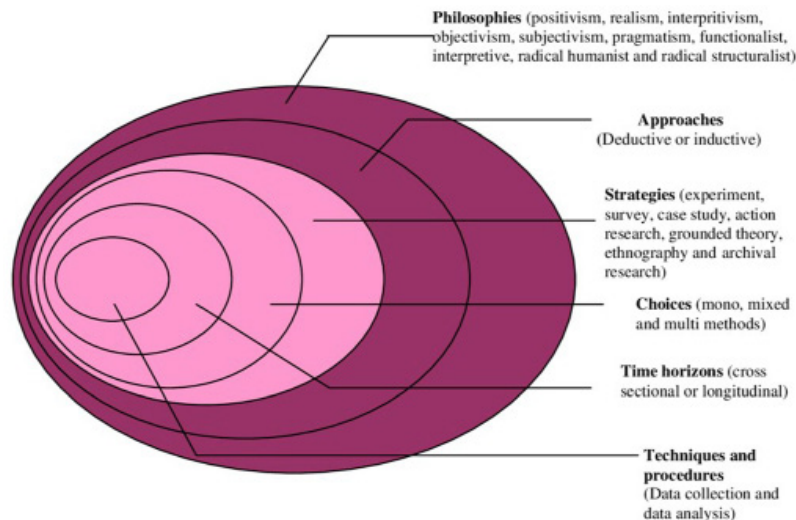


Fig.1 : The research onion (Saunders, Lewis, & Thornhill, 2007)

Research Plan and Design

To carry out this investigation, a descriptive and explanatory investigation is carried out. This research

is mainly evaluated based on a primary survey. An expert suggestion on the need for research was considered exceptional for the questionnaire. The

study is based on several statistical tests such as correlation, regression, average, standard deviation, among others. The software called Statistical Package for Social Sciences (SPSS) and Microsoft Excel was used to analyze and interpret quantitative data. This software is commonly used by researchers easily available in a corporate environment. Scale reliability is analyzed using Cronbach's alpha since Cronbach's alpha test is the best fit for multi-scale articles and is also the most popular test for reliability of consistency between articles.

Research Approach

Different procedures took to conduct the research which is the primary concern of the research approach. The existing approaches i.e. deductive and inductive which will be helpful while conducting research. The first approach is inductive by collecting data based on the method of findings and observations which is relevant to the topic.

Research Strategy

(Saunders, Lewis, & Thornhill, 2007) says that the research strategy incorporates the survey, case study, experiment, grounded theory, action research, ethnography and lastly archival research. Each method data is combined and inspected from one approach then onto next. Each and every research strategy can be connected to each other where all can be easily explainable. Combination of both qualitative and quantitative approaches with new statistical tools are frequently increasing strategic management. Qualitative data enrich and colors the analysis and interpretation of such phenomena whereas quantitative data attracts the underlying objective facts that give evidence of the phenomena (VARGAS-HERNÁNDEZ, LEÓN, & VALDÉZ, 2011).

Data Collection

Sampling Methods and Sample Design

A superiority is given to primary data collection method in this research. This type of data is firstly used for testing assumption and after that helping out to support researcher privilege. For the support of primary data, researcher can use secondary data as per required.

A survey method was approached for the study of vivid research. To get quantitative data, the

result obtained from collected questionnaire were administered. For the mode of administration, both paper based & e-survey methods were formulated. In paper-based survey, researcher personally visits and provides the respondents a hardcopy of the questionnaire. Using internet as a mediator a survey was conducted where the questionnaire links were sent to respondents.

The objectives of the research guided the overall survey and study as objectives are mentioned in the beginning of the chapter. The respondents were directly related to the ones who use ERP system. The age band of 20 to 50 years above. Therefore, the level of understanding of the respondents was considered during the sample design. The researcher distributed one hundred and fifteen (150) online questionnaires to the interviewees, of which one hundred and fifteen (115) responded, while the same survey was distributed manually to seventy (70) people and only fifty-two (52) responded. In total, one hundred and sixty-seven (167) people responded to the survey of two hundred and twenty (220) sent to answer.

Data Collection Methods

With the help from literature, web engines, papers, and views through questionnaires as filled up by officials & staffs of manufacturing industries & public for adopting the plan primarily.

Primary & Secondary data are the 2 different sources for the collection of data.

Data Capturing and Data Editing

Primary Data

Using subsequent techniques primary data will be collected:

Questionnaire

Well-structured questionnaire for executive, manager, and employee of manufacturing industry will be prepared. The questionnaire includes the questions regarding quality of services provided after ERP implementation which incorporates service, feasibility, adaptability, changeability and so on in manufacturing industries of Nepal.

Interview

The interview will be conducted with the executives, managers, and employees of manufacturing industry of Nepal to understand the views in details.

Observation

For better understanding, a running system will be observed on the site visits of the manufacturing industry of Nepal. The participation of the officers, employee, and public in actual implementation of the system, will be observed. The concrete pros and cons of the system will be deeply observed.

Secondary Data

From the following sources it has been taken help for collection of secondary data:

Reference Books

The researcher will study various books and references related to ERP implementation in the manufacturing industry, Enterprise Resource Planning Systems and User Performance, Quality Assurance and Quality Control in ERP Systems Implementations, An Information Processing Theory View of ERP, Critical success factors in the implementation of ERP system, etc.

Journals & Research Papers

Various journals and research papers will be referred.

Internet Source

Internet sources will be viewed for better understanding about benefits, framework, working principle, procedure, features, Business operations, etc. of ERP especially in the manufacturing industry all over the world.

Design of the Interview and Questionnaire Question

To the respondents, a well-designed questionnaire was prepared and shared. As mentioned instructions, respondents filled up the questions. After the completion of questionnaire, it was collected from them. Very less time will be taken to fill up the questionnaire as it contains close-ended questions. For the easiness to response the answer without any biasness the questions were mostly measured using 6 rating i.e. Likert Scale (1 (strongly disagree)

to 6 (strongly agree), with disagree, and agree as interval points) and also with Yes/No options.

Data Collection Limitation

- During the interview, the interviewee would provide an answer based on his/her experience and knowledge which might be biased.
- When using the questionnaire, the participants are restricted to the options given in the questionnaire.
- Also, when using the questionnaire, the answers might not be fair enough if the correspondence is an influence.

Data Collection Assumptions

- The participants are randomly chosen to represent the entire manufacturing industry of Nepal.
- The participants are primarily chosen especially with IT background with related minimal knowledge to the research domain.

Reliability and Validity

Research validation in regard of design and plan are verified with discussion of experts also, before taking startup to investigation portion there was the development and tested the research instrument. With the discussion of my supervisor, questionnaire was formed. In consider with research question, all the items were properly designed. To find out correctness of data both reliability and validity are incorporated. A true measurement which represents characteristics refers to validity. Some samples will be collected to measure exterior validity. To grasp the customer's perception with maximum content validity there were performed comprehensive literature review. Reliability refers to item, scale or instrument correlation with a hypothetical one which measures what it is supposed to be. P-value is compared in terms of 0.01. If p value is less than 0.01, the null hypothesis is rejected else if it is equal to or more than 0.01, the null hypothesis is accepted. Means were also compared to assess the reliability of scales. The value ranges between 1 to 6 and the mean is 3.5. Generally, it is thought that the mean value more than 3.5 is positive response, the mean value 3.5 means adequate and less than 3.5 is

negative response. The values are if above 3.5 it can be concluded that the scales are reliable.

Limitations

There were some limitations during data gathering and analysis process. One of the limitations was that it was too difficult to get full participation, as most of the participants did not fill up the questionnaire. The original time planned for data gathering was one month but due to some unforeseen reasons, the data collection took more than one-month time period.

Research Timeframe

There are only two types of research timeframe i.e. longitudinal or cross-sectional timeframe whereas longitudinal timeframe is useful for those research which takes much longer period but it quite different with cross-sectional timeframe i.e. it is useful for those research that takes a limited timeframe. A longitudinal study is additionally associate empiric analysis technique that gathers knowledge for identical subjects repeatedly over an amount of your time because it will extend over years or even decades (Rouse, n.d.). The cross-sectional study design allows researchers to compare different variables at the same time as looking at gender, age, income, and educational level. It may not provide definite information about cause and effect relationships (Institute for Work & Health, 2019). The timeframe which is allocated for the research to be carried is actually research timeframe. It gives time for gathering data and what must be achieved. Only for gathering data exercises will not be more than 21 days. If there is a delay in data gathering, the result would be matched against total expected result and once the participant limit covers 75% feedback, then it means your data is valid and can be used without waiting for remaining feedback result.

Ethics and Confidentiality

Ethics and confidentiality is a very careful portion which is important to state the reason why a particular data is to be collected. Safety of each data becomes very important whereas confidentiality involves keeping data safely after gathering from a group of people where no other can have access to it. For the purpose of this research, different data were collected from varied manufacturing industry and kept safely as confidentiality. All the collected data were utilized for the purpose of research and

no other purpose. Being trustworthy, no data were shared with any person, group or organization. All of the participants were clearly informed and explained why such information is being collected and for what purpose it is used for.

Data Analysis and Findings of Research

Mode of Analysis

Quantitative data analysis methods were usually used for questionnaire data analysis which was utilized to analyze statistical data and after that collection of interview data was done. A researcher essential portion is to analyze and interpret data that relates to modifying data which explains the solution to the research question. For the data, both the analysis i.e. qualitative and quantitative approaches are going to help for achieving (Akande, April, & Belle, 2013). There are different tools available for analyzing the quantitative data i.e. SPSS, MATLAB, PSCP, Microsoft Excel, Google Analytics, Stata, etc. Semiotics, hermeneutics, narrative and thematic analysis are different modes available for analyzing the qualitative data. To analyze & interpret the data, Statistical Package for social science (SPSS) and Microsoft Excel are the software which was used. Commonly researchers use this software as it is easily available with business setting. These tools were very fruitful and useful throughout the data transcription and habituation.

Overview Analysis of Questionnaire Results

Questionnaire Duration

Each questionnaire duration was of thirty (30) minutes and the participants.

Profile of Participants

For the questionnaire, the contributors were from the manufacturing industry and some expertise from IT industry, which has the knowledge of ERP whereas employees of manufacturing industry were not filtered with specification of departments.

Number of Participants

Online survey and manual distribution survey was carried out which was made accessible and available for the participants. The researcher distributed one hundred fifty (150) online questionnaires to respondents out of which one hundred and fifteen (115) responded whereas the same survey was also distributed manually to seventy (70) individuals

and only fifty-two (52) responded to it. In total one hundred and sixty-seven (167) individual responded to the survey out of two hundred and twenty (220) send for response. The validity for use was set more than 75% for better accuracy. The result is given below.

Analysis

The analysis is necessary to find the gap of ERP implementation in different manufacturing industry

also with the services are as the vendor has promised them. The questionnaire is usually used to get an opinion from different sectors of individual especially in manufacturing industry regarding ERP. It also lets participants share their feeling about ERP as they are always the prospective user. Altogether there are Forty-seven (47) questions out of which only twenty-five (25) questions are structured below.

Table 1: Age Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 25 years	18	10.8	10.8	10.8
	25-40 years	105	62.9	62.9	73.7
	40-50 years	41	24.6	24.6	98.2
	Above 50 years	3	1.8	1.8	100.0
	Total	167	100.0	100.0	

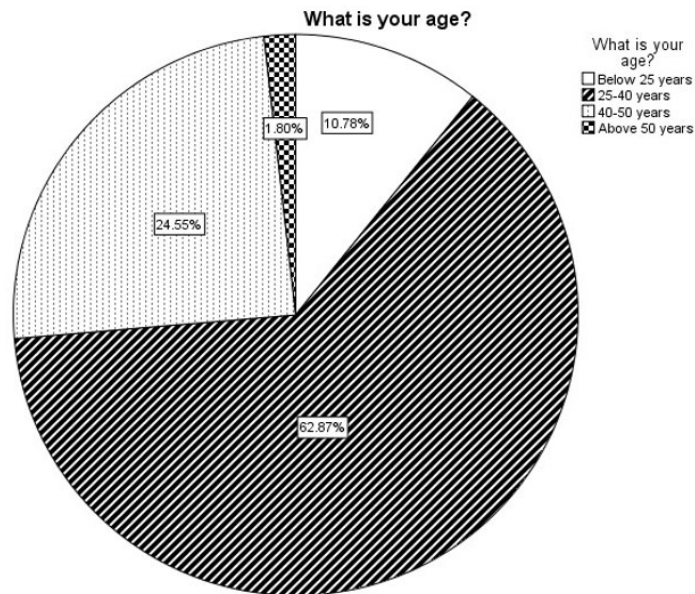


Fig. 2: Pie-chart of Age Frequency

In this research, it has been found that most of the participants i.e. 105 in the survey is of 25-40 years range which is 62.9% all of the total 167 whereas

24.6% respondent of age range 40-50 years, 10.8% of age below 25 years and lastly 1.8% respondent of age above 50 years.

What is your Gender?

The table clearly shows that out of total of 167 respondents, 118 were categorized under Male field with 70.7% of total participants whereas 49

respondents were categorized under Female with 29.3% of total participants. To represent the data more clearly graphical representation of gender-wise distribution is shown above.

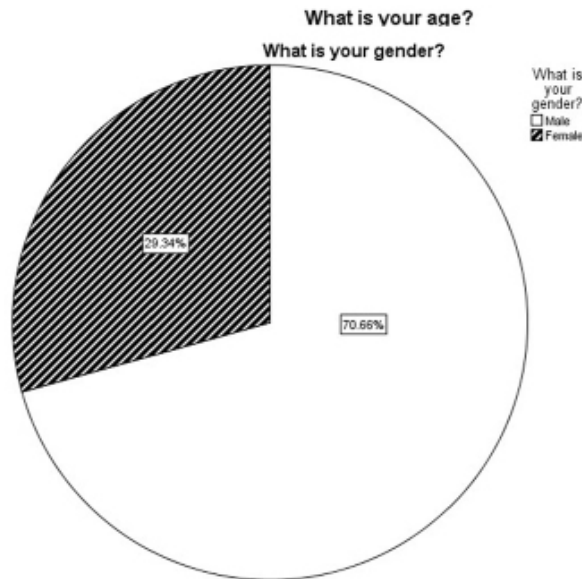


Fig. 3: Pie-chart of Gender Frequency

Table 2: Gender Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	118	70.7	70.7	70.7
	Female	49	29.3	29.3	100.0
	Total	167	100.0	100.0	

What is the Level of your Education?

According to the survey, most of the respondent is of University level which might make the result more

effective. As 140 respondents have University level education whereas the remaining 27 respondents have got the knowledge of College level education.

Table 3: Level of Education Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	College	27	16.2	16.2	16.2
	University	140	83.8	83.8	100.0
	Total	167	100.0	100.0	

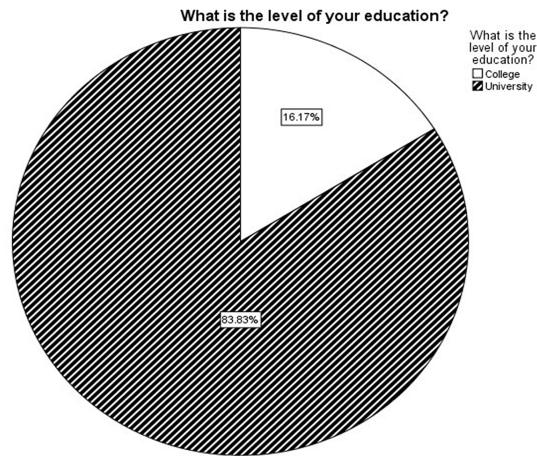


Fig. 4: Pie-chart of Level of Education Frequency

What is your Position?

We have a variety of position and so some are listed accordingly as common. Hereafter in the survey, out of 167 total participants 54 respondents were staff i.e. 32.3%, 50 respondents were executive i.e. 29.9%, 32 in total respondents were manager i.e. 19.2%, 22 respondents were accountant i.e. 13.2% and ending up

with 9 others position employee with 5.4% respondent. In the survey, we have similar frequency of two different positions which has absolutely different roles comparing together i.e. Executive and Manager, this might help to get different perspective from both the sides which might make me easier to get with objectives.

Table 4 :Position Frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Executive	50	29.9	29.9
	Manager	32	19.2	49.1
	Accountant	22	13.2	62.3
	Staff	54	32.3	94.6
	Others	9	5.4	100.0
	Total	167	100.0	100.0

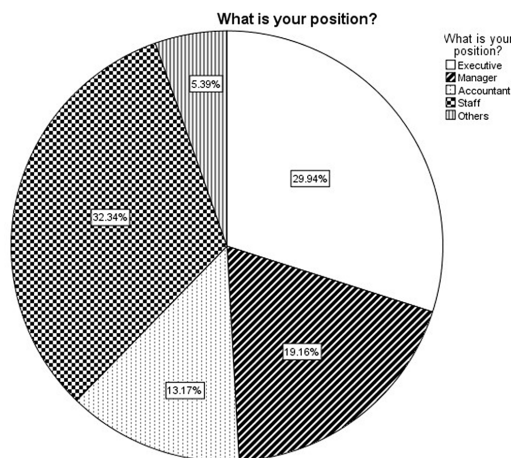


Fig. 5: Pie-chart of Position Frequency

What type of ERP System are you using?

Different ERP software were listed out to the respondents, whereas most of the manufacturing industry uses Microsoft Dynamics AX/NAV i.e. 102 respondents choose this system i.e. 61.1%, SAP

(Systems Applications and Products) system were chosen by 36 respondents i.e. 21.6%, TC ERP by 20 participants and other system by 9 respondents. Looking after the result, most of the manufacturing is dependent upon Microsoft Dynamics AX/NAV.

Table 5: ERP system Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Microsoft Dynamics AX/NAV	102	61.1	61.1	61.1
	SAP	36	21.6	21.6	82.6
	TC ERP	20	12	12	94.6
	Other	9	5.4	5.4	100
	Total	167	100	100	

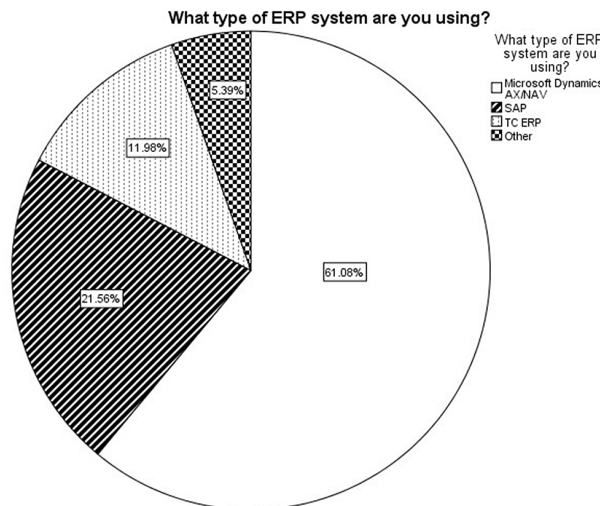


Fig. 6: Pie-chart of ERP system Frequency

What is your Work Experience with the ERP System?

In the above table result, it can be seen that 90 respondents i.e. 53.9% out of total 167 have less than 2 years' experience with the ERP system, similarly, 41 respondents have more than 5 years' experience and 36 respondents have the experience

in between 2 to 5 years'. An emerging technology requires the individual to get updated rapidly as the number of respondents is higher who has less than 2 years' experience regarding ERP makes them know about system efficiently with changing features to the system.

Table 6: Work experience Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
	Less than 2 years	90	53.9	53.9	53.9
	Between 2 to 5 years	36	21.6	21.6	75.4
Valid	More than 5 years	41	24.6	24.6	100.0
	Total	167	100.0	100.0	

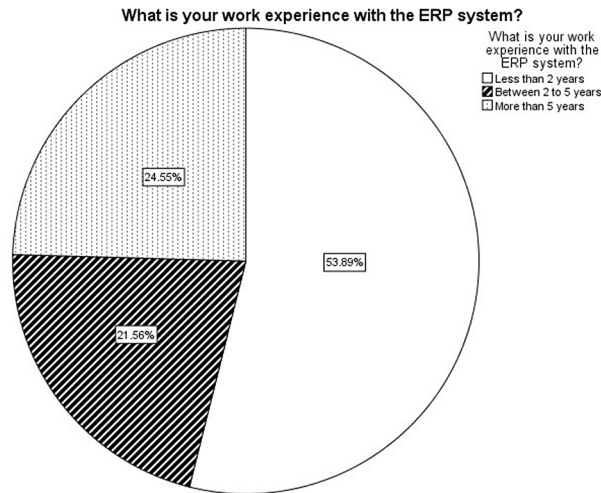


Fig. 7: Pie-chart of ERP system Frequency

Analyzing ERP Usage Pattern

The SAP ERP versus Dynamics Comparison Report facilitates the work of examining the first variations between the 2 software system, however solely with reference to characteristics. For that reason, your comparison chart does not account for your group's priorities, no matter the result they may wear the ultimate outcome. This ought to be thought of should your organization need to perform a lot of thoroughgoing comparison method. The subsequent features and functionalities are listed below:

- Economic
- Humanoid Resources
- Manufacturing Management
- Record Management
- Procuring Management
- Superiority Management
- Deals Management
- Merchandise Technology

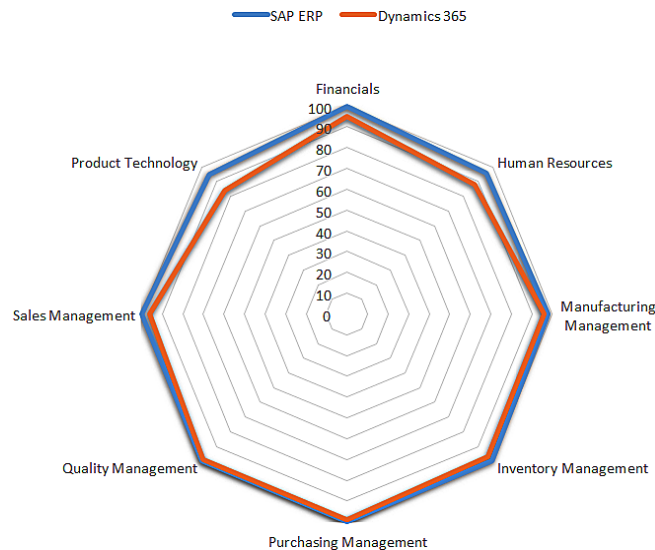


Fig. 8: Comparison of SAP and Microsoft Dynamics (Technology Evaluation Centers,n.d.) Let's take a closer look at each of the eight domains.

Economic

SAP ERP is appreciated because comparing with Dynamics it is powerful contender in terms of features and functions of economic.

Human Resources

According to some study, SAP is found with high ranking than Dynamics. In terms of Humanoid Resources options and functions that area unit offered off the shelf as SAP has also excelled in it.

Manufacturing Management

Both SAP ERP and Dynamics offer comparable coverage of Manufacturing Management functions and features.

Inventory Management

SAP ERP slightly eclipses Dynamics in terms of Inventory Management features and functionalities.

Purchasing Management

The two software supply similar coverage of buying Management options and functionalities; they each give comparable coverage of capabilities during this module.

Quality Management

Again, neither software stands out here. Both Dynamics and SAP ERP have nearly the same support for Quality Management features and functions.

Sales Management

SAP ERP slightly outperforms Dynamics in the Sales Management module.

Merchandise Technology

In this field, we have found that SAP obtains higher rating than Dynamics. Here we see that SAP ERP excels with regard to functionalities that are available off the shelf (Technology Evaluation Centers, n.d.).

Overview Analysis of Interview Results

Interview Duration

As due to the busy schedule of interviewees there was a time limitation which was almost an hour for each interview. The participants were allowed to answer the questions in an open way in order to avoid the researcher from influencing the response coming from the participants.

Profile of Interview Participants

All the participants were from the IT perspective of their respective manufacturing industry.

Below table represents the participants' role and years of experience. This research refers to participants as MI1 and MI2 in order to ensure their confidentiality and that of their respective manufacturing industries. Starting from three (3) years to ten (10) years are the experiencing years by participants which makes them involve with IT decision in their own manufacturing industries.

Table 7: Tabular form of Interviewee details

S.N.	Participant	Years of Experience	Organizational Role	Have ERP using experience?
1	MI1	8	Sr. Joint Manager IR-Admin	Yes
2	MI2	5	Senior Manager	Yes
3	MI3	8	Senior Manager	Yes

Sample questions to Interviewee

Below few questions are extracted as a sample question which will be asked to the interviewee.

- 1) What are the challenges faced during implementation of an ERP?
- 2) Do you feel any changes in productivity after ERP implementation?

- 3) How effective services are provided by an ERP vendor?

List of Visited Industries

The below list are of different manufacturing industries where the researcher visited for it survey and findings.

Table 8: Tabular form of visited industries

S.N.	Ref.	Organizational Name	Estd. Year	Location	Product
1	I1	Surya Nepal Pvt. Ltd.	1986	Simara, Bara, Nepal	Cigarette, Match Box, Incense Stick, etc.
2	I2	Dabur Nepal	1992	Simara, Bara, Nepal	Fruit Juice, Oil, Cleaner, Toothpaste, etc.
3	I3	Chaudhary Group	1965	Nawalparasi, Nepal	Noodles, Electronic, Beer, etc.

Number of Employees

The manufacturing industries where the respective participants work are all large and famous in Nepal and in other countries with ranging employees from 500+ to 5000+. The manufacturing industries are referred to as I1, I2 and I3.

Participants by Role in IT Decisions

All the participants from the manufacturing industries are involved in making IT decisions for their respective workplace.

Participants Understanding of ERP

Understanding of ERP by participants, all of them have very good knowledge of ERP and were able to give their view of ERP based on their experience. Some of the definitions of ERP by the participants are:

- According to MI1, "This software package makes selections easier as a result of the integrated information is accessible with slightly."
- According to MI2, "Tons of apps to add and configure that makes the possibilities endless for what does and can do to help our business grow and grow our business in the right direction with its gorgeous visual charts and widgets and knowledge management."
- According to MI3, "ERP is very versatile platform to make worldwide and standardized MES template".

Data Findings

Technology

Security

It is the most essential factor to consider when adopting ERP system, particularly for manufacturing industries. The system holds the sensitive and confidential data of customers, employees, and

product. There are other more things to consider depending on the use case as said by some participants. Some participants noted that cost and quality of internet services are important for conduction of business activities. An example gave by one participant was the need for continuous connection is required for branch interconnection and for tracking products. Commonly, security terminology was repeated by most of the participant several times which show security is the most significant factors for manufacturing industry.

Architecture

The architecture of the ERP system in some manufacturing industries are three-tier architecture and some have web-based architecture. MI3 stated that they have their own local data center for storing data with their functioning for the purpose of failover and to minimize the downtime.

Quality of Service

Quality of system specification and Internet services are very important for ERP system to function effectively as the ERP system requires a good processor with system compatible operating system and some manufacturing industries requires good Internet service for its reliability.

Organization

Impact on Business Value

Many respondents have agreed regarding cultural change while ERP implementation. In terms of the business value of ERP implementation, all of the participants have defined as essential and measured with growth of production as well as satisfaction.

Skills and Training

Proper understanding of system use is one of the most essential parts for effective result. As

ERP system is one of the complex systems which requires trained staffs and expertise in computer in terms of department wise. MI1 says for continuous improvement in organization growth there should be skilled manpower and can be sharpened more by training.

Business Continuity and Disaster Recovery

ERP software provides disaster recovery in itself with the features of time-time backup. Every ERP system has its own plan and thought for recovering data from disaster. MI1 noted that before deploying ERP in particular place you need a full documented business continuity and disaster recovery plan. Quick recovery is essential as in many organizations they don't have any ability to do business without ERP working smoothly (ERP Desk, 2015). Contingency plans required if primary disaster recovery plan fails and also documentation need to cleared regarding whom to contact when such disaster event occurs said by MI2.

Environment

Cost

Total cost estimation of an ERP software solution requires careful asses manufacturing industry, not of an array of variables which may vary widely from one organization to another (WorkWiseSoftware, 2013). In terms of cost determination, it may also vary based on unique requirements and the scope. Understanding the factors i.e. maintenance, training, software customization, upgrades, support, process redesign, etc. that will influence the cost of ERP. It will also help to get better idea of business which can be paid as expected. Some participants said that cost is very important as their goal is to spend less amount where possible and believe to deliver the same or better quality of work.

Conclusions and Recommendations

Findings

To understand the current ERP usage in the Manufacturing Industry of Nepal.

In the research, we have found that neither software stands out here. Both Dynamics and SAP ERP have nearly the same support for Quality Management features and functions. Both SAP ERP and Dynamics offer comparable coverage of Manufacturing Management functions and features.

One of the supreme significant question which is the startup objective regarding current research. Different ERP software were listed out to the respondents, whereas most of the manufacturing industry uses Microsoft Dynamics AX/NAV system. Looking after the result, most of the manufacturing is dependent upon Microsoft Dynamics AX/NAV.

To Find the Challenges of ERP Implementation in the Manufacturing Industry.

There are numerous challenges where every section has to be aware like different position employees should have proper guidance and knowledge regarding ERP. If proper balancing is not done in an organization, then it might lead to cultural change which may not be adaptable to everyone. As ERP is a large software which might take more time during implementation as it features with the integration system with different departments. One of the biggest challenges is during ERP implementation which takes a long time. In a survey, high number of respondents have agreed to say large time is required during ERP implementation.

While implementing ERP, it needs to be carefully managed because it may cause massive change. The below listed are one of the challenging factors which needs to be carefully handled for successful ERP implementation:

- Vital Issues
- Change in Structural (Process & People)
- Execution time & cost
- Employees Self-esteem

How ERP is Helping the Manufacturing Industry to Manage and Support the Value Creation of Product?

As ERP is helping in different factors of manufacturing industry which manages and support to create more quality product. Continuous training is one of the basic requirement of every organization where technology is emerging day by day so everyone should know about it in their own field aspect. As an emerging technology the interface and pattern keep on changing and it makes challenging to the user so most of the respondents strongly agreed regarding continuous training which directly implies

in standard product. The quality factor is important assets of manufacturing industries.

With the production, the organization has to maintain its benchmark with its product. Competitive era requires to maintain its standardization. So this research wants to assure whether ERP is helping to maintain standardization of the product. According to survey, it has been found that high priority is given for product standardization is better than before whereas some are still confused to find the differences as it might be due to ERP implementation was done currently. So as result ERP is very frequently helping in standardization product.

What is the Efficiency of the ERP System in Terms of Quality?

Efficiency matters with the monitoring to employees and verifying log reports by top management members. Ranging from shop level to the root level of an organization ERP helps to improve business enactment at all. It streamlines automatic operations in terms of processing to production for gaining larger reflectivity on different aspects of operations like from entry of order to production line, granary management, and delivery. It also replies quickly to customer queries whereas helps to increase accurateness and reliability of secure orders.

Customer demand keeps on changing whereas this agile feature software adapts to changeability. It controls and manages rush orders & make exceptions also, handles minimum time left changes to manufacturing processes with variety of options for planning, tracing, and action messages which are collaborative.

How is the Service Provided by ERP?

Implementation cost varies with the demand of the software product and brand also with services. Reliability is the quality of being able to be trusted or believed because of working or behaving. For long term benefits, during implementation of ERP

both training and education factors play vital role. Well-skilled user's area unit economical, extremely impelled and sometimes invent new techniques to avoid wasting time and improvise business manners. Continuous training approach makes the service quality better directly proportional to the betterment of product quality.

Future Recommendation

In general, the ERP system confirms several advantages for business growth. Although the estimated value is not exceeded after the risk is taken. Together, there seems to be an optimal level of useful integration in ERP with margins that decrease to a certain level, consistent with the diseconomies of scope for terribly massive implementations, as expected. Although our data does not currently allow for a more detailed analysis of the exact adoption model (due to the lack of detailed data on the extent of distribution at the worker level) or the long-term impact on productivity (due to the lack of long-term publication implementation of data at this time), both topics are promising areas for future research. It may be a more productive survey if the researcher himself observes from the beginning of the implementation of an ERP to the production level with control and measurement of the product, discovering at the same time the effectiveness between the interdepartmental correlation.

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Conflict of Interest

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