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ABSTRACT

Most of the projects letdowns are encountered in production industries such as oil and gas production industries are attributed to human factors; at the same time repercussions related to such incompetence consistently expose industries to big challenges.

During the project delivery stages it has become increasingly important to look up into the project success rates. A universal approach towards the success of delivering complex projects is by ascertaining well stated distinct requirements, assigning necessary resources, focusing on suitable design, appropriate project planning and management, beside a well enhanced team communication and coordination. Nevertheless, the consideration of all these preeminent practices does not guarantee success without risk factors because of the existence of the human ineffectiveness in a project like negligence, stress, incompetency, workload and poor social conduct in most cases resulting into likeliness of reduced effectiveness, quality as well as functionality, leading to delay in the deliverance of the project.

This study centralizes its attention on flaws and the initial cause of the faults encountered in between engineering and progression stage of project. Particularly, the background of the article restricted within Supervisory, Control and Data Acquisition (SCADA) systems and DCS (Distributed Control System) industrial control for vital infrastructures. SCADA and DCS systems are employed all through a wide range of industrial spheres including the power domain, in chemical plants, at gas and oil firms and distribution, the water and waste water domain, and others. A general feature about the utilization of the systems within the very industries so as the infrastructure operation and control procedure is carried out all the way through various occurrences of multiple industrial control systems derived from a number of vendors, pooled into superior architectures of system inbuilt in other systems. All systems are worth being considered as vendor-generated products developed through a lengthy period for a wide range of consumers. Therefore, as soon as each system is vended and positioned, there is a great task through the engineering, product designing to the particulate operation condition at the same time incorporating in the midst of related neighboring systems. Usually, during systems positioning a wide range of individuals from the vendors and EPC are included together with external experts. Thus, it is quite challenging to deliver this kind of a big and

complicated project minding the three key inter-reliant constraints for each individual project: time, expense and scope. The delivery of projects within the stipulated budget and that successfully meet the scope requirements are not justified for being successful by the main stakeholders for quality issues.

The study is aimed at exploring the sort of mistakes arising amid the development period of the SCADA and Industrial Control systems at the same time relating them to sort of liabilities the faults results into. This is done with an aspiration that the learning will be of significant help to the key decision makers and analysts at basic infrastructure operations and additionally system vendors to boost their productivity levels in accomplishing a high level of project management. The survey utilizes the Bayesian network so as to evaluate the relationship between positioning mistakes, and aspects, and their related impact on the project delivery. The information exhibited depends on interviews' outcomes with specialists with long experience on SCADA system deployment as well as industrial control.

The proposition is an accumulation of exploratory papers, books, specialists' judgment as well as outline contemplations on how Human ineffectiveness can impact on the project lifecycle.
The key contributions (C) presented in the proposition are:
C1: Access of the qualitative structure of the Bayesian network (BN)
C2: Access to the quantitative parameters of the Bayesian network (BN)
C3: Quantification of the results and applicability of this replica
Throughout the study the following Research Questions (RQs) were discussed:
The findings will justify how these mistakes, in any project conveyance, is directly attributed to the human factors included. Furthermore, the most renowned causes of these kinds of mistakes will be identified in this research work.

ACKNOWLEDGEMENT

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The following thesis represents the work and research done in this semester. The task was not only interesting but challenging as well, and has helped me learn more about the topic and the process of producing a piece of scientific writing.

In the end, I would like to thank every individual who has helped me in the research process, through feedback and zealous participation.

Stavanger, June, 14, 2016

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LIST OF ACRONYMS

ABB (ASEA Brown Boveri)

DNV (Det Norske Veritas)

SCDA (Supervisory Control and Data Acquisition)

DCS (Distributed Control System)

PSA (petroleum Safety Authority, Norway)

CP (Conditional Probability)

CPT (Conditional Probability Table)

BN (Bayesian Network)

SOP (Standard Operating Procedure)

EPCM (Engineering, Procurement and Construction Management)

EPC (Engineering, Procurement and Construction)

FPSO (Floating Production Storage and Offloading)

HSE (Health, Safety and Environment)

M (Mistakes)

C (Causes)

G (Graph)

T (True)

F (False)

1 INTRODUCTION

This chapter aims to create better understanding about this thesis, the objectives and the background of the thesis. Moreover, information regarding the background, the problem identification and the constraints related to the study, have been included in the introduction as well

1.1 BACKGROUND

We, human beings, are subjective in nature and usually rely on heuristics developed with the experience. Due to these factors, we usually tend to overlook or miss important pieces of information while making decisions and large scale industrial projects are no exception. Improving the project success rates is an increasingly essential task in project delivery phases. It is a common believe that the on-time and successful delivery of complex projects depends on factor such as well-defined requirements, concentration on appropriate design, optimum resource allocations, suitable project management and planning, and strong project team coordination and communication.

Despite employing these best practices, the risk factor cannot be avoided due to the presence of human factors in a project. Human factors such as negligence, incompetency, stress, workload and improper behaviors lead to reduced efficiency, quality, and functionality as well as cause delay in the project delivery. In the complex industrial system where one part is dependent on the other, many risks are involved due to project members responsible for managing projects on different levels. Human aspect is a biggest risk involved in delaying the projects (CCPS 2007)and it is essential for the organizations and supplier to manage such risks. History proves that rely on such novel technical system is useless without disciplined and effective staff (Felix Redmill 1997).

In this project we want to investigate human and organizational inefficiencies or mistakes that negatively impact such a kind of projects. Identifying the problems and their root causes during such a scenario is our focus of interest. We want to perform quantitative analysis of such a qualitative aspects by finding out the probabilities of falling into a specific type of a problem. Each problem has its associated root cause(s), we want to tag them to each problem quantitatively by using conditional probabilities. Consequently these connected probabilities can be used to build a Bayesian network to analyze their cumulative influence on a large scale industrial project

1.2 Organization Background

ABB came into being in 1988 as a merger between a Swedish company and a Swiss company, Allmänna Svenska Elektriska Aktiebolaget and Brown, Boveri & Cie respectively. This cooperation of ASEA and BBC saw the rise of ABB to a global leader in power and technological industry that has been established in over 100 nations with over 145, 000 employees globally. Nonetheless, currently ABB Company is made up of five partitions operating globally, that is, Discrete Automation and Motion, Power systems, Low Voltage Goods, Power Products, as well as Process Automation. Each of the partitions have their unique Business sections committed to them that are meant to work on their industries as well as products (ABB 2016).

The Process Automation sector of ABB works on providing consolidated solutions related to better control, optimization and application based knowledge to industries and consumers globally. These solutions are vital for industries, to ensure an environment of profitability, productivity and improved risk management and responsibility.

ABB Process Division includes projects of multiple scales, which range from simple internal to large scaled external oil and gas projects. The effective and applicable solutions provided by ABB cater these ranges and forecasts high returns on resources, through effective control on production, proper utilization of process and easy maintenance. Brief overview of engineering process covering stage 4.1 to 4.4 presented in

Fig 1. This process starting from a successful sale all the way to installation and handover. The purpose of this Stage is to mobilize the project team and all required facilities. The project team needs to review the project basis from the tender and the contract to ensure a full understanding of the scope, schedule, and terms and conditions. It is also important to align customer expectations with the planned deliverables.

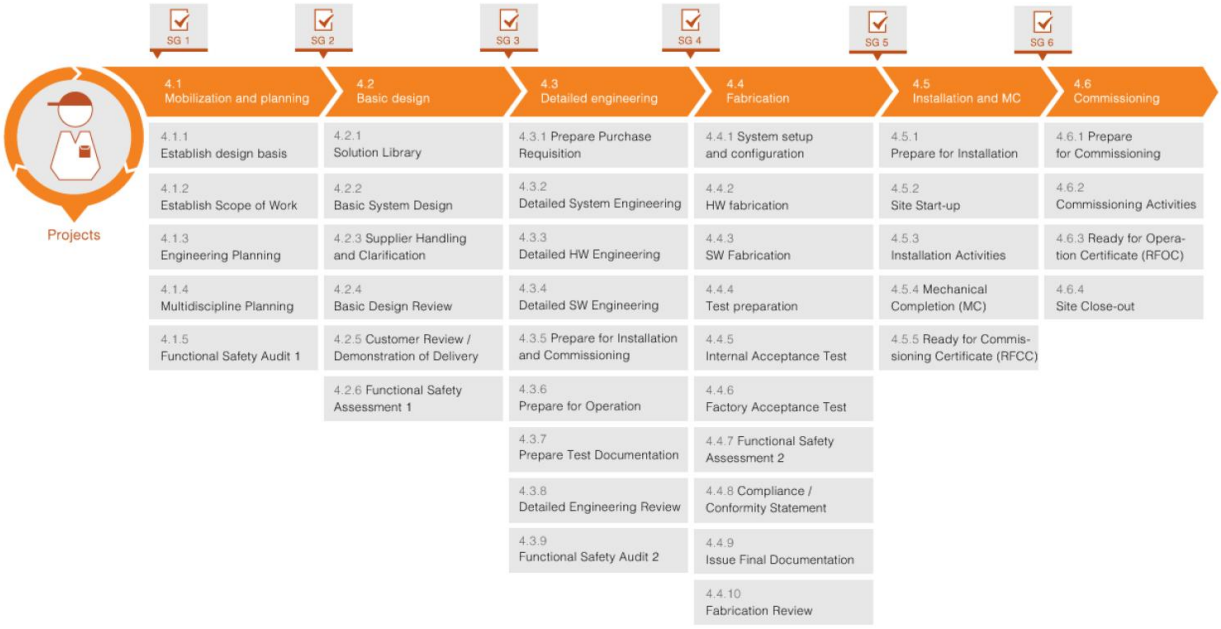

Fig 1: Projects Engineering Workflow (Rune 2015)

1.3 Research Purpose

The purpose of thesis is to identify human and organizational inefficiencies that negatively impact project life-cycle. Also, to gain an insight of the problems and associated causes that decrease project success rate. In addition to the above, an efficient approach is to be explored from existing best practices followed in different phases of project management relevant to human and organizational factors for reducing risks.

1.4 Research Scope and Limitation

Human and organization factors affecting the project life-cycle has a broader business landscape due to diverse nature of industries. The main area of this research is focused on energy as well as oil & gas sector. Sequel to this, the research of this thesis resort to emphasis on one company and variety of projects managed by experts with different industrial background. Further, most of the ABB experts are engaged in different projects with large number of clients in all types of working environment. The limitation of this research is not to compare the result with other industries to make generalization.

1.5 Report Outline

The structure of thesis is in the following way:

Chapter one: Contains background, purpose, scope and limitation of research.

Chapter two: The second chapter presents topics such as, theoretical method of the thesis, research approach, theories and methodology.

Chapter three: Includes literature review in order to collect number of mistakes.

Chapter four: Contains results in the form of Bayesian Network

Chapter five: Describe analysis which is based on research result and methodology.

Chapter six: Elaborates the conclusion drawn from research.

Chapter seven: Provides a list of references used in this thesis.

Chapter eight: Presents interview questions, response and calculations.

2 METHODOLOGY

This paper mainly discusses the Bayesian network as presented in section *4*. This section is about the formalism of the Bayesian network and how it was developed.

To achieve this objective, the methodology was divided into two major parts. The first one consisted of literature studies to identify mistakes. Section *3.16* provides a list of the mistakes. The second part consisted of interviews in three phases, based on the mistakes identified from the first part of the methodology. These phases are shown below in *Fig 2*:

1. Interview Step 1 – Identify probable causes of each mistake as obtained during literature study.
2. Interview Step 2 – The possibility of causes that we identified during the first step of the interview.
3. Interview Step 3 – Collection of conditional probabilities of mistakes against identified causes

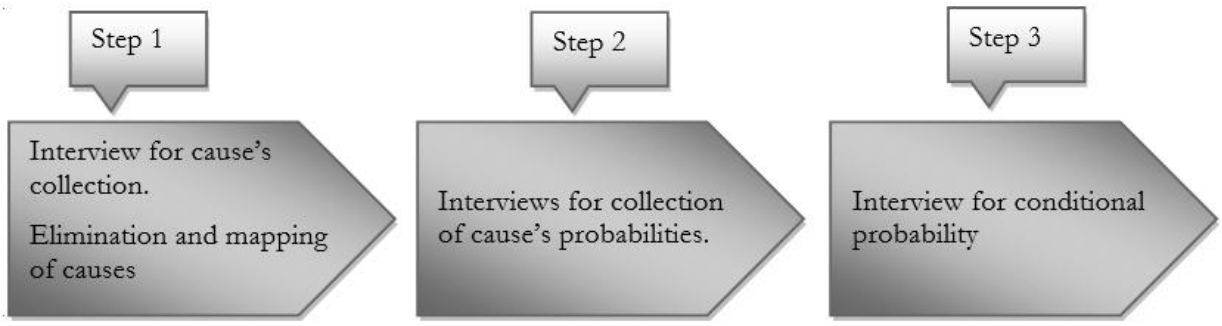

Fig 2: Illustration of Interview Steps

The outcomes of qualitative and quantitative study were used to represent mistakes, possible causes of those mistakes, with probabilities and they were analyzed and validated using Bayesian Network.

Bayesian Network is a graphical model which explains relationships among variables. Bayesian model supports comprehensive and potential explanation of decision problems to provide the desired alternatives (Smith 2006). This model was therefore used to explain the results.

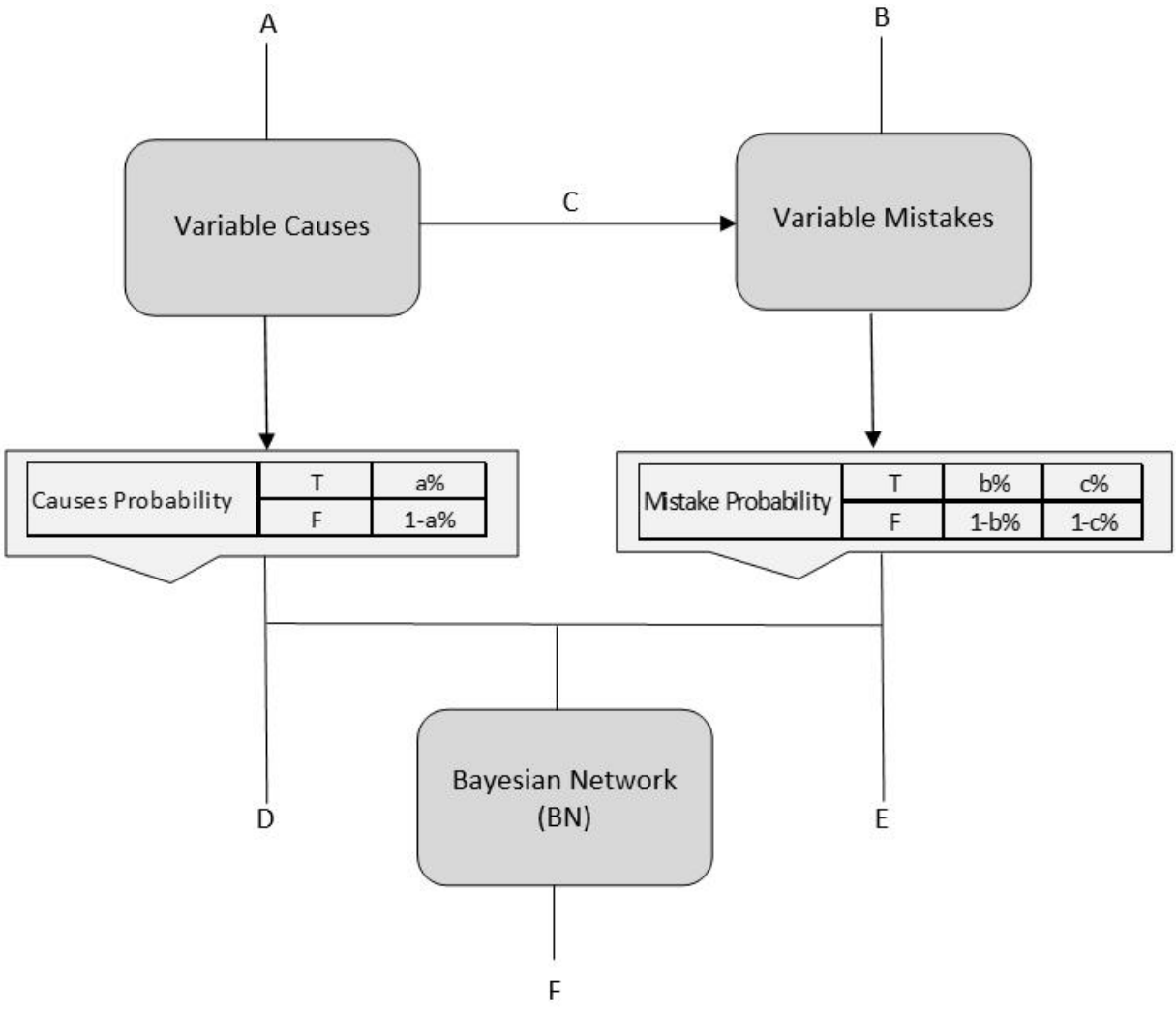

Fig 3: Depiction of Methodology

We explain in *Fig 3* the method of this process. Variable Causes "A" were collected during interviews, Variable Mistakes "B" were collected by using literature. "C", Illustrates the causes creating impact to mistakes. Both "D" and "E" show the *probability* that was collected from domain experts during interview session. Finally "F", Graphical Bayesian Network has been drawn using GeNIe, a development environment software that provides a platform for building graphical decision theoretical models. This software tool was developed in the Decision Systems Laboratory of University of Pittsburgh (Silvana Quaglini, Pedro Barahona 2003)

2.1 Bayesian Networks

We used BN Model in this study to illustrate the probability distribution between the two main segments; A) qualitative structure B) quantitative parameters. *"These two A and B segments are representing a joint probability distribution (Friedman and Koller, 2000)"*. The mathematical Form of BN and its specification has been described in the further section.

Bayesian Network illustrates the probabilistic connections between different variables. For instance BN identify the probabilistic association between the diseases and its related symptoms. BN is very useful to calculate possibility related to diverse diseases by given symptoms. Bayesian Networks have been used in an area of expertise or application that needs to be examined to solve a problem, where the number of variables and their values are indefinite(Kraaijeveld n.d.)

As an example: probability of wrong design input described 0 as an impossible and 1 as a possible. The consequence of wrong design input, depends on number of variables behind these consequence like lack of Technical Experts, Communication gap between EPC and Project Design Complexity.

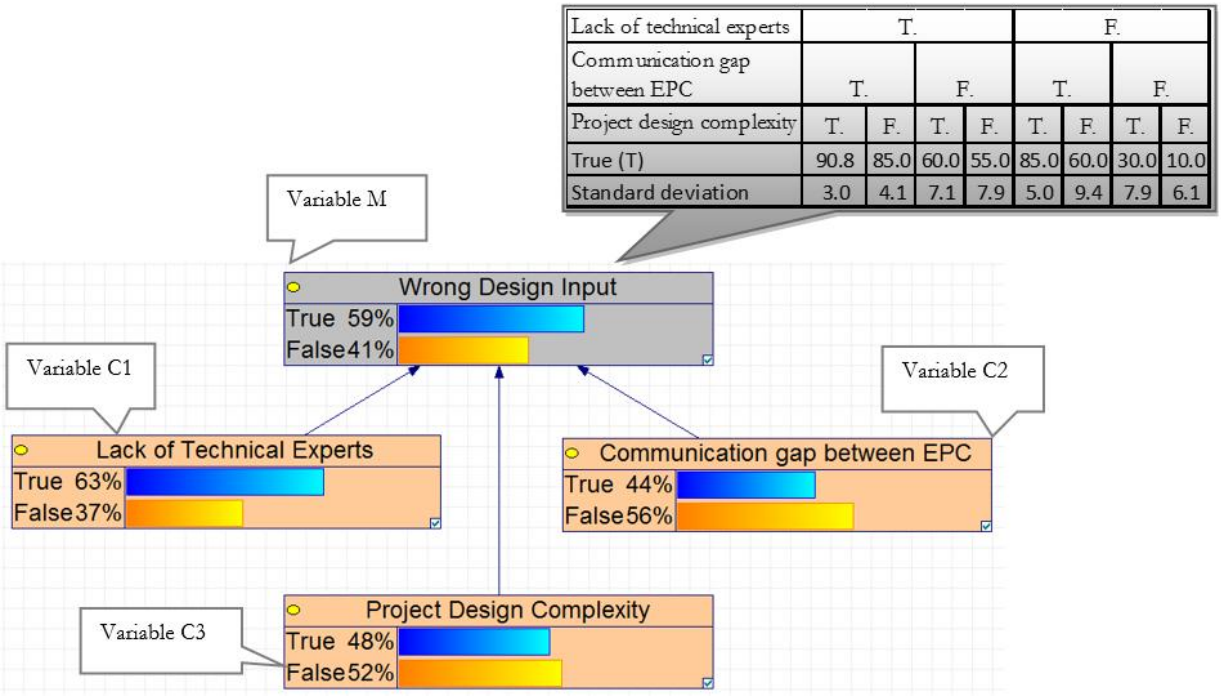

Fig 4: Outcome of Wrong Design Input in Bayesian Network

The possibility of wrong design input depends on different circumstance like the cause of wrong design input is lack of technical experts. To describe the ways how causes variable can influence to probability, in order to define characteristics in Conditional Probability Table. We can say that the probability of wrong design input depends on the combination of causes like P (wrong Design input = True |$Factor_1$... $Factor_N$) to get result of wrong design input 8 (2^N) probabilities questioned to experts.

However, mistakes are influenced by number of factors. To get exact list of mistakes, we interviewed repetitively in order to produce a precise list of causes. The initial cause of wrong design input was identified and proceeds to get extensive list of opinion from experts. After that list of probable causes of each mistake was ordered and key cause of distinct mistake was identified. Eventually to minimize the size of CPT, most appropriate causes were selected. This was important to get precise opinion from expert; otherwise it could be problematic to answer against several factors. This was also important to reduce repetition.

To get a probability distribution of a variable's (M), Domain experts were interviewed to provide a numeric value. In other words, the probabilities of causes were determined as True and False. The given factors (say C1, C2 and C3) has been influenced by probability distribution. In the *Fig 4* direction of arrows shows the factor that are under the influence of variables. i.e. C1, C2 and C3 to M.

The following tables were derived by using GeNIe, software representing various states of every possible combination of diverse factors.

Table 1: Structure of CPT

	(C1) Lack of Technical Experts	T				F			
	(C2) Communication gap between EPC	T		F		T		F	
	(C3) Project Design Complexity	T	F	T	F	T	F	T	F
(M) wrong design input	T	CP1	CP2	CP3	CP4	CP5	CP6	CP7	CP8
	F	1-CP1	1-CP2	1-CP3	1-CP4	1-CP5	1-CP6	1-CP7	1-CP8

In above scenario, probabilities of CP1 to CP8 were calculated after the interviews. CP1 to CP8 represents probability of M to be considered as T assumed C1, C2 and C3 are in particular state. For example, CP5 shall represent the probability of PP(M=T | C1 = F, C2 = T and C3=T).

Therefore we obtain, all probable combination of conditions for desired factors under the influence of "M" to calculate the probability whether "M" is T (True). If we take the difference of 1, the probability of "M" is F (False) was obtained.

CP1 shall be the probability P(M=T | C1=T, C2=T and C3= T)

CP2 shall be the probability P(M=T | C1=T, C2=T and C3= F)

CP3 shall be the probability P(M=T | C1=T, C2=F and C3= T)

CP4 shall be the probability P(M=T | C1=T, C2=F and C3= F)

CP5 shall be the probability P(M=T | C1=F, C2=T and C3= T)

CP6 shall be the probability P(M=T | C1=F, C2=T and C3= F)

CP7 shall be the probability P(M=T | C1=F, C2=F and C3= T)

CP8 shall be the probability P(M=T | C1=F, C2=F and C3= F)

2.1.1 Mathematical formalism of Bayesian networks (BN)

The forwarded Acyclic Graph G= (V, E) , is a representation of the Qualitative structure. V is a denotion for the vertices, which is basically involves variables, let say X1,...Xn , which would represent the two exclusive states (of e.g true or false) from a finite domain. The value E, is the representation of the dependent relation of the two vertices i.e one quantity or constant has a direct impact on the state of the other constant. The variable who's direct influence is noted on the other variable is referred to as the parent variable. In simpler words, BN is a graphical representation of the qualitative structure, in which a casual dependent relation between the variables is noted an example of which is shown in *Fig 4*. Note that the arced and rounded rectangles are representing the qualitative structure.

In order to determine the degree of this dependent relationship, the constants and values of the Graph (the qualitative framework) along with the quantitative values and parameters were specified. Basically these are representing conditional probability for the variables, which help in understanding the probability distribution between these variable.

Conditional Probabilities for variables are shown in the tables *8.5* of *Fig 4*.

The function of specifying the quantitative parameters is to deduce and observe the probability relationship of variable V and constants in the Graph (G). Moreover, BN is used to determine the probability distribution that exists. The joint probability allocation over variables i.e X1.....Xn , in the graph G, is written in the following way:

$$P(X_1, \dots, X_n) = \prod_{i=1}^{n} P(X_i | Parents\ (X_i))$$

From this, we can see that the possibility of the variable states has the possibility of being inferred within the BN. This inference can additionally take into account the evidence on the variables state, that is, while the states of other variables are recognized others are not.

2.1.2 Bayesian Network (BN) Construction

Quantitative parameters and qualitative structures are defined in order to specify a BN. This definition is done through experts' domain knowledge, literature, statistical data, or these sources combined together (Gaag 2000).

Literature specifies the probabilities that are used to come up with the Bayesian Network and provides input to qualitative associations that involves the variables. In domains where the statistical data amount of is large, the formation of BN can be made automatic through the use of partial or full computational methods. If the dataset is rich enough, both quantitative parameters and qualitative structure can be derived from the data (Gaag 2000).

Availability of statistical data studied in this domain is sparse. There is not any consistent statistics on the connection between gas sector projects and oil properties and the engineering associated errors made in the projects. Field experts have a vital role in identifying the qualitative structure and stipulating conditional possibilities. The experts, who played a important role in the construction of the Bayesian network (BN), are shown in the following *Table 2*, while section *2.3 and 2.4* explain how the quantitative and qualitative parts were built.

2.2 Domain Experts Competency and Experience.

In the following study, Bayesian network (BN) has been induced from twelve different domain experts. The experts with different roles and responsibility within same organization were selected by management to represent a heterogeneous group of individuals. Majority of them has had a valuable experience working with project deliveries in the control system. *Table 2* depicts the current active status of these experts, the time invested by them in the project deliveries, alongside their knowledge

and experience. The assessment of expert knowledge and category of experience was completed by respondents themselves.

Table 2: Domain Experts Competency and Experience

Industrial Experts:	1	2	3	4	5	6	7	8	9	10	11	12
Experience of Industrial Projects (yearly)	18	26	7	8	14	22	4	30	40	18	12	11
Competency domain:												
Project management (Technical).		•	•	•		•	•	•				
Design engineering and requirements gathering.		•	•	•		•		•		•	•	•
System design & system architecture.		•	•	•				•		•		•
Product development& product Testing		•		•				•				•
Installation, commissioning and integration		•	•	•	•			•		•	•	•
DCS and HMI design		•	•	•		•		•		•		•
Integration of 3rd party system				•		•		•		•		•
Digital control system	•											•
Equipment and customer systems						•						
Resource management and competence development and management								•				
Telecommunication									•			
Automation						•			•			
Instrument engineer										•		
Hardware engineer										•		

2.3 Formulating Qualitative framework of Bayesian Network

The qualitative structure of BN comprises of two parts; Set of mistakes that can be made during delivery projects and a set of factors that influence the probability that these mistakes are made. The description of these two groups of variables, is further defined in below section of this study.

2.3.1 Identification of Mistakes

Classification of the qualitative part was conducted by a study of literature. The aim of this particular observation was to come up with the severe and common mistakes made during designing, engineering, installation, and commissioning phase of projects. Academic publications, that is, (e.g. (Kaulio 2008)), technical reports (e.g. (PTIL.No 2016)), and books (e.g. (Camilleri 2012)) were looked in to during the study

The mistakes, which were highlighted in these literature forms, were than classified into groups of mistakes, such as "Project Complexity and Design Errors". Later the domain experts were addressed to relate to these groups of mistakes, which were listed in the interviews. The interviewees were presented with the same categories of mistakes, as presented in this research to validate the significance of these mistakes, along with the option to include any left out mistake and combine similar ones. This method is commonly used in order to get the probabilistic information (Gaag 2000). The questions in printed form have been presented during interview session with experts.

The data that we collected considerably helped to identify significant mistakes. Furthermore, it gives us in-depth knowledge based upon the expert opinion about the human negligence during the different phases of projects. The recognized mistakes during this phase and a set of questions are presented in this section *3.16*.

2.3.2 Identification of Causes to Mistakes

When mistakes had been observed by the professionals, factors which influence the likelihood that these errors are occurring were observed. The respondents were requested to list the biggest causes of every mistake in their own words. The professionals acknowledged about two to eight causes of each mistake

There existed an overlap, in the causes given by the different experts. Experts identified and listed somewhat the same causes and also identified some of the common causes influencing to several

mistakes. Based on the causes presented by the experts, a consolidated list was created. Later; this consolidated list of mistakes and their probable causes of occurring as deduced from the experts, were presented to the same experts with firsthand knowledge and experience, in the form of interviews for validation.

Moreover, the number of probable causes, for a particular mistake, provide the amount of quantitative data, which was required by Bayesian network (BN). To make next phase of this study feasible a sub-purpose of aggregation process was the reduction of required data. The expert's were interviewed face-to-face, with the consolidated list of utmost significant causes given by all of them. In this way, the list of causes was reduced, giving a framework for developing the qualitative framework of the BN.

Lately, qualitative structure of BN *Fig 9* detailed in section *8.4 and 8.5* have been presented to expert's during different phases of interview, for the purpose of validation and assurance of consensus amongst experts.

2.4 Determining Quantitative Parameters of the Bayesian Network (BN)

Provisional possibilities seen within the BN were derived from the area experts as illustrated in *Table 2*. Using a prearranged process for elicitation of expert is vital so that bias is minimized in the domain expert. The procedure for the phases in an elicitation progression is provided in (Renooij 2002). The process consists of: choice as well as motivation, training and structuring, documentation and elicitation as well as verification

2.4.1 Selection and motivation

While drawing out conditional probabilities for Bayesian Network, it is recommended to use more than one expert (Clemen, R.T. and Winkler 1999) (Edwards. 1987). The quantitative parameters and data had been assessed with the help of same industrial experts, from which the qualitative structure was constructed with (Renooij 2002). This is done to minimize the risk of errors associated with the uncertainty of variable that might exist. We selected twelve indusial experts with different level of expertise to exemplify a heterogeneous group of experts within the same organization, who were motivated to assess and improve the potential project execution challenge's present in their organization.

2.4.2 Training

In case of unfamiliarity of respondents with the qualitative structure, the respondents are effectively trained, in order to make them understand the definitive parameters of the research. As the quantitative data was extracted from the same expert's, from which the qualitative structure was constructed, so they had clear understanding of the variables associated with the research and the relationship that existed in the Bayesian Network. Along with this, the concepts of conditional probabilities was furthermore discussed with the respondents, in order to eradicate any sort of misunderstanding and explain them. This was done in order to make the respondents well informed about the method to be used, and to assure their comfort with it (Renooij 2002)

2.4.3 Structuring

A suitable structured format was developed to present the questions to the experts (Renooij 2002).

During the extraction sessions, valid definition of variables was presented to the respondents. The respondents, as prior to the process, then provided their answers (probability) for all the individual listed conditions, in the probability table. Graphical formats for answering such as check-boxes are preferably selected, to ensure the respondents feel comfortable in providing probabilities, as providing direct probabilities is regarded as a uncomfortable practice normally (Cooke 1991). In case of this study, the format of interviews, on which the quantitative data was collected, made it easier for the respondents to record their probabilities. The experts used this format to record their answers, along with the interviewer, in a way that the probability was provided by the respondent, complemented with verbal feedback, which was taken in regard too.

2.4.4 Elicitation and documentation

According to (Renooij 2002), it is quite possible and has been noted that experts witness stress while using quantitative numbers for expressing themselves. For this purpose, experts were instructed to use only those numbers and quantities for expression in which they had complete confidence in, backed with their own judgment and experience. This method highly overlapped with the recommendation provide by Renooij.

Another such recommendation of (Renooij 2002) which was incorporated was reference to the elicitation process. The questions were presented as mentioned in *Section 2.4.3*, where direct questions had been asked only. For further explanation or clarification, the documentation used in the interview sessions was referred to them.

2.4.5 Verification

This process of confirmation, keeping in mind the condition in which the recorded probability values fall with, or follow the observed frequency, is difficult to confirm in this study. But in order to verify the study, as much as possible several efforts were made. Firstly, the Accuracy of expert's judgment can be affected by several kind of bias (Cooke 1991).

With reference to this study, the condition that the experts might be supporting each other's estimates was not plausible as the elicitation process was held individually, and the resultant of other respondents (experts) was not shown until and after the process had been completed with the selected respondent.

Another scenario which was expected in case of this study, was the expectation of deliberate influence or manipulation of the result from the expert's side, based on some hidden motive. This risk or scenario was eliminated, due to two factors. Firstly, the group of experts, were made up of a heterogeneous majority of people, meaning some were managers, some were engineers and some technical lead. They were collectively depicting the majority of the company (c.f. *Table 2*). Secondly, the experts were well aware of the fact that the results (which would be in form of their estimated numbers), would be discussed in front of their peers, making them responsible for whatever they say. All individual recordings, were presented to the group of domain experts, after the elicitation process. These individual recording were in the form of arithmetic statements, which were collected and assessed in order to construct a Bayesian Network. The resulting probabilities were recorded, from group of twelve experts, with no initial known variables provided to them. This proved that all the experts involved in this network were, honest and gave accurate responses. Addition to this; A separate domain expert, of the same organization but of the different branch, was consulted for cross checking the numbers recorded by the other experts , and the over-all consolidated data was approved by this respective expert as well. The low value of variance, noted among the provided results and numeric, from the respondents, is another condition which verifies that the data provided is reasonable and substantial. The standard deviation values, of these experts is depicted in the tables of section *8.5*, with explanations provided in *5.5*.

2.5 Interview Step Description

2.5.1 Interview Step 1 Collection of Causes

Phase I questionnaire is based on the mistakes that helped to interview the industry experts in order to collect number of factors caused by the mistakes. The response of the industry experts to questions was open ended answers based on what could be the possible causes of such mistakes in their opinion. A set of fifteen questions was prepared in order to present the experts for identification of possible causes of the mistakes. The experts can response to the questions differently and answers can be of same nature because of the open set of questions. The correlation between different answers was identified and most common factors was recognized from the data. Comprehensive list of causes resulted in these mistakes is attached to this thesis report.

2.5.2 Interview Step 2: Eliminating and Mapping of Common Causes

At this stage, the repeated set of answers was removed and therefore, a list of eliminated number of causes was prepared to be used as questionnaire for upcoming interviews. Due to the reason of high number of causes for our adopted method of analysis, Bayesian Network, similar causes was merged to prioritize the most common causes following the homogenous taxonomy.

As an example the causes of wrong design input can be “Lack of Technical Experts”, “Low level expertise”, “lack of knowledge” and“ Inadequate training”. We can simplify it like “Lack of knowledge/competency and training”, to reduce the number of causes, as we discussed earlier. The process we used to reduce the number of causes attached under Appendix. For authenticity and accuracy of grouped causes, industry experts was approached again so that they can validate grouped causes and the suggested changes can be made.

As soon as similar causes were grouped together after eliminating the common causes, Bayesian Network was used to present dependency and influence of the causes to other mistakes. One cause can be under the influence of many mistakes. The correlation between possible causes and mistakes is depicted with the arrow in the

Fig 5.

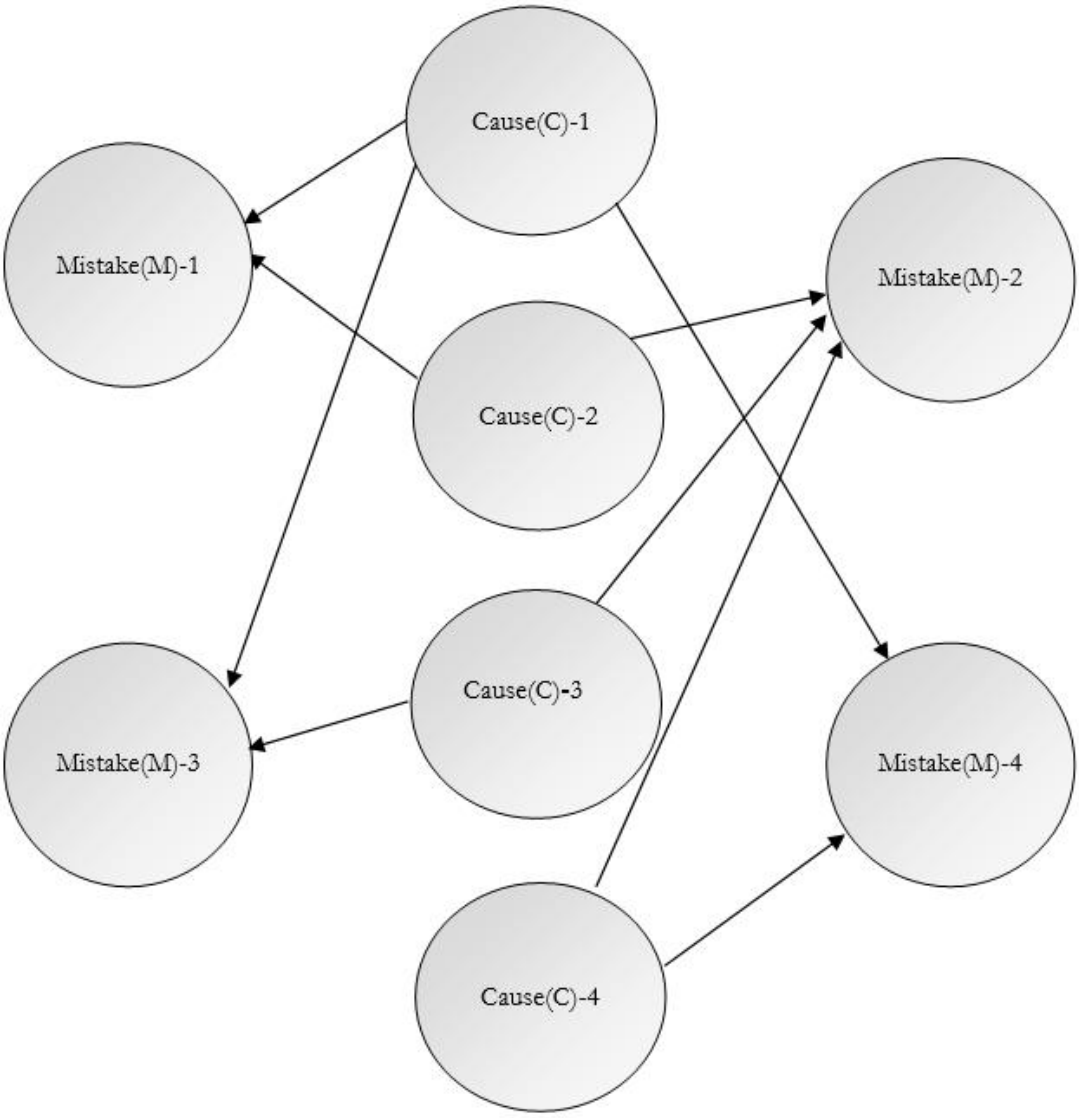

Fig 5: Example of Bayesian Network Containing Mistakes & Causes.

2.5.3 Interview Step 3: Probability Pertaining to Causes

After completing first step of the interview process from industry experts, a list of common causes of mistakes was composed. Although, the collected data is of high value but not adequate for Bayesian Network. For this purpose, second phase of the interview process was started with industry experts to collect rigorous causes of these groups in the form of numerical values. As shown in *Table 3*, list of questions *8.4* are prepared for second phase of the interview process with industry experts to get the

probability of causes. The data collected from industry experts as illustrated in *Fig 6*, average value was calculated in order to use in causes nodes in Bayesian Network

Table 3: Structure of Causes Probability

Causes	Probabilities						
	Expert-1	Expert-2	Expert-3	Expert-4	Expert-5	Expert-6	Average
Cause1	$P1_1$	$P1_2$	$P1_3$	$P1_4$	$P1_5$	$P1_6$	$P1avg = \frac{\sum_6^1 P}{6}$
Cause2	$P2_1$	$P2_2$	$P2_3$	$P2_4$	$P2_5$	$P2_6$	$P2avg = \frac{\sum_6^1 P}{6}$
Cause3	$P3_1$	$P3_2$	$P3_3$	$P3_4$	$P3_5$	$P3_6$	$P3avg = \frac{\sum_6^1 P}{6}$
Cause4	$P4_1$	$P4_2$	$P4_3$	$P4_4$	$P4_5$	$P4_6$	$P4avg = \frac{\sum_6^1 P}{6}$
…	…	…	…	…	…	…	…

By getting the probability of causes from experts, it was possible to rank the causes. In general this level will indicate the severity level of each cause. The values of causes alone not shows how much influence of individual cause has on related mistake, therefore CPT numbers were collected during the Step 3 of experts Interview. This is explained in section underneath.

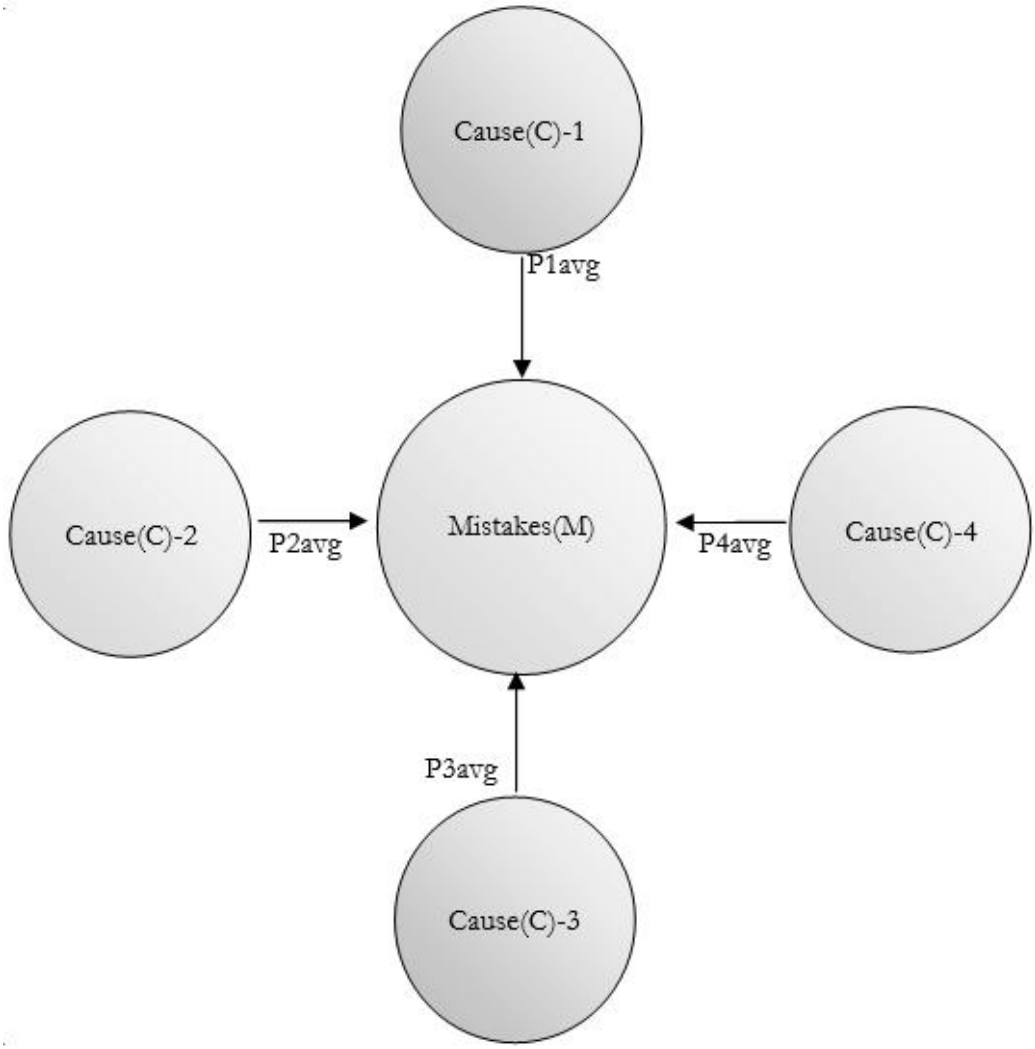

Fig 6: Placement of Probability in Causes

2.5.4 Interview Step 4: Mistakes Probability Using CPT

In the previous stage of interview, we collected possible causes of known number of mistakes. The collected information, however, is not significant enough to contribute for making any mitigation strategy to reduce the impact of mistakes.

Therefore, interview with industrial experts was held to get numbers for probability distribution of the mistakes and this was completed during 3rd stage of interview session.

During the final stage of interview underneath questionnaire was composed to obtain the severity level, how the causes will influence to each mistake and this questionnaire was based on CPT. The example of questionnaire presented in *Table 4* and detailed in section *8.5* presented during this stage. Industrial experts from different culture and experience was approached to get probabilities. The

number of tables has been created to obtain the probability of mistakes and the procedure of CPT calculations is described in section *2.1* above.

The mean value was calculated after getting the probability of variables from experts. It is also considered to calculate Mean Absolute Deviation to confirm the difference among the values that collected from the experts during interview. MAD is the average distance between each data value that we got from the experts and the mean. The average (mean) value was calculated and then the variance among each data value and mean was also determined. Likewise the absolute value of each difference and finally the mean (average) of differences between values were evaluated. The aim was to observe the difference between the values taken from the experts.

A lot of time was required for this type of work due the challenges of free slots required to schedule appointments with experts and ask them to fill the tables with several causes along with probabilities. After getting the numbers in CPT we continued to add the probabilities (number we got from the experts) in Bayesian Network.

Table 4: Calculations in the CPT

Variable (M)Mistake	Variable (C)Causes	Conditions(T/F)

	(C-1) Lack of Technical Experts	T								F							
	(C-2) Communication gap between EPC	T				F				T				F			
	(C-3) Project Design Complexity	T		F		T		F		T		F		T		F	
(M-1) Wrong design input.	(C-4) Lack of requirements engineering/poor documentation	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
Expert-1	TRUE	$P1_1$	$P1_2$	$P1_3$	$P1_4$	$P1_5$	$P1_6$	$P1_7$	$P1_8$	$P1_9$	$P1_{10}$	$P1_{11}$	$P1_{12}$	$P1_{13}$	$P1_{14}$	$P1_{15}$	$P1_{16}$
Expert-2	TRUE	$P2_1$	$P2_2$	$P2_3$	$P2_4$	$P2_5$	$P2_6$	$P2_7$	$P2_8$	$P2_9$	$P2_{10}$	$P2_{11}$	$P2_{12}$	$P2_{13}$	$P2_{14}$	$P2_{15}$	$P2_{16}$
Expert-3	TRUE	$P3_1$	$P3_2$	$P3_3$	$P3_4$	$P3_5$	$P3_6$	$P3_7$	$P3_8$	$P3_9$	$P3_{10}$	$P3_{11}$	$P3_{12}$	$P3_{13}$	$P3_{14}$	$P3_{15}$	$P3_{16}$
Expert-4	TRUE	$P4_1$	$P4_2$	$P4_3$	$P4_4$	$P4_5$	$P4_6$	$P4_7$	$P4_8$	$P4_9$	$P4_{10}$	$P4_{11}$	$P4_{12}$	$P4_{13}$	$P4_{14}$	$P4_{15}$	$P4_{16}$

Expert-5	TRUE	$P5_{1}$	$P5_{2}$	$P5_{3}$	$P5_{4}$	$P5_{5}$	$P5_{6}$	$P5_{7}$	$P5_{8}$	$P5_{9}$	$P5_{10}$	$P5_{11}$	$P5_{12}$	$P5_{13}$	$P5_{14}$	$P5_{15}$	$P5_{16}$
Expert-6	TRUE	$P6_{1}$	$P6_{2}$	$P6_{3}$	$P6_{4}$	$P6_{5}$	$P6_{6}$	$P6_{7}$	$P6_{8}$	$P6_{9}$	$P6_{10}$	$P6_{11}$	$P6_{12}$	$P6_{13}$	$P6_{14}$	$P6_{15}$	$P6_{16}$
Expert-7	TRUE	$P7_{1}$	$P7_{2}$	$P7_{3}$	$P7_{4}$	$P7_{5}$	$P7_{6}$	$P7_{7}$	$P7_{8}$	$P7_{9}$	$P7_{10}$	$P7_{11}$	$P7_{12}$	$P7_{13}$	$P7_{14}$	$P7_{15}$	$P7_{16}$
Expert-8	TRUE	$P8_{1}$	$P8_{2}$	$P8_{3}$	$P8_{4}$	$P8_{5}$	$P8_{6}$	$P8_{7}$	$P8_{8}$	$P8_{9}$	$P8_{10}$	$P8_{11}$	$P8_{12}$	$P8_{13}$	$P8_{14}$	$P8_{15}$	$P8_{16}$
Mean/Average Value		Pmean1	Pmean2	Pmean3	Pmean4	Pmean5	Pmean6	Pmean7	Pmean8	Pmean9	Pmean10	Pmean11	Pmean12	Pmean13	Pmean14	Pmean15	Pmean16
Mean Absolute Deviation																	

In order to calculate what was the probability of happening of each mistake, the values of each mistake node from conditional probability table used in Bayesian model. The value of CPT against mistakes will depend on the causes that may or may not occur. *Table 4* represents the values in the form of logical expression named as Truth Table and it can be observed whether the causes may or may not be present. The mean value of the probability was calculated which is based on industrial experts opinion and this was also considered as ultimate conditional probability values to be added into the Bayesian Network as illustrated in *Fig 7*.

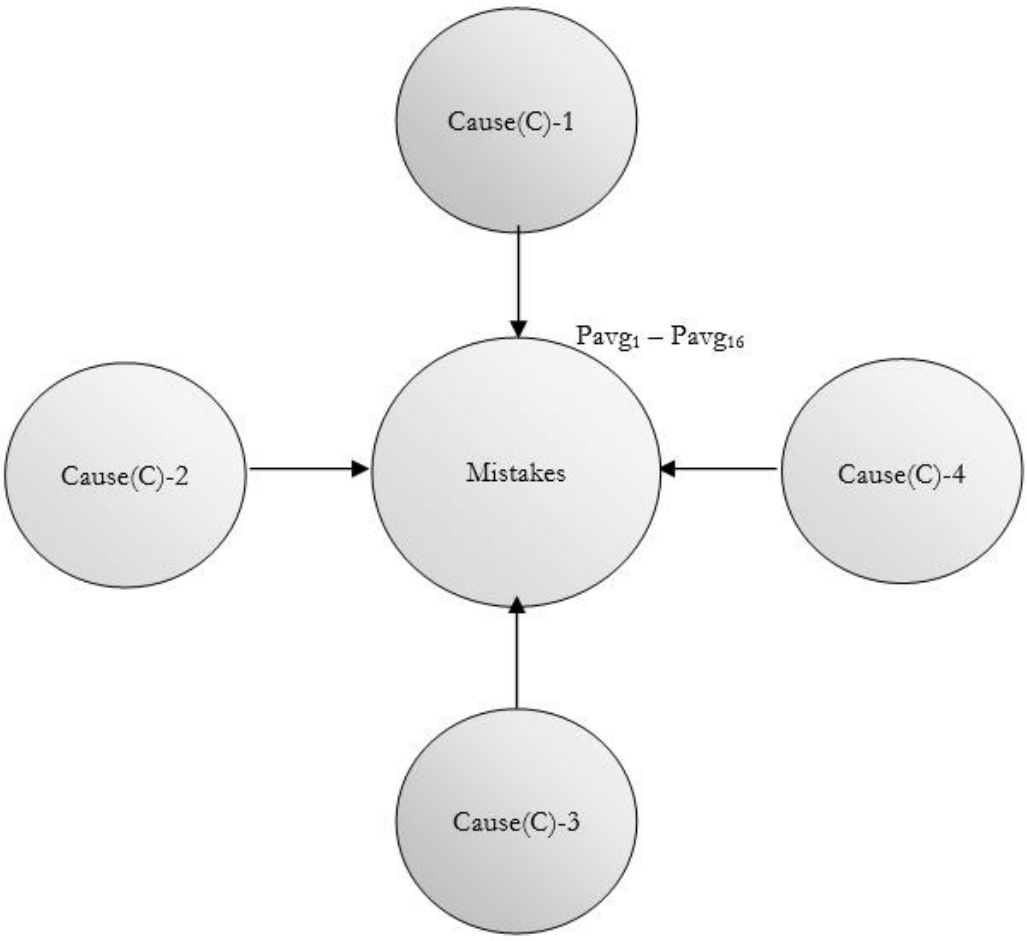

Fig 7: Allocation of Probability Values into Mistakes

3 LITERATURE REVIEW

In research literature many factors has been identified that influence the delivery phase of the projects, i.e. work motivation, work satisfaction, team coordination, technical input, requirement gathering, missing deadlines, correct estimate, failing to realize expectations and/or delivering project with many errors. A study by (DNV 2011) refers that employees should be well trained, educated and experienced for the assignment that they supposed to accomplish. We can say during the allocation of project team such factors can influence on the project cost, quality and in time delivery. The main causes of project being postponed are stress during work, resource allocation and improper requirement gathering (Blichfeldt, S. B., & Eskerod 2008).

In a big organization where many projects executed simultaneously, results in allocation of resource sharing and also causes the prioritizing of projects. In such cases it is very important to allocate recourses smoothly(Engwall, M., & Jerbrant 2003). Payne (1995) argument on this and explains that keep the balance between required resources is difficult due to the involvement of experienced personnel's in different project assignments in the same interval time period. The involvement of one expert into several projects cause disturbance in different phases of projects. This also enforces reschedule of resources and difficult scheduling. In such circumstances issues in one project can have influence on other project due to lack of knowledge, inappropriate technical solution and redistribution of resources (Engwall, M., & Jerbrant 2003).

Study explains that the employees perform better in a challenging work environment. The motivation for the employs is to do something different and significant for a company. In a challenging and innovative work environment employees has inspiration on job assignment and schedules (Kaye, B. & Jordan-Evans 2003). Employees in a challenging work feels better, even though they need to work hard with complicated task (Woodruffe 2006). Kaye, B. & Jordan-Evans (2003) study describes that it is a need of human to feel connected and a perfect team can help to achieve this goal. Relationship with the managers and project team has a significant impact for better performance to deliver project effectively.

Yaghootkar, K., & Gil (2012)focus on the project schedule pressure and listed as a gap among the project responsible, resource allocated, and deadline of delivery. According to Blichfeldt, S. B., & Eskerod (2008)project under schedule pressure usually delayed that result in negative influence on the

corporate. Besides due to the project delivery schedule pressure experts continuously change between the projects. They also debate that the management on different level possibly allocate resource from similar projects to deliver most important project with due time and this result bad productivity.

Human factor plays vital role to build connection, teamwork and motivation. The successful project in a company is dependent on the people working style and way of interaction with project team. In today's business model human factor is a major issue. The main cause is globalization, reduction of working force, parallel project execution, sharing of resources between project and relationships of employees with employer (Wong 2007)

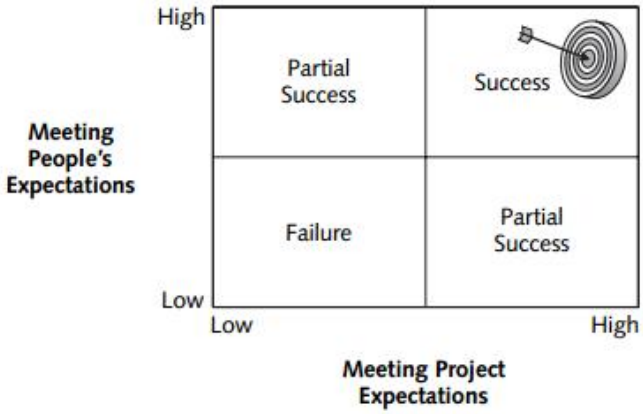

Fig 8: Project Success Dimension (Wong 2007)

Fig 8 demonstrates the dimension of performance. The first dimension is "Meeting Project Expectation" meaning the result meets project objectives including on time delivery, meeting the specification, and budget. The second dimension is "Meeting peoples Expectation" meaning people are happy and they accomplish project goal together with a team. Successful delivery require both dimension "people and project expectation" (Wong 2007)

3.1 Project Complexity and Design Errors

Design errors have been identified as major factors that cause overrun and delay in most projects. Appropriate representation of client's requirements always forms an important part to note and the blueprint to aim at the achievement of high-quality technological contribution to project executive often laid out based on project blueprint. For this reason, designs with errors indicate concepts of inappropriate representation or instead wrong illustration deliverables of the project. This can lead to

incorrect submission of practice with the outcome, in the sense, when the real execution phase of the project discloses, these deign errors, will be on the attempt to make correct and will bring about cost overrun or delay.

The other way that design errors could add to interruption and overrun of costs can be identified in the sense of estimation of a project is conducted based upon the design procedure. As to which obtaining errors in the design is part of unexpected misrepresentation or omission will imply that the approximation for cost of project will additionally add to these omissions, which will further into additional work or change order, therefore resulting in cost overrun or delay. In the same way, the designs that are conducted without much or extended analysis on the site have the potential of leading to errors. Likewise such system design that is completed without considering proper site survey can lead to probable errors. This is because, similar design approaches could result in extra work, review of similar work scope and revision contract as the specific set conditions start floating up at a structure stage of project.

These will undoubtedly influence the general task conveyance time and cost. Reasons for outline mistakes referred to in many undertakings are lacking field examination,, specification and error in design, design changes and plan errors, to mention but a few.

A project complexity could addition contribute to delay and cost overrun. Complexity in a definition term could imply the project dimension; most major ventures have extensive achievement time limits when comparisons are made with smaller projects. This could be as an effect of inflation, change in price material and changes in the price of material and rate of exchange such that the original resources may be complemented primarily for the completion of the project. The resulting impact could be as a consequence of overrun of cost and extended negotiation chaining that can further lead to delay.

Similarly, projects that have a higher degree of complexity usually come as a result of complex procedures, estimations, and schedules, such that in the case are is not appropriately considered the habit of omitting particular aspects of the project plan and estimations could be prominent, which can further lead to a change of orders. Such could bring about absolute cost overrun and delay. Also, the complication of projects could be clear regarding the difference of stakeholders with various specific interests and a long chain of communication channel accompanied by additional slow feedbacks. Accordingly, combining their interests could result in the consumption of valuable time and resources

that if can possibly be disregarded; conflict consequences and disagreement could take place, therefore having negative effects on the project accompanied by the situations of delay and cost overrun (Ambituuni 2011).

The delay and cost overrun may be a contributing element in the project complexity. The complexity of project depends upon on the project size. Though the projects that are big or large require comparatively long time span for accomplishment and to implement, while the projects which are small have relatively short duration for completion of any assigned project. The initial budget is needed to be supplemented for the project completion. This budget is influenced when the price of the material varies specially increases or when rate of exchange varies. This can result the overwhelming of cost or discussion aimed at reaching some cost agreement that may cause delay in project (Ambituuni 2011). The delay and cost overrun in the project failure are typically due to lack of concentration in performing the critical task and also due to the unavailability of proper SOP (Nilofur Abbasi;Iqra Wajid 2014).

In the Goliat FPSO most of the major areas of projects are succeeding as scheduled. Though, the development of FPSO production facility meets the challenges and increase technological complexity. This is because of the improvement and innovation of technology used in the construction of production facility (Norge 2012).

3.2 Poorly Defined Project Scope and Scope Change during Project Execution:

In the project process, cost overrun and delay could be on account of change of scope. Usually, scope characterizes a whole deliverable that should be at the end phases of the task. Essentially, it possible to argued that all schedules of a development plan of a project, estimations, quality, and baselines usually are formed based on the previous scope of the project. Therefore, changes made in the task scope at the season of execution will be as a method for the whole initial project arrangement that will contain the improvement of a survey of the financial support, schedule, and quality. In other words, this is there are extra time duration and considerable resources to for subsistent placement in within the first baseline. "With every change of capacity, valuable resources of the project are reverted to actions that previously were not recognized in the newly innovated scope, which further towards to anxiety within the plan of the project and the project budget."

Changing the development plan of project or its scope could additionally be as a result of the unintended definition of scope, uncertainties or inherent risk, sudden interest change, funding of project change among others. Such could result to change request that in turn could result in changing of the project budget, deliverables, or even a whole project workforce. The other thing that could, beyond doubt, make possible cost overrun of a development project plan, is unorganized scope management change that comes as a result of dispute that may request for budget suspension and time on proceedings and adjudication for the privilege of the contractor or client's belief(Ambituuni 2011).

Due to deficiency of ideas and plans of project review there is lack of complete and formal attitude for reviewing the ideas of project (Mbokane 2005).Though such projects that does not have any goal are useless. Scope change is the most risky things for any project and should be handled properly to avoid cost and time overrun.

Unplanned project changes have been the key know reasons for cost overruns. This happens in case of any changes made that are not reflected in the budget, which is not essentially associated with the scope creep. These changes may arise once some features are realized to having not been accounted for in the budget, leading to adaptation to the lack of necessary materials, or other related aspects that are not effectively planned for.

Goliat FPSO work of fabrication on the floater of Sevan designed for marine has previously holed up for an year because of the changes in engineering on FPSO, high prices of equipment's and increase in delivery time which causes project delay and increase in cost (Upstream 2014).
Another issue in projects is the implementation of modern technology in the half of the project completion. Because of curve of learning the problems which arise in new technologies that are undeveloped or have budget problems can affect the project. In some cases new and modern technologies help to accelerate the project speed (Atesmen 2008).

3.3 Challenges with EPC and Inappropriate and Inadequate Procurement:

Insufficient and improper procurement accompanied by contractual supervision can have major impacts on the delay of the project and overrun of cost. Contracts reflect on all the business correspondence aspects, which involve pricing, terms of payment, and levels of services offered.

Therefore, contracts that do not have things to consider for an entire project scenario can cause disputes to occur within the contract scheme. For example, in case an initial agreement does not abide by all the relevant aspects precisely that the project work entails, long chains of negotiation, arbitration or migration can be the result due to order change and the expedition for reviewed the contractual arrangements with improved plan and budgets. The outcome will with no hesitation be delaying of the project and as a result leading to cost overrun. Similarly, contractual agreement on ambiguous terms with indistinct calluses can lead to the potential dispute which further generates impediment and cost overrun of a project. In the similar sense, when a client selects an inexperienced contractor due to low bid may result to cost overrun and delay accompanied by unethical behaviors, the distinction in winning the bid and a second bid, contract bid amounts to difference in winning bid and estimations of an engineer and contract plans most projects. This makes it noteworthy to observe the acquirement process and contract administration for fruitful undertaking culmination. Along these lines, ineffectively chose contractual workers accordingly low offer without the specialized ability to proficiently handle the project will jeopardize the project and result in delays of schedule, poor quality results, accompanied with a result that has no acceptable limits. Furthermore, delay and cost overwhelm can likewise be as a consequence of moderate installment plan from a contract administration framework (Ambituuni 2011).

The common reason of the postponement of project is the advisors and subcontractors. When a company starts a project on the contract base then contracted work cause delay in the working process. To predict these situations is a difficult task for an organization and to overcome these is also a tough which may cause delay. Another reason of delay of subcontractor is that the subcontractor may be working on more than one project at a time.

A big confront for a project is the dealer's low quality service or poor capability of the instruments provided. A rush forward to the new rising activities in the world resulted in the increase in demand of new and modern equipment's having specific action, working forces and services. In contrary to this background the whole chain supply can be hampered due to the deficiency of sufficient supply which may include EPCM and EPC along with the service provider with mandatory abilities, systems and processes. If the administration of the contractor is insufficient at any stage of project the risk of the supply chain may increase leading to extreme deviation or claim of supplier without being confronting by the expertise. (EYGM 2014)

While setting up, implementation and synchronization with subcontractor misinterpretation of the things may cause the improper working on the task which may lead to delay of time and budget teeming.

In addition of cost EPC service provider selection will judge the experience of the contractor in country and about the skills and expertise involved. During hiring a contract a contractor which was having high skills and experience but was of high cost was considered expensive and in comparison to that a low cost contractor having less experience either in a plant building or in use of technology was selected. This resulted in delaying of the project and causing high cost of the project. The owner has to pay for the teeming and thus the overall cost of project became almost as same as that of the high cost highly qualified contractor. Here is a lesson that do not compromise on the quality of work for the sake of some money, low cost can only be best when the qualification of contractor is as high as that of high cost contractor (Rothman 2000). Customer can also delay the project that may be due to dissatisfaction of customer from the product or some time customer changes his thinking about the project need. Many types of projects mostly lead to delay by either type of the reason presented above. As the product starts to develop or building up it is common for the client to demand for the changes and the contractor do not have a clear, exact and precise sketch of project scope before the start. Most of the time EPC don't know what to do, when to do, where to do and why to do.

3.4 Quality and on-time Delivery:

The project team compromises on the value of the project supply due to having some supply pressures. The poor work needs to be settled many time, requiring a lot of money for overtime charges though increases any budget. These issues can be sorted out by the replacement of experienced and experts for any project (Keane & Caletka 2015).

After 2 years of work, the reservation system was cancelled for the new airline passenger. Little information provided, but press release quotes problems with supplier performance. The quality of the components supplied by the suppliers is recorded by the press release. However, we would imagine that we would not be able further to deliver such product that would reach the customer's needs (International Project Leadership Academy 2007).

3.5 Lack of proper Procedure, Documentation and Maintain Record of Changes:

It has been seen that most of the organization are missing specified plans to inform their team members with the continuous progress of their projects. Though this information would be helpful for

the team members to take decisions independently. This type of activity is very essential to check the proficiency and activities of every team member and to polish their decision-making abilities(Camilleri 2012).

One of the important difficulty in the project execution is the incomplete information of the previous records (Hanisch, Bastian; Lindner, Frank; Mueller, Ana; Wald 2009). The member which are involved in the projects often neglect such important points that are stated (Disterer 2002). (Disterer 2002)stated that the plan of the projects hardly contains any useful information that could be utilized by the team members. It is one of the big reason for the lack of interest of the project members.

There is a lack of maintaining a complete record of all changes which take place during various project phases. This is very necessary to keep the records of all the changes that are happening in various project stages. Although some records are useful and some are just waste but the recommendation is to take the record of every processing to further referring and evaluation the previous projects whenever needed(Young 2007). Most of the time team members don't follow these kind of routines and it take extra effort, time and cost if at some level in the projects we need to know the history of changes to meet particular milestone.

3.6 Technical and Operational Challenges

Challenges related to process and techniques contribute to decrease the rate of success in projects. Let's discuss some of the issues faced by FPSO Goliat in the Barents Sea of Norway. An oil project was designed in 2013 for first time which has to turn out 1 barrel oil. While it was guesstimated that the field could clasp oil almost 174 million barrels. The cost of the project was estimated to 5.06 billion dollars which exceeded to 6 billion dollars. Eni Norge in August 2015 said that the few weeks were missed for the start of the project which resulted the drop in 2016 (OilandGasPeople 2016)..

While implementing the project of FPSO Goliat challenges related to process and techniques were not considered important for the success of the project that resulted in ending up with a lot of problems. In 2012, 2014 and2015 PSA accomplished many logistics assessments. The points which were not satisfied or have to be improved were pointed out during these types of audits. An audit of logistics of PSA on Goliat held in June 2015 reports that operational and mechanical circumstances that were pointed out in past audits had not been corrected and this has been noticed during the latest audit held in January 2016 (PTIL.No 2016).

3.7 Regulatory Challenges and Environmental Concerns

The things which impact on the performance of a project include increase in focus on the effects of project on environment, superior requirement of regulation and ambiguity in policy. These requirements of regulatory expected to increase continuously. HSE (Health, Safety and Environment) and "Zero tolerance to accidents" environmental contents are increasing the expenditure on fulfillment to standards of HSE. There is no doubt that it is a positive move where expenditure can rapidly rise without close supervision. In the same way to invest in agreement with local substance directive is progressing in a try to beat the short term as well as medium term logistics tests in local market of start placing goods and services.

The major problem that oil and gas companies in the world wide are facing hurdles in approval of megaprojects with in time. This delay is due to the problem in obtaining the permits for the multiple government bodies, vague regulatory needs and excessive technical or ritual processes.

There are certain types of excessively challenges in projects that can be raised in relation of both financial and technical issues inherited due to unknown, unstable and harsh environmental factors. For instance development of ENI Goliat oilfield located at Barents Sea of Norway, faced numerous challenges starting from its development of oilfield located in north of Hammerfest in 2000. ENI, an Italian based Oil Company, owning 65% stake in Goliat Oilfield. Estimated 31.3 billion NOK for the project since its development start-up in 2009 (approximately 5 billion USD). Recently a report has been published in Dagens Næringsliv (DN) describing the astonishing facts about it cost, which has risen to 46.7 billion NOK (49.2%). The customized oil platform for Barents Sea and parts being constructed for this project in South Korean company Hyundai has not been deliver as per plan and ENI still facing many challenges related to design, material and engineering mentioned in the audit report, January 2016, of Petroleum Safety Authority of Norway (PSA) on Goliat FPSO Project reporting that the circumstances that were found during audit in June 2015 are unchanged (Berglund 2015)(PTIL.No 2016).

3.8 Project Interdependencies and Poor Resource allocation.

Reliance on the workers on staff for several projects enforces the distribution of resources making the schedule imperative. If there is an issue in one project then it will have impact on the others because of the reorganization of employees or may be due to deficiency in technological clarifications having inappropriate schedule (Engwall & Jerbrant 2003).. If there is competition between project

interdependence and division of source of a project then a debate arise related to consent to resource and redistribution related to specific entity to definite projects (Engwall and Jerbrant 2003).
While planning to be in command of over an intricate and large timetable, containing a lot of activities and resources consigned to every activity, it is very difficult to maintain a balance between activities and sources. As a result the project members remain unable to understand and manage the schedule and thus the scheduler remains fail (Harris 2009).

Due to this, problem occurs in project resource management causing over commitment to project means that more projects have been started but the budget or resources are not enough. If many projects are to run simultaneously then the common resources have to be shared causing concern about giving priority order to the projects as there should be even division of employees in the projects(Engwall & Jerbrant 2003). (John H Payne 1995) gives his views about the balance between the mandatory starting places. According to him the resources that needed are hardly achieved as mostly the labor or employees are engaged with other projects also.
Any change in the team working on the project may impart bad affects on the project. Time is utilized in giving training to the new team members of project and to get knowledge of the of project, its present condition, problems, design of the system and read and understand all the documents relating to project. It is not easy especially in a huge project. Transmission of project tasks form one person to another in the middle of the project always causes delay or hindrance. The cavernous the person in his task the more the delay will be. The change in the team members in the management level may also cause problems in the project as to get all the knowhow of the project and current situation will take time.

While implementing the project the members of the project may be change locally or internationally. This creates unsteadiness in the project specially when an efficient member who is displaced. The reason of the change may be the injury, sickness, maternity leave, switching of the member's job. Hence organizations in such cases don't deal with all such problems or mishaps and motivate the other team members to keep their spirit high to work in unity and this can be a probable cause of delay in the projects.

3.9 Level of collaboration and Communication between project team members:

The reason of project failure is due to unsuccessful communication between project team members. Knowledge of communication, its right use, its style to convey a message successfully, so that it may be understood, is very important. For development of a project to work correctly and on time, communication is necessary in whole project. Management of the project should clearly explain what the project demand is, about its supplier, contractors and other coworkers of the project. Every team member should know about each other and should have communication with each other. Any misinterpretation during the project may lead to delay of project and to correct that misconception takes more time leading to delay and exceeding of the budget. The coworkers should give up to dates about the working of project to each other so that every member can clearly understand the process and problems occurring in project. This will help the timeline ending of project and also cost effective. According to (Ricketts & Ricketts 2010)mostly the problems occur in project due to lack of skill of communication between the coworkers.

If more than one team is involved in a process are running at a time in a complex project then boundary line between the teams are to clearly define. The accident of space transfer Challenger could be kept away from if a good structure of communication would be established according to Presidential Commission, 1986. The evidence showed that management could not communicate properly thus informed decision could not be taken. In Hartford Coliseum case due to interaction between production supervisor and team of designing could find out the errors in design while construction. In Hyatt walkway case one of the reason of failure was problem in communication (Luth 2000, Gillum 2000) but it was not sure that was this a major reason or not(Bruce Ellingwood 2005).

Deficiency of group effort in the project coworkers is reason of delivery failure of the project successfully. The establishment of the team work depends upon many factors like motivation ideas, mutual confidence, satisfactory advice response and good relationship of workers (Camilleri 2012). On the other hand projects not always get done in the way they are planned initially but need to be poked time to time.

Implementations of the development in offshore IT policy involve the working in different association and civilization. These two things may be totally different from the ones culture and may require change in working way for the members of team working on onshore. Offshore organization has many

ways to work on but the changes have to be done on the basis of cultural setup. It may take long time than expectations to get use of these changes in setup both for onshore as well as for offshore workers. But onshore team members mostly get use to this difference. In all the steps these differences have to be discussed with the workers otherwise it may create problems in project (Köster 2009).

If there is difference of more than 4 hours then it causes trouble in relationship of communication. So in all events related to project the communication have to be planned with great care if there is considerable time zone difference. Difference of time zone means that synchronous collaboration time between onshore and offshore members of project is narrow. Misinterpretations which could be solved in few minutes by right communication can take lot of time if the communication is indirect. It shows that the time zone can lead to the delay of the process of communication and indirectly the ability of making up-to-date decisions. It also may increase the expenditure of the coordination between shores (Meyer & Joseph 2007).

3.10 Conflict within Project Team Members w.r.t Different Factors:

Conflicts are indeterminate contrasts existing among people and play a vital role during the smooth execution of industrial projects. Conflicts cause people to bear on in an unforeseen way. Both physical and mental conflicts have a powerful enthusiastic segment associated with them. The most broadly perceived sorts of dispute are change, worth, and behavior and it is a basic phenomenon that causes delays in different phases of project execution. As an outline changes may contain course of action changes, new requirements, improvements, new organization, spending arrangement cuts, or conformity in methodologies for achievement. These movements may come unexpectedly, realizing enthusiastic changes to an endeavor, or they may contain a movement of little changes that cause a gathering to persistently modify and alter. Standard changes in an affiliation are critical work process changes, overhaul or remaking, new ownership or organization, development changes, genuine events, (for instance, mergers, acquisitions, new associations, or centered changes), or new assignments and business opportunities.

That these movements are as a general rule outside the control of a gathering may add shakiness and frustration to collaboration orchestrates. Exactly when people are run up against with the probability of advancement, their responses may contrast; they may see an open entryway for helpful change, be

intrigued to take in more, meet the probability with doubt and suspicion around the fundamental clarifications behind the change, or be concerned over the potential individual impact. People who are happy about change may be particularly incorporated into the undertaking and in like manner have control. In like manner, they despise their present state and welcome a change. The earnestness of the response depends on upon the clear impact of the change on the individual.

The more individual and drawing closer the change is, the more unmistakable the individual will feel incapacitated. The kind of characteristics attempted may fuse validity, uprightness, ethics, or social differences. People don't deal their qualities instantly. Regard conflicts are the things that people have confidence in and are the most difficult to oblige when challenged (Spiess & Felding 2008). Behavioral conflicts are interpersonal conflicts among associates that reduce cooperation and execution. By and large called character conflicts, they happen when two or more people couldn't care less to work with each other, which causes an intrusion to gathering space. People have unique styles by the way they give, express their slants, process information, and associate with others. These qualifications in practices may be gotten contrastingly by others. Behavioral conflicts are character conflicts, which diminish coordinated effort and execution.

3.11 Lack of Responsibilities:

The reasons of nonappearance of commitment going from modest laziness or an anxiety of frustration, through to a sentiment feeling overwhelmed by the extent of an issue or a situation and this effect the endeavor amazingly. Whatever the reason, if people disregard to expect obligation, they'll miss the mark in their jobs, they'll fail their gatherings, and they'll disregard to create as individuals. The dominant part of this makes it basic to address the issue. In both the Hyatt walkway and Hartford stadium cases, one of lessons learned was lack of clear and well define responsibilities for all stakeholders who participate in the process of different design and construction phases of project (Bruce Ellingwood 2005).

Various undertaking executives coordinate a Stakeholder examination toward the start of an endeavor. This endeavor records each one of the overall public and relationship with an energy for the endeavor and their distractions in the errand and their preference or pined for results. Key accomplishment variables may recognize from the leisure activities of the intense accomplices. It is

weak to accomplice examination to perceive all the accomplice practices and consolidate them in the schedule (Harris 2009).

Moderate decisions similarly achieved undertaking slippage. Around one-sixth of the deferral cases were a result of chiefs or distinctive accomplices who did not go about as quick as essential to keep the endeavor on timetable.
As a less than dependable rule the reason appeared was lack of approach to boss or nonappearance of boss eagerness for undertaking. Due to various endeavors, delay of project resulted of increase in common contentions, trades, or delay.

A company has excellent resources and experts but project delay happens due to incomplete information about the project, improper planning, unawareness of changing and schedule create interdependency. Project managers don't take appropriate action to provide sufficient information and assign responsibilities to each individual.

In average projects facing such issues loose around twenty five days to get feedback against project request(Kendrick 2015). An organization has brilliant resources and expertise however still delay occurs because of insufficient information, poor planning, lack of changes and schedule awareness make interdependency. Project Managers and Leads don't work out properly to distribute required information and task to all project members. Moreover Project Managers don't prepare, update and share the site and system information to the individuals. These issues lead to cost overrun and delay in different allocated task in projects.

3.12 Insufficient Training and Experience:

In instances where there is a lack in training throughout the project, i.e. from engineering related work to unit operations and staff maintenance, it is likelihood that the contractor failed to realize the necessity of extra-training and supervision of the sub-contractors. Moreover, there is also a probability that the proprietor did not appreciate the lack of training in operating and maintenance workers. The aftereffects of this shortsightedness would be adverse commencing from prolonged deferrals in project beginning, production and finally its completion; significant loss of funds; problems in developing the on-specification products as well as in maintenance of plant operations; increased cost

prices due to huge off-specification products; and lastly in launching of markets with contended consumers.

The group leader casts huge impact on the output efficiency of the group. Group leader's behavior in addition to the morals of the group, helps the group in achieving its aims and objectives. There is a possibility that an experienced individual may not get the chance to lead a group. It may be probably because that individual never got nominated for the post or, as stated earlier, he might have been absent at the right time. A project under the hold of an inexperienced leader may suffer financial losses because of carelessness and mismanagement. Though it holds true that first step leads to the next step and experience needs to be learned from mistakes, an individual with prior expertise in the field will prove to be a better candidate to carry out the project from start till end. Beginners need supervision during the process, or nonetheless, they require a supervisor who is well-versed on the matter and is trustworthy to provide the best possible guidance. The capability of a leader to inspire his followers to perfection is the potent factor that differentiates leadership and management. One needs to be an arduous leader, in order to be able to ignite a flame of passion and persistence, to become an inspiring leader(Ricketts & Ricketts 2010).

3.13 Project Planning and Controlling:

Skipping planning procedure usually followed in those projects which possess comparable responsibilities as done in former projects. It means that a minor but quiet significant project can be directed deprived of a proper strategy and association. According to (Larson 2012), this sort of planning ulimately results in high cost mistakes and reason behind these mistakes is that tasks of project were performed without any definite direction and went in incorrect way. Moreover, plan and situations of affairs are not stagnant particularly in complex and huge projects so they always demand constant altering and reviewing. The fact is that performing a project needs thorough preparation and constricted control, but the technique useddemands consistent and repeated reviews. It can be established that absence of an appropriate planning and control mechanism has severe consequences. The consequences involved may be are as follows:

- Customers are displeased by late delivery.
- Staff members of organization experience low self-esteem and low inspiration due to persistent burdens to attain unachievable targets.

The directors or supervisors of projects are forced to take short cuts that are not only risky in some situations but may also cause hazards to the repute and status of organization; every single project demands need to overcome the same concerns as the prior projects.

On the other hand, Camilleri in 2012 revealed that adopting proper planning as well as control mechanism at every moment will enable a project to be performed and completed in time and be capable to intermingle successfully with the customer, dealers and the tasks allotted to the staff members of organization. An appropriate planning and control mechanism permits those contained within in the project to fully comprehend what is mandatory. Moreover, any arising dangers and fears which are expected are sorted out and solved before they may be detrimental to the project(Camilleri 2012).

According to Chemuturi & Cagley 2010, an overall interruption in each action is also a consequence of the pitiable planning or poor control in the course of project accomplishment. A quotation of *Abraham Lincoln says, "Incase of six hours assignment to fell a tree, I would spend around four hours to sharp the axe".* This statement is the best guidance to suggest the value of planning as numerous drawbacks are related with planning.

It is most commonly observed that in many organizations planning needs too many documents. Occasionally the process of planning goes overboard and administration substitutes proficiency, mostly in those organizations which deal planning of project as a workout in forming documents just in order to meet the necessities of the procedure. These organizations produce planned documents and afterwards put them apart and complete the project on an ad hoc base. So far, planning is not a workout to make documents. Planning is something looking into the future and building requirements for the requisite assets so that a project will be completed efficiently and without any mismanagement (Chemuturi & Cagley 2010). Due the mismanagement of planning at this level create ambiguity and this causes delays in different level of projects. Deficiency of incorporation between the stakeholders of project, as well as the prescribed groups, customers, dealers, supervisors and many others may results in overlooking and interruption of whole plans. For that reason, project scope as well as the incorporation of those who are involved in the project, offers a strong origin for precisely determining the content, necessities of work and establishing quantity of the works, labor and further resource request (Camilleri 2012).

(Yaghootkar, K., & Gil 2012)gave the definition of schedule pressure that it is the gap between perceptions of days of work of project manager needed to finish work days that are allotted for finishing project as well as the days of actual working that remain prior to accomplishment of strategy. Griffin , Blichfeldt and Eskerod studied and gave argument that timeline pressure on the project caused the delaying and induced the negative effect on the performance of business (Yaghootkar, K., & Gil 2012). Moreover the pressure of schedule originates from settings by exchanging of resources between the projects.

Senior level administration might possibly allocate resources temporarily from other projects to complete most critical and important project on time. As a result the productivity decreases due to increase in the attempts to cover up the delay in project.

Studying the research from Rosenau (1998), Crawford (1992), Canonico & Soderlund (2010) and Geraldi (2008) (Yaghootkar, K., & Gil 2012) stated that it is a part of spirited environment and to overcome this in the market it is necessary to address more than one project at a time under the pressure.

3.14 Lack of Trust at work:

There can be a relation between performance and lack of trust. In the organizations or institutes the trust is very important thing. It becomes more important when an employee feels insecurity or at risk. This can be exemplified by the time when there was employment disorder like acquisitions, mergers etc. The prominent issue for the people of that time is trust. Trust is a big factor which motivates employees free to pay their full attention and energy to work. If the workers or staff has trust in their organization then they will invest their energy, focus, intension, time and abilities to make perfect working environment. They just want to know that if their organization or institute is taking prudent or astute decision about their investments. This allegory shows that trust is important thing which make the employees enable to invest their hard work. If there is no trust then the employees will use his most of the time and power to secure them not for the progress of organization (Macey et al. 2011)

3.15 Poor Post Execution Phase of Project Delivery

Cost overrun and delay can be as a consequence of post-execution stage (conclusion) of an undertaking. Since this is typically the last portion of a project life cycle, there is a plausibility of it

being disregarded even by an association, more so inside of different project situations. Slow closeouts could drag different activities that involve hand over through unresolved disputes connected or associated with acceptance of the client, procurements, and contracts, order change issues unresolved, final changed orders not addressed, out of final poor closer accents, unclear documentation of success of the project and lessons obtained.

Clients who prove slow to accept or even fail to complete a project arrange can be a result of unexpected delay and stray charges that are pulled out on the project. An example is when the project workforce is not decommissioned within the period following the project completion, there is a habit of organizing a team that has most of the idlers that have the possibility to incur extra project expenses as a result of visual projection, and this can cause project overrun of the project cost. In a similar circumstance, payment delays to suppliers and contractors after completion of a project could bring about disputes and delay to sign the final project certificate after completion. Cost overrun and delay of slow exclusion can be prevented through implementation of project closure phases as premeditated (Ambituuni 2011).

3.16 List of Mistakes

The section *3* focused on literature study, a list of mistakes produces by the use of different sources. Considering the mistakes questionnaire was produced to get the probable causes of mistakes from industrial experts. *Table 5* below illustrates the mistakes identified during literature review.

Table 5: Mistakes Produced during Literature Study

Sr No	*List of Possible Mistakes*
3.1	What are the major causes of Project Complexity and Design Errors, which influence the Project completion?
3.2	What are the major causes of Poorly Defined Project Scope and Scope Change, which influence the Project completion?
3.3	What are the major causes of Challenges with EPC and Inappropriate and Inadequate Procurement Procedure, which influence the Project completion?
3.4	What are the major causes of Poor Quality and Delay in Delivery, which influence the Project completion?
3.5	What are the major causes of Lack of Proper Procedure and Documentation, which

	influence the Project completion?
3.6	What are the major causes of Technical and Operational Challenges, which influence the Project completion?
3.7	What are the major causes of Regulatory Challenges to follow-up, which influence the Project completion?
3.8	What are the major causes of Poor Resource allocation and frequent Change of Project Team, which influence the Project completion?
3.9	What are the major causes of Poor Collaboration Level and Communication between project team members, which influence the Project completion?
3.10	What are the major causes of Conflict within Team Members, which influence the Project completion?
3.11	What are the major causes of lack of responsibilities, which influence the Project completion?
3.12	What are the major causes of insufficient training and experience, which influence the Project completion?
3.13	What are the major causes of inadequate project planning and controlling, which influence the Project completion?
3.14	What are the major causes of lack of trust at work, which influence the Project completion?
3.15	What are the major causes of poor post execution of project, which influence the Project completion?

4 RESULT

The BN structure generated with the domain specialists' assistance is portrayed in the *Fig 9* below, CPT variables in section *8.5* has been placed in each node and result are presented in *Table 7*

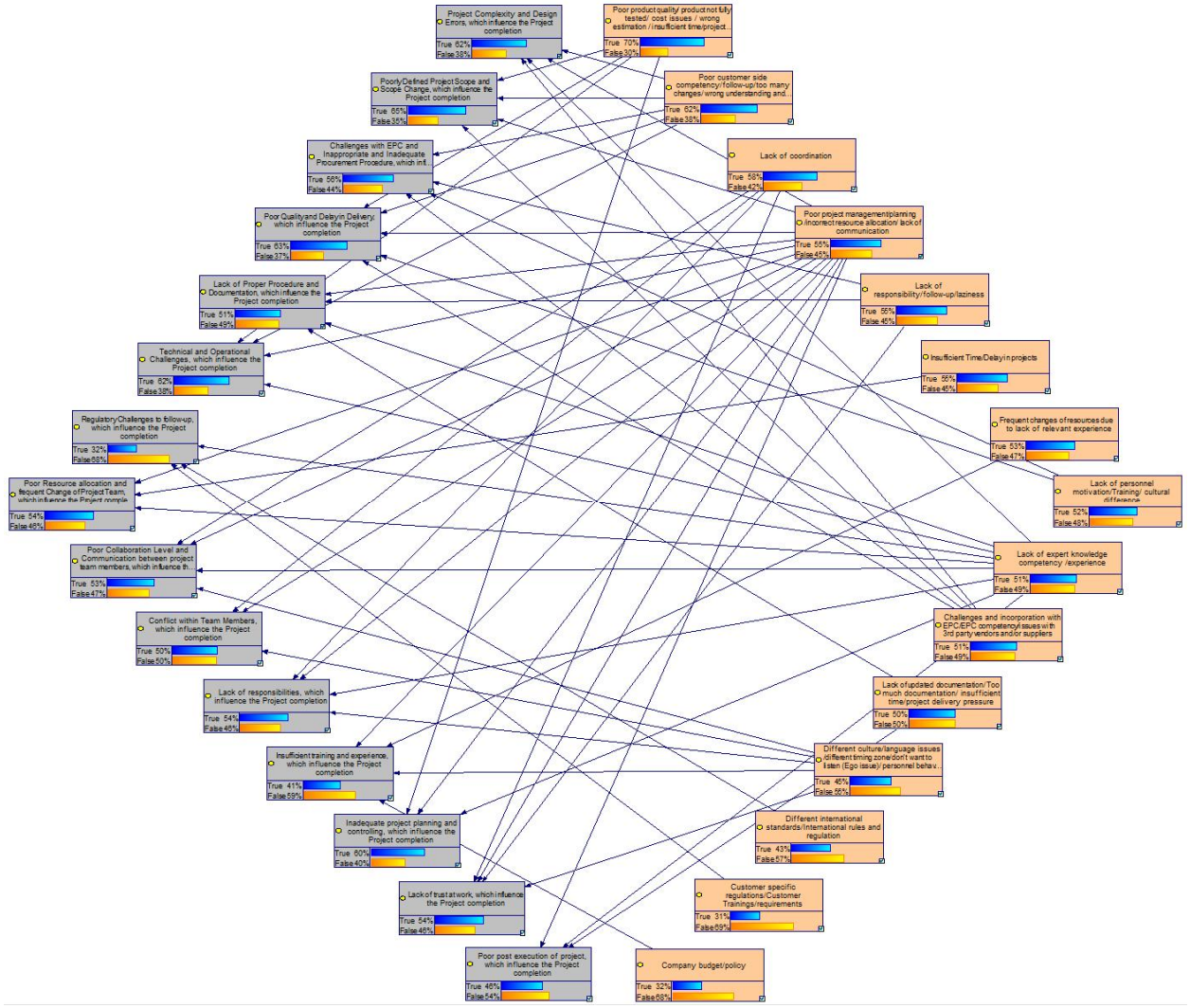

Fig 9: BN build on mistakes in industrial control, DCS, and SCADA system project deliverance

The probabilities of the mistakes and their related causes were placed in a BN followed by simulation in Genie software. The model provided the probabilities of occurrence for every mistake. In so doing, we showed the effect of each one of the causes on the mistakes as a quantifiable measure. Moreover, the effect of every cause was evaluated solely. From this we developed an individual measure of the effect of every cause.

It is worth noting that, this Bayesian Network does not seek to be absolute in the sense that all essential dependencies are stipulated. According to the description in section 2.3, the dependencies incorporated are those that were recognized to have great impact parameters by the domain specialist when taking into account the expense of specifying quantitative parameters over the dependencies.

5 ANALYSIS

5.1 Applications and precision

The consequential BN can be useful in decision making process in various ways. This part will explain how the mistakes probabilities can be foreseen and how the influence strength of related variables can be evaluated. The potential appliances of BN in the research sector are shown here through the methods applied. Finally in this part, the precisions of the predictions provide by the network is described. The Genie software (Druzdzel 1999) was used for the analysis.

5.2 Prediction probabilities of mistakes

The tables described in section *8.5* details about the likelihood that a mistake is encountered under distinct conditions. These can be employed in the assessment of the likelihood that a project has encountered a mistake. For example, the possibility that Project Complexity and Design Errors, which influence the Project completion (M1) can be premeditated based on an evaluation of: 1- Lack of expert knowledge competency /experience (C9), 2- Poor project management/planning /incorrect resource allocation/ lack of communication (C4), 3- Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers (C10), 4- Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication (C2).

Agreed that the preceding or default probabilities for these variables are obtainable these evaluations can also be developed for the distinctive project or for projects which requirements are known partly. *Table 6* depicts preceding probabilities for the measures included in the network. These were obtained from the same domain specialists as the conditional probabilities (CP). They intend to mirror the possibilities that an unsystematic project within the firm is implemented under these conditions.

Table 6: Preceding probabilities for the circumstances in the firm's project. C1 and C15 indicate the influential causes.

Id. Number	*Conditions (Causes)*	*Probability*	*Std. Deviation*
C-1	*Poor product quality/ product not fully tested/ cost issues / wrong estimation / insufficient time/project delivery pressure*	*70.4*	*21.4*
C-2	*Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication*	*62.3*	*23.4*
C-3	*Lack of coordination*	*58.1*	*18.1*
C-4	*Poor project management/planning /incorrect resource allocation/ lack of communication*	*55.4*	*19.9*
C-5	*Lack of responsibility/follow-up/laziness*	*55.4*	*19.8*
C-6	*Insufficient Time/Delay in projects*	*54.6*	*24.4*
C-7	*Frequent changes of resources due to lack of relevant experience*	*53.1*	*21.4*
C-8	*Lack of personnel motivation/Training/ cultural difference*	*51.9*	*19.5*
C-9	*Lack of expert knowledge competency /experience*	*51.5*	*22.5*
C-10	*Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers*	*51.2*	*21.4*
C-11	*Lack of updated documentation/ Too much documentation/ insufficient time/project delivery pressure*	*50.0*	*22.2*
C-12	*Different culture/language issues /different timing zone/don't want to listen (Ego issue)/ personnel behavior*	*44.6*	*21.8*
C-13	*Different international standards/International rules and regulation*	*43.5*	*26.6*
C-14	*Customer specific regulations/Customer*	*31.5*	*19.6*

	Trainings/requirements		
C-15	*Company budget/policy*	*32.3*	*17.2*

Basing on this probabilities, the possibility that a mistake is encountered can be evaluated for a random organizational project. These are indicated in *Table 7*. With preceding probabilities for situations that obtained forecasts could also be developed for distinct occasions where bit of the conditions are well identified and the others are not known. *Table 7* demonstrates this via set-ups A and B scenarios. In the set-up A, condition C1, C2, C3 and C4 are "true" as shown in BN *Fig 10*, whereas in set-up B condition C1, C2, C3, and C4 are "false" shown in BN *Fig 11*.

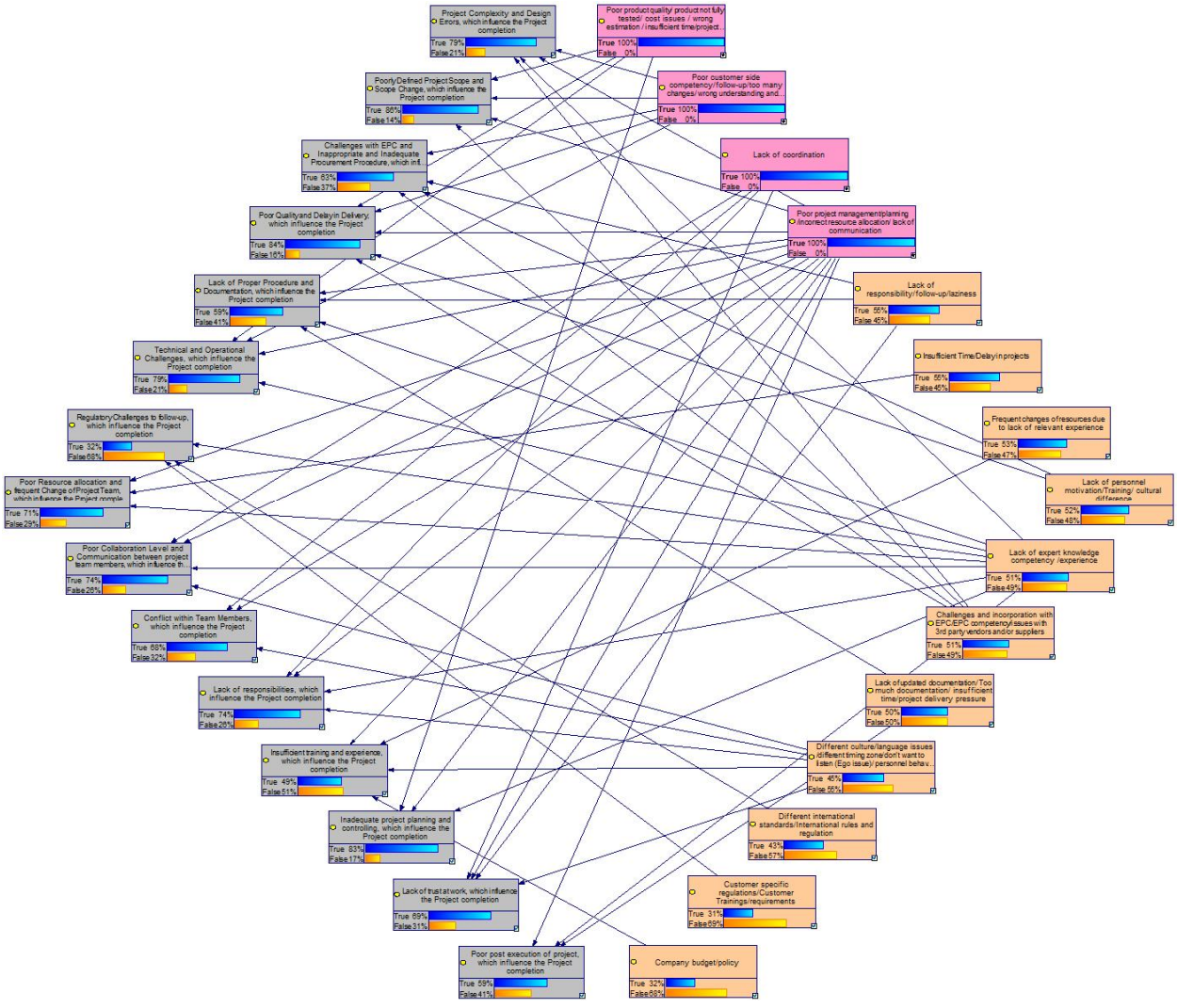

Fig 10: Scenario A, where the condition C1, C2, C3 and C4 are true

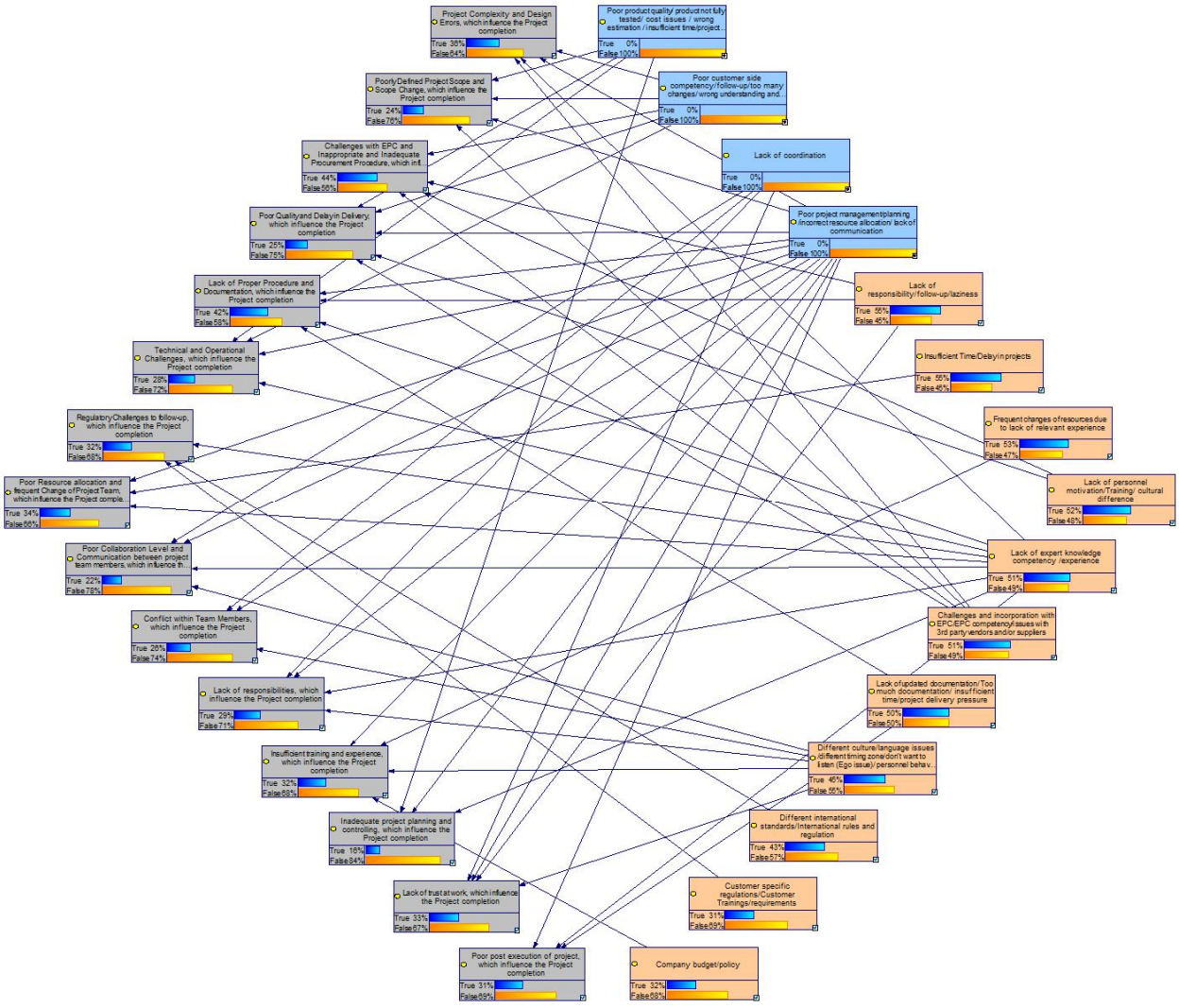

Fig 11: Scenario B where condition C1, C2, C3, and C4 are false

Table 7: Preceding possibilities for the circumstances in the firm's project. M1 and M15 indicate the mistakes identifies as the ones with great impact. Random project indicates the probability of the equivalent mistake to be encountered for a typical project. Scenario A and B indicates the possibilities of equivalent mistakes to be encountered in the case of certain cause conditions.

Id. Number	*Mistakes*	*Random, Project,s*	*Scenario A*	*Scenario B*
M-1	*Project Complexity and Design Errors, which influence the Project completion*	*62*	*79*	*36*
M-2	*Poorly Defined Project Scope and Scope Change,*	*65*	*86*	*24*

	which influence the Project completion			
M-3	*Challenges with EPC and Inappropriate and Inadequate Procurement Procedure, which influence the Project completion*	*56*	*63*	*44*
M-4	*Poor Quality and Delay in Delivery, which influence the Project completion*	*63*	*84*	*25*
M-5	*Lack of Proper Procedure and Documentation, which influence the Project completion?*	*51*	*59*	*42*
M-6	*Technical and Operational Challenges, which influence the Project completion*	*62*	*79*	*28*
M-7	*Regulatory Challenges to follow-up, which influence the Project completion*	*32*	*32*	*32*
M-8	*Poor Resource allocation and frequent Change of Project Team, which influence the Project completion*	*54*	*71*	*34*
M-9	*Poor Collaboration Level and Communication between project team members, which influence the Project completion*	*53*	*74*	*22*
M-10	*Conflict within Team Members, which influence the Project completion*	*50*	*68*	*26*
M-11	*Lack of responsibilities, which influence the Project completion*	*54*	*74*	*29*
M-12	*Insufficient training and experience, which influence the Project completion*	*41*	*49*	*32*
M-13	*Inadequate project planning and controlling, which influence the Project completion*	*60*	*83*	*16*
M-14	*Lack of trust at work, which influence the Project completion*	*54*	*69*	*33*
M-15	*Poor post execution of project, which influence the Project completion*	*46*	*59*	*31*

Apart from that, another unique relevance is to evaluate how examinations of mistakes that are not available or available impact on the belief on unavailability or availability of other mistakes. The evaluation of the posterior probability for any unique network variables under certain examination of variables in given network has been made probable by use of Bayesian networks. This can be applied in the evaluation of the likelihood of a condition of a project according to its observation of the mistakes encountered in it. With rationalized beliefs on the circumstances of a project, efficient beliefs for other mistakes can be contingent. For example, when it has been identified that "Project Complexity and Design Errors, which influence the Project completion" (M1), this will signify the status in conditions C2, C4, C9, and C10. Since these situations also have an impact on the possibility that other mistakes are encountered, this set of information will rationalize the possibility that these mistakes are developed. In an incidence where M1 is already identified to be true the possibility that M2, M3, M4…..M15 are true is also amplified.

5.3 Validation of Model by Stimulating the Presence and Absent of Causes

Through simulation of a model designed for the all causes step by step for both the presence and absence conditions aided us in the confirmation of the results. The outcomes of this exercise are us displayed in *Table 8* and *Table 9* below. These portray at the same time validates our claim that the likelihood of mistakes rises or declines as we begin to incorporate or eliminate the causes. Basing on the table, it is vividly portrayed on how setting a confirmation for one or more causes affects the likelihood of the mistakes. It is worth knowing that after verification is set for the leading four causes, there is minimal or no alteration in the likelihoods. Therefore, we can state that these causes are significantly vital.

Table 8: illustrates the progressive presence of causes

Id Number	Mistake	Gradually Presence of Causes														
		(C1) 100% True	(C1 to C2) 100% True	(C1 to C3) 100% True	(C1 to C4) 100% True	(C1 to C5) 100% True	(C1 to C6) 100% True	(C1 to C7) 100% True	(C1 to C8) 100% True	(C1 to C9) 100% True	(C1 to C10) 100% True	(C1 to C11) 100% True	(C1 to C12) 100% True	(C1 to C13) 100% True	(C1 to C14) 100% True	(C1 to C15) 100% True
M-1	Project Complexity and Design Errors, which influence the Project completion	62	68	68	79	79	79	79	79	89	96	96	96	96	96	96
M-2	Poorly Defined Project Scope and Scope Change, which influence the Project completion	71	79	79	86	86	86	86	86	86	95	95	95	95	95	95
M-3	Challenges with EPC and Inappropriate and Inadequate Procurement Procedure, which influence the Project completion	56	63	63	63	69	69	69	75	75	89	89	89	89	89	89
M-4	Poor Quality and Delay in Delivery, which influence the Project completion	71	76	76	84	84	84	84	92	92	97	97	97	97	97	97
M-5	Lack of Proper Procedure and Documentation, which influence the Project completion?	51	51	51	59	65	65	65	65	77	77	85	85	85	85	85
M-6	Technical and Operational Challenges, which influence the Project completion	69	73	73	79	79	79	79	79	93	93	93	93	93	93	93
M-7	Regulatory Challenges to follow-up, which influence the Project completion	32	32	32	32	32	32	32	32	43	43	43	43	50	76	76
M-8	Poor Resource allocation and frequent Change of Project Team, which influence the Project completion	54	54	54	71	71	82	82	82	87	87	87	87	87	87	87
M-9	Poor Collaboration Level and Communication between project team members, which influence the Project completion	53	53	65	74	74	74	74	74	80	80	80	88	88	88	88
M-10	Conflict within Team Members, which influence the Project completion	50	50	61	68	68	68	68	68	68	68	68	83	83	83	83
M-11	Lack of responsibilities, which influence the Project completion	54	54	32	74	74	74	74	74	78	78	78	88	88	88	88
M-12	Insufficient training and experience, which influence the Project completion	41	41	41	49	49	49	56	56	56	56	56	64	64	64	83
M-13	Inadequate project planning and controlling, which influence the Project completion	69	69	69	83	83	83	83	83	87	87	87	87	87	87	87
M-14	Lack of trust at work, which influence the Project completion	54	54	60	69	74	74	74	74	74	74	74	87	87	87	87
M-15	Poor post execution of project, which influence the Project completion	46	46	46	59	59	59	59	59	72	72	79	79	79	79	79

The simulation of the model was meant to observe the likelihood of mistakes consistently after every cause all through from C1- C15 was presented. The model was simulated with 100 percent existence of the variable cause each after each to contrast the likelihood of mistakes as we presented each cause. The results of this experimentation are illustrated in the *Table 8* where the extreme changes in likelihoods of mistakes are represented by the grey columns while each of the main causes was incorporated. It is apparent that possess a key impact on the likelihoods of mistakes.

Table 9: illustrates the progressively absence of causes

Id Number	Mistake	Gradually Presence of Causes														
		(C1) 100% True	(C1 to C2) 100% True	(C1 to C3) 100% True	(C1 to C4) 100% True	(C1 to C5) 100% True	(C1 to C6) 100% True	(C1 to C7) 100% True	(C1 to C8) 100% True	(C1 to C9) 100% True	(C1 to C10) 100% True	(C1 to C11) 100% True	(C1 to C12) 100% True	(C1 to C13) 100% True	(C1 to C14) 100% True	(C1 to C15) 100% True
M-1	Project Complexity and Design Errors, which influence the Project completion	62	52	52	36	36	36	36	36	21	9	9	9	9	9	9
M-2	Poorly Defined Project Scope and Scope Change, which influence the Project completion	53	39	39	24	24	24	24	24	24	10	10	10	10	10	10
M-3	Challenges with EPC and Inappropriate and Inadequate Procurement Procedure, which influence the Project completion	56	44	44	44	35	35	35	27	27	11	11	11	11	11	11
M-4	Poor Quality and Delay in Delivery, which influence the Project completion	45	37	37	25	25	25	25	15	15	8	8	8	8	8	8
M-5	Lack of Proper Procedure and Documentation, which influence the Project completion?	51	51	51	42	32	32	32	32	22	22	9	9	9	9	9
M-6	Technical and Operational Challenges, which influence the Project completion	46	36	36	28	28	28	28	28	8	8	8	8	8	8	8
M-7	Regulatory Challenges to follow-up, which influence the Project completion	32	32	32	32	32	32	32	32	20	20	20	20	16	7	7
M-8	Poor Resource allocation and frequent Change of Project Team, which influence the Project completion	54	54	54	34	34	17	17	17	9	9	9	9	9	9	9
M-9	Poor Collaboration Level and Communication between project team members, which influence the Project completion	53	53	36	22	22	22	22	22	17	17	17	6	6	6	6
M-10	Conflict within Team Members, which influence the Project completion	50	50	36	26	26	28	26	26	26	26	26	11	11	11	11
M-11	Lack of responsibilities, which influence the Project completion	54	54	43	29	29	29	29	29	24	24	24	7	7	7	7
M-12	Insufficient training and experience, which influence the Project completion	41	41	41	32	32	32	20	20	20	20	20	16	16	16	8
M-13	Inadequate project planning and controlling, which influence the Project completion	41	41	41	16	16	16	16	16	8	8	8	8	8	8	8
M-14	Lack of trust at work, which influence the Project completion	54	54	46	33	22	22	22	22	22	22	22	7	7	7	7
M-15	Poor post execution of project, which influence the Project completion	46	46	46	31	31	31	31	31	16	16	8	8	8	8	8

On the other hand, we excluded the variable cause nodes related to the same way it was carried out for the inclusion in the preceding section. This again evidenced the key effect of the four causes. The results of the likelihood of mistakes after the exclusion of step by step of causes C1 – C15 are illustrated in the grey columns in *Table 9*.

The second substantiation level was through the verification of our justification by evaluating the strength of impact of cause nodes on the mistake nodes. The summation of this strength of the impact evaluation in *Table 10* acknowledged the causes that were more impactful on the mistakes. Through comparison of the justification process we established that cause C1 through to C4 had the major influence, while others has a minimal impact, however, not worth negligence.

5.4 Evaluating the strength of influence on conditions

The BN in *Fig 9* describes how the status of thirty (30) variables associates with each other. This can be used by a decision maker to evaluate the influence of fifteen causes on 15 types of mistakes. This effect can be evaluated by carrying out observations on the conditional probabilities indicated in *Fig 9*. These describe how presumption would act under distinct conditions. Nevertheless, the theory portrayed in the conditional probabilities of the BN can be hard to comprehend, even for the experts.

The stagnant standardized impactful strength is one of the various approaches that have been generated to visualize and obstruct the presumption of a BN into fundamentals that are easier to comprehend. This magnitude indicates how a change in the condition of a variable impacts on the condition of another variable in the simulation.

Table *10* portrays the impact a cause has on the mistake probability in the normal. The euclidian distance is applied here in the measurement of the extent at which a cause impacts the probability that a mistake generated.

Table 10: Average static strength of influence

	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
C-1	*	0.18	*	0.26	*	0.23	*	*	*	*	*	*	0.28	*	*
C-2	0.16	0.21	0.19	0.12	*	0.13	*	*	*	*	*	*	*	*	*
C-3	*	*	*	*	*	*	*	*	0.28	0.25	0.19	*	*	0.14	*
C-4	0.26	0.2	*	0.2	0.17	0.13	*	0.36	0.22	0.16	0.24	0.18	0.39	0.22	0.28
C-5	*	*	0.15	*	0.15	*	*		*	*	*	*	*	0.15	*
C-6	*	*	*	*	*	*	*	0.27	*	*	*	*	*	*	*
C-7	*	*	*	*	*	*	*	*	*	*	*	0.19	*	*	*
C-8	*	*	0.13	0.19	*	*	*	*	*	*	*	*	*	*	*
C-9	0.24	*			0.2	0.31	0.24	0.12	0.1		0.09		0.1	*	0.27
C-10	0.19	0.21	0.27	0.11	*	*	*	*	*	*	*	*	*	*	
C-11	*	*	*	*	0.2	*	*	*	*	*	*	*	*	*	0.17
C-12	*	*	*	*	*	*	*	*	0.18	0.32	0.24	0.09	*	0.23	
C-13	*	*	*	*	*	*	0.12	*	*	*	*	*	*	*	*
C-14	*	*	*	*	*	*	0.3	*	*	*	*	*	*	*	*
C-15	*	*	*	*	*	*	*	*	*	*	*	0.23	*	*	*
Sum	0.85	0.8	0.74	0.88	0.72	0.8	0.66	0.75	0.78	0.73	0.76	0.69	0.77	0.74	0.72

Table 10 consequently reveals the impact a cause has on the mistake-probability in a normal case. The impact of "Poor project management/planning /incorrect resource allocation/ lack of communication" (C4) on the condition of the state in the variable "Project Complexity and Design Errors, which influence the Project completion" (M1) is for example 0.26. Nevertheless, the persuade of "Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication" (C2) on a similar mistake is only 0.16. The total of the cause' influence-strength mirrors how well they describe variability in the probability distribution. In a

similar way it can be deduced in the conditional probabilities of *Fig 9*, section *8.5* and *Table 10* these mistakes are fully detailed by the causes incorporated here.

5.5 Accuracy of Model with reliability

The precision of the estimations generated through the availed BN is a major implication of its usefulness. This BN is generated with the aid of the domain specialist. Therefore, the uncertainty related to these estimations can be evaluated based on these respondents' domains knowledge at the same time the network elicited using this process. Mistakes in these two would evolve differences amongst respondents. The elicitation process, the respondents and their concurrence is conferred below.

Table 2 details the domain specialists' experience. The table proves the experience of the domain specialist in the field of Industrial Control, DCS and SCAD system deployment. Based on time experience with deploying varied technology they are experienced ranging between 4 years to 40 years. According to this it logical to consider that the group of individuals employed to make the BN are well versed with their work. Nevertheless, since their work is only accountant for by a single organization they have worked for, it is worth questioning whether their statements on conditional possibilities can generalize other possible organizations.

Considerate to the elicitation methods the best practice method detailed in (RENOOIJ 2002) has been employed with some anticipation. In particular, data was not gathered with the aid of figures or other annotations, at the same time the data has not been proved regard to the observable frequencies. Apart from that, the interview design provided the domain specialist with a given extent of freedom when responding to questions and the utilization of a number of respondents provides some extent of proof.

The BN depends greatly on the idea of multiple experienced individuals. According to (Einhorn 1974) an essential, although not adequate, provision for these persons to have domain specialty is that they be of the same opinion at the same time they can reach for a mutual understanding. The accord of the respondents' answers can therefore, provide a given extent of proof of the models accuracy. In precise, it is particularly based on data acquire form domain specialists. According to (Weiss & Shanteau 2003), this criterion demands that specialists share an opinion about variables definition

that they do not essentially do. In the current incidence the respondents could get to a consensus on the BN qualitative formation at the same time the discrepancy of the respondents; evaluation of quantitative strictures is also low, cf. the tables in *Fig 9*. This portrays that they have similar definitions of the ideas surveyed. More prominently, it holds up the simulation's accurateness and point out that domain specialists have a good concept of how human/organization variables impact on the mistake presence. Nevertheless, further studies are required to prove that the domain specialist are calibrated, are accurate, for instance, by contrasting the BN's possibilities to the observed frequencies.

6 CONCLUSION

The deliveries of the complex project in the energy industry experiences fails and delays because of human and organizational aspects. Preceding studies in this area were either concerned with human and/or organizational variables that result to delays or the delays per se. Nonetheless, the quantitative studies about this relationship between variable types have not been fully exploited.

A standard deviation technique was used in the authentication of the differences in opinions amongst the industry experts; the evaluated variation results revealed that there were no considerable differences amongst the experts' opinions. This study proves that domain specialists in power and process automation system deployment field have a common point of view on how distinct variables associate and their related significance. The domain specialist considered in this survey reached a mutual agreement on both with regards to the variables definitions as well as their ideological relationship to each other. During the allocation of quantitative strictures to this relationship an agreement amongst the respondents was reached as well.

By means of literature review and industrial experts' opinions, a set of mistakes and their causes have been extracted which provides an insight of the problems and associated causes. Further, average of the extracted causes of the mistakes has been evaluated basing on the industrial experts feedbacks. The average values were then integrated in the BN to evaluate their dependency and influence on each other. This provides an efficient way of considering causes and mistakes associated with human and organizational factors so as to prioritize at the same time reduce the risk. In other words a project success rate can be improved if the possible causes that are highly influential to mistakes are considered. The second step entailed the validation of the influence of identical grouped causes as well as their possible mistakes generating a twofold result. At one side, it has been determined how a group of certain causes can influence different mistakes.

On the other side, a certain mistake can be avoided while considering a group of identical causes which can be helpful in reducing project risk and improving project success rate. All over again the BN approach has been used to visualize the level of influence of individual and group of identical causes depicting the impact of critical successful factors in projects.

Basing on this data as the background, this survey proves the belief that human and organizational inefficiencies, such as project control/management, cultural, policy aspects, customer and EPC inefficiency, personnel accountability, and resource allotment impact on the project lifecycle in organizations. More precisely, this survey proves that these aspects have a considerable impact on the presence of mistakes. The background of this research was deployments of DCS, SCADA, and Industrial Control systems. Since these systems in most cases operate complex infrastructure it worth noting that the defects as result of mistakes is quite common in this context.

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8 APPENDIX

8.1 Stage Number 1 of Interview Questionnaire, Collection of Causes *(from domain experts)*

3.1.1 What are the major causes of Project Complexity and Design Errors, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
	Expert 1		
1.	Changing engineers	5.	Different Tax rules in different countries
2.	Lack of new skills	6.	Document control
3.	Customer don't approve in time	7.	Difficult approve from customer
4.	Customer changing demand	8.	
	Expert 2		
1.	Because of customer	5.	Lack of experience
2.	Technology difference	6.	Lack of motivation
3.	Different ABB organization	7.	Lack of competency
4.	Delay from supplier	8.	
	Expert 3		
1.	Design input readiness and quality	5.	Projects put on hold, when started again expected to be same design as before

2.	EPC competency on ABB	6.	
3.	Late involvement of ABB in EPC projects	7.	
4.	Lack of responsibility	8.	
Expert 4			
1.	Missing or poor design input	5.	Communication gap
2.	Many revisions of the design input	6.	Parallel number of projects
3.	Lack of understanding of design	7.	Lack of competency
4.	Design not agreed upon and understood	8.	
Expert 5			
1.	Changes in projects	5.	Incompetency
2.	Complex design	6.	Lack of knowledge
3.	More disciplinary changes	7.	No complex overview
4.	Many vendor involvement	8.	
Expert 6			
1.	Breakdown structure	5.	Onshore project approval but rejection from offshore
2.	Sales Vs project ‘’gap’’	6.	
3.	Customer must involve operators	7.	

4.	Ownership at customer	8.	
Expert 7			
1.	Different discipline	5.	
2.	Lack of competency	6.	
3.	Complexity of design	7.	
4.	Design freeze in late phase	8.	
Expert 8			
1.	ABB structure (Different location and discipline)	5.	
2.	Lack of competency(vender)	6.	
3.	Lack of competence (EPC)	7.	
4.	Lack of competence (customer)	8.	
Expert 9			
1.	Different discipline	5.	Lack of communication
2.	Wrong understanding of project	6.	Pressure to cost down
3.	Administration influence	7.	
4.	Location difference	8.	
Expert 10			

1.	Lack of Scoop understanding	5.	Less experience
2.	Complex systems	6.	Communication gap
3.	customization of existing plane(project)	7.	Continuous Scope changing
4.	Introducing new systems	8.	
Expert 11			
1.	Wrong overview of project	5.	Lack of knowledge
2.	New technology	6.	
3.	Not ask from higher authority(feeling shy or aberrance)	7.	
4.	Lack of experience	8.	
Expert 12			
1.	Costumer requirement	5.	At the time of execution
2.	3rd party interphase	6.	Limited project offers from ABB
3.	Unclear input/misinterpretation of input	7.	
4.	Competence issue	8.	

3.1.2 What are the major causes of Poorly Defined Project Scope and Scope Change, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes

Expert 1			
1.	Communication with others	5.	Number of load changes
2.	Topology drawing	6.	Priority of shut down
3.	Lack of input /output diagram	7.	
4.	Extension in project increase the project scope	8.	
Expert 2			
1.	Misunderstanding issue to customer side	5.	Misunderstanding from outside
2.	Improper design input from customer side	6.	Bad quality
3.	Lack of experience	7.	
4.	Lack of planning from engineer and customer side	8.	
Expert 3			
1.	Involvement of correct resources and suppliers (ABB)	5.	
2.	Inadequate planning	6.	
3.	Design budge for proper study	7.	
4.		8.	
Expert 4			

1.	Poor communication	5.	Time pressure lead to that design is not of good quality
2.	Lack of competence	6.	Project don't have the necessary competence to execute the project
3.	Poor planning	7.	Expectation and scope don't clarified between the parties in the start of the project
4.	Scope change(poor scope)	8.	EPCI is not necessarily familiar with the scope /technology delivered in a project
	Expert 5		
1.	Time delay and increase the cost	5.	
2.	Wrong estimation	6.	
3.	Customer continuous change demand	7.	
4.		8.	
	Expert 6		
1.	Missing pre study	5.	
2.	Low 'front load'' by customer	6.	
3.	Lack of competence in EPC	7.	
4.		8.	
	Expert 7		
1.	Lack of competency	5.	Lack of communication

2.	New solutions	6.	ABB involvement in late phase
3.	Unclear estimated time	7.	
4.	Client interference	8.	
Expert 8			
1.	Different interpretations/ expectation	5.	
2.	Project start up	6.	
3.		7.	
4.		8.	
Expert 9			
1.	Not detail focus	5.	
2.	Customer requirement changes	6.	
3.		7.	
4.		8.	
Expert 10			
1.	Late involvement of supplier	5.	Not involvement of difference department with in EPC
2.	Competency in engineer companies	6.	Not involvement of relevant engineer/people
3.	Schedule pressure	7.	
4.	Internal transfer of project sales to	8.	

	project execution		
Expert 11			
1.	Hurry / not proper planning	5.	
2.	Customer don't know exactly what they want	6.	
3.	More resource/engineer come up with a new idea	7.	
4.		8.	
Expert 12			
1.	Change customer requirement	5.	
2.	New requirement	6.	
3.	Improper study of project	7.	
4.		8.	

3.1.3 What are the major causes of Challenges with EPC and Inappropriate and Inadequate Procurement Procedure, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			
1.	Resource changes	5.	
2.	Documentation dependency	6.	

3.	Drawing	7.	
4.	Changing of demand	8.	
	Expert 2		
1.	Documentation dependency	5.	Several scope mixed
2.	Lack of coordination	6.	Not enough experience
3.	Not responsibility	7.	
4.	Not understanding the requirement	8.	
	Expert 3		
1.	Late involvement of ABB	5.	Fresh engineer at EPC
2.	Late design input	6.	
3.	Short time for ABB to perform our part	7.	
4.	EPC understanding of ABB system/work	8.	
	Expert 4		
1.	Unclear delivery date for project	5.	Because of customer
2.	Time pressure to start project	6.	With unfamiliar scope procedure will be important project execution
3.	Unclear expectation and defined scope	7.	
4.	No purchase order in time of start of project execution	8.	

Expert 5			
1.	No knowledge about delivery	5.	Different focus
2.	Design engineer phase slow	6.	
3.	EPC and company decide themselves not involve engineer	7.	
4.	Cultural difference	8.	
Expert 6			
1.	Culture ‘not in same boat’	5.	
2.	Purchase at customer not knowing our scope	6.	
3.		7.	
4.		8.	
Expert 7			
1.	Lack of documentation	5.	Error in design and don’t know how to proceed
2.	Focus on the technical part	6.	Specific competence
3.	Engineer not following procedure	7.	
4.	Discontinuity of engineer	8.	
Expert 8			

1.	Late involvement of EPC	5.	
2.	Unclear design input	6.	
3.	Lack of experience EPC	7.	
4.	New EPC might have different procedures and culture	8.	
Expert 9			
1.	Interphase between parties	5.	Unexperienced people from different culture
2.	Climate of corporation	6.	Cultural difference
3.	Lack of training	7.	
4.	Late involvement of ABB	8.	
Expert 10			
1.	Different competence level	5.	Mentality/ personality
2.	Poorly define sope	6.	Inadequate procurement procedure
3.	Not proper procedure	7.	Communication between EPC
4.	Working culture in EPC	8.	Communication interphase with in discipline
Expert 11			
1.	Don't give sufficient information	5.	
2.	People don't know standards	6.	

3.		7.	
4.		8.	
Expert 12			
1.	Incorrect specification	5.	
2.	Improper study of installation	6.	
3.	Incorrect scope	7.	
4.	Incomplete scope because they don't know ABB system	8.	

3.1.4 What are the major causes of Poor Quality and Delay in Delivery, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			
1.	Don't check before delivery	5.	Supplier delay
2.	Wrong engineering	6.	
3.	3ed part involvement	7.	
4.	Delay in Shipping delivery	8.	
Expert 2			
1.	Wrong design input	5.	

2.	Personal fault	6.	
3.	Lack in understanding of importance and use	7.	
4.	Wrong paper work	8.	
Expert 3			
1.	Late involvement of ABB	5.	Late delivery of hardware from supplier
2.	Dependency, customer, EPC and supplier	6.	Change of scope
3.	Many parties in one project interfaces	7.	
4.	Delay in design input	8.	
Expert 4			
1.	Poor design input and many revision of design input	5.	No project schedule or not following up the project schedule
2.	Late design input	6.	No clear define millstone or delivery dates
3.	Lack of resources and competence	7.	Delay in ordered hardware
4.	Poor following up of the project	8.	No routines for QH
Expert 5			
1.	Poor design input	5.	Scope change
2.	Lack of knowledge	6.	Planning issue
3.	Not proper candidate for job	7.	Delay in design input

4.	Unnecessary waiting/ delay	8.	Technical challenges
Expert 6			
1.	Low follow up from PM	5.	
2.	Late planning	6.	
3.	Project members does not have ownership to task	7.	
4.	Wrong resource	8.	
Expert 7			
1.	Poor quality of design input	5.	Availability of resources
2.	Poor competence	6.	
3.	Design input not delivered on time	7.	
4.	Time pressure	8.	
Expert 8			
1.	Internal ABB issues with OTD	5.	Procedure not followed always
2.	Role and responsibilities with in ABB	6.	Late input from EPC
3.	Work overload	7.	Pressure on ABB scopr
4.	Poor quality from vendors	8.	
Expert 9			

1.	Bad engineer quality	5.	
2.	Bad software quality	6.	
3.	Wrong decision	7.	
4.		8.	
Expert 10			
1.	Lack of motivation to work	5.	Misunderstanding and individual interpretation of procedure
2.	Personal problem	6.	
3.	Lack of information from customer	7.	
4.	outsourcing	8.	
Expert 11			
1.	Lack of communication and follow- up	5.	
2.	Individual task to new one	6.	
3.	Lack of skills in reading design	7.	
4.	No read standers	8.	
Expert 12			
1.	Change in scope	5.	
2.	Unclear scope	6.	
3.	Change in requirement at last moment	7.	

4.	Competence issue	8.	

3.1.5 What are the major causes of Lack of Proper Procedure and Documentation, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
	Expert 1		
1.	Input from customer	5.	
2.	Complexity in finding right information	6.	
3.		7.	
4.		8.	
	Expert 2		
1.	Lack of understanding of proper procedure/paper work	5.	
2.	Misunderstanding project management	6.	
3.		7.	
4.		8.	
	Expert 3		
1.	Not always prioritized proper procedure and documentation	5.	

2.	Lack of timing	6.	
3.	Lack of knowledge or correct resource	7.	
4.	End customer don't prioritize because of budge	8.	
Expert 4			
1.	Poor internal procedure in the company is not a priority	5.	Project personal assigned to new project before previous project have been closed
2.	Time pressure	6.	Lack of motivation
3.	Lack of trainings	7.	
4.	Project don't follow up the internal procedures. Don't updated	8.	
Expert 5			
1.	Ignorance	5.	
2.	Engineer don't like to do	6.	
3.	Lack of timing	7.	
4.		8.	
Expert 6			
1.	Timing is short	5.	Use of trust to workman instead to plan
2.	Lack of focus	6.	
3.	Lack of time at setup	7.	

4.	Low focus on documentation and dates	8.	
Expert 7			
1.	Experience	5.	Difficult to document
2.	Focus on delivery	6.	Cost
3.	Time pressure	7.	responsibility split
4.	Approve quality	8.	Documentation owner unclear
Expert 8			
1.	Not needed for minor projects	5.	
2.	Lack of resource to develop and maintain procedure and documents	6.	
3.	Customer not willing to pay	7.	
4.	Different opinion of what is needed	8.	
Expert 9			
1.	Dual task/not funn/boring	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 10			

1.	Company culture for adopting to generation change	5.	Lack of training
2.	Competency	6.	
3.	Out-resourcing	7.	
4.	Lack of interest	8.	
Expert 11			
1.	Procedure are heavily follow up/ made by lawyer or engineers	5.	
2.	Procedure are boring	6.	
3.	Lack of training	7.	
4.	Prioritization	8.	
Expert 12			
1.	Not interesting	5.	
2.	Not considered in estimation	6.	
3.	Lack of focus	7.	
4.	Lack of timing	8.	

3.1.6 What are the major causes of Technical and Operational Challenges, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			

1.	Dead line	5.	Unavailable system
2.	Lack of timing	6.	
3.	Generation changing in controller	7.	
4.	Change of technology	8.	
Expert 2			
1.	Lack of technical training	5.	Lack of training
2.	Lack of time	6.	
3.	Customer give late design input	7.	
4.	deadline	8.	
Expert 3			
1.	Wrong design input	5.	Lack of specialists available
2.	New software and hardware	6.	
3.	Complexed technology	7.	
4.	Correct resource	8.	
Expert 4			
1.	New technology and unproven being delivered	5.	Poor/wrong technical solutions
2.	Missing and poor design input	6.	

3.	Missing and poor competency in the project	7.	
4.	Unclear scope	8.	
Expert 5			
1.	Lack of knowledge	5.	
2.	Uncomfortable new technology and use too with old one	6.	
3.	laziness	7.	
4.	Not want to do new things/not interesting in change	8.	
Expert 6			
1.	Introducing new technology in complex site	5.	Does sales know that it will work? 100% tested?
2.	Operator not involved to solution/ Or late involve	6.	
3.		7.	
4.		8.	
Expert 7			
1.	New technology	5.	Lack of competence
2.	Limited test	6.	
3.	New engineers	7.	
4.	Lack of understanding the whole	8.	

	procedure		
Expert 8			
1.	Time pressure	5.	
2.	Lack of competence	6.	
3.	New technology	7.	
4.	More remote work	8.	
Expert 9			
1.	New technology	5.	not tested well/scaling test
2.	New software	6.	High expectation
3.	New thing effect on other things	7.	
4.	Bad quality when new software introduced	8.	
Expert 10			
1.	Obscelete equipment's	5.	Resource availability
2.	Not able to find equivalent component	6.	Lack of testing
3.	Upgrade systems	7.	Misconfiguration of system
4.	Lack of knowledge of existing systems	8.	
Expert 11			

1.	Complexity	5.	
2.	Involvement of many different departments	6.	
3.		7.	
4.		8.	
Expert 12			
1.	Resistance to change	5.	
2.	Lack of documentation	6.	
3.	Improper implementation of project in a paste	7.	
4.		8.	

3.1.7 What are the major causes of Regulatory Challenges to follow-up, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			
1.	Customer specific specification	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 2			

1.		5.	
2.		6.	
3.		7.	
4.		8.	
Expert 3			
1.	Access and training to customers regulation	5.	
2.	Knowledge and experience	6.	
3.		7.	
4.		8.	
Expert 4			
1.	Lack of knowledge and understanding of regulation	5.	
2.	Not implicating guideline into design	6.	
3.	Lack of experience	7.	
4.		8.	
Expert 5			
1.	Too strict	5.	
2.	No user-friendly	6.	
3.	It might block innovation	7.	

4.	Not easy to assess	8.	
Expert 6			
1.	Change between different physical standers	5.	
2.	Contract and frame agreement	6.	
3.	Norsok documents	7.	
4.		8.	
Expert 7			
1.	Lack of training	5.	
2.	Region difference	6.	
3.	Not easy to find information	7.	
4.		8.	
Expert 8			
1.	Employer from aboard	5.	
2.	To many technical requirements from customer	6.	
3.	Lack of competence	7.	
4.		8.	
Expert 9			

1.		5.	
2.		6.	
3.		7.	
4.		8.	
Expert 10			
1.	International regulation	5.	Political resource
2.	Customer	6.	
3.	Lack of information about regulation	7.	
4.	Too many regulation	8.	
Expert 11			
1.	Standers are say different	5.	
2.	Difference between standers make it complex	6.	
3.	Customer don't know properly	7.	
4.	Misinterpretation what is allows or what is customer demand	8.	
Expert 12			
1.	Safety	5.	
2.	Recent new development(design context)	6.	
3.		7.	

4.		8.	

3.1.8 What are the major causes of Poor Resource allocation and frequent Change of Project Team, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
	Expert 1		
1.	Lay off	5.	
2.	Lack of resource knowing automation	6.	
3.	Change in schedule because of variation order	7.	
4.		8.	
	Expert 2		
1.	Lack of technical resource	5.	
2.	Illness	6.	
3.	Get other opportunity	7.	
4.	Prioritize the portrait	8.	
	Expert 3		
1.	Poor understanding of scope of work for the requester	5.	

2.	Poor hardware and shared knowledge	6.	
3.	Lay off	7.	
4.	Get better opportunity	8.	
Expert 4			
1.	High work load within organization	5.	Poor resource planning
2.	Priority of project that have higher focus	6.	Resource allocation has no committed by management
3.	Not enough project personal to cover necessary competence	7.	
4.	Personal leaving the company	8.	
Expert 5			
1.	Fluctuation between positions	5.	Personal reasons
2.	Lack of resource	6.	
3.	Bad planning	7.	
4.	Delay in project mass up resource allocation	8.	
Expert 6			
1.	Change in priority in work	5.	
2.	Reorganization challenges	6.	
3.	Bad communication from PM	7.	

4.		8.	
Expert 7			
1.	Prioritization change	5.	Time pressure
2.	Leaving company for change	6.	Allocation wrong competence
3.	Several offices in different locations	7.	
4.	Change in plan	8.	
Expert 8			
1.	Lack of resources	5.	
2.	Time pressure	6.	
3.	Turn over personal	7.	
4.	Lack of management attention	8.	
Expert 9			
1.	Good Offer from others	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 10			
1.	Misunderstanding scope of work	5.	

2.	Change in positions	6.	
3.	Change in responsibilities	7.	
4.	favoritism	8.	
Expert 11			
1.	Management problem	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 12			
1.	Incorrect mapping of competency	5.	
2.	Lack of resources	6.	
3.	Overload of work(one resource involve in many task)	7.	
4.		8.	

3.1.9 What are the major causes of Poor Collaboration Level and Communication between project team members, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			

1.	Time difference	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 2			
1.	Responsibilities not define	5.	
2.	Cultural change	6.	
3.	Not understanding of responsibilities	7.	
4.		8.	
Expert 3			
1.	Cultural difference	5.	Conflict values
2.	Different geographical location, not face to face	6.	
3.	Not motivated to listen	7.	
4.	Ignoring their responsibilities	8.	
Expert 4			
1.	Lack of management follow-up in the project	5.	Lack of kick meeting(internal and external)
2.	Project are located at different locations	6.	No focus on building a project team

3.	No project meetings	7.	Time difference
4.	Different understanding of project scope	8.	
Expert 5			
1.	Cultural difference	5.	Lack of time
2.	Different personality	6.	
3.	Project management issue	7.	
4.	Not physical location	8.	
Expert 6			
1.	Missing communication matrix	5.	
2.	Low team spirit	6.	
3.	Personalities	7.	
4.	Not exactly know who is responsible for asking	8.	
Expert 7			
1.	Location time difference	5.	Different culture
2.	Remote work	6.	
3.	Poor management	7.	
4.	Time pressure	8.	
Expert 8			

1.	Culture	5.	System and procedures
2.	Language	6.	Personality in project – to focus on own work
3.	Poor project management	7.	
4.	Lack of competence	8.	
Expert 9			
1.	People don't know what are expectation	5.	
2.	Personality	6.	
3.	Don't know who is responsible for what	7.	
4.		8.	
Expert 10			
1.	Language	5.	culture
2.	Unclear communication lines	6.	
3.	Poor define role	7.	
4.	Individual personalities	8.	
Expert 11			
1.	Language skills	5.	

2.	Different nationalities	6.	
3.		7.	
4.		8.	
Expert 12			
1.	Unclear role	5.	
2.	Ego issue	6.	
3.	Cultural difference	7.	
4.		8.	

3.1.10 What are the major causes of Conflict within Team Members, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			
1.		5.	
2.		6.	
3.		7.	
4.		8.	
Expert 2			
1.	Misunderstanding	5.	Different priorities

2.	Daily issue	6.	
3.	Different way of working	7.	
4.	Different type of working	8.	
	Expert 3		
1.	Cultural difference	5.	Late delivery can be cause people to blame each other for not performing
2.	Conflicting values	6.	
3.	Misunderstanding	7.	
4.	Stress in project	8.	
	Expert 4		
1.	Lack of communication	5.	
2.	Tight project schedule and high work load	6.	
3.	Different interest between project members	7.	
4.		8.	
	Expert 5		
1.	Misunderstanding because of language barrier	5.	
2.	Conflict in values	6.	
3.	Lack of coordination between project	7.	

4.		8.	
Expert 6			
1.	Personal issues	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 7			
1.	Competition	5.	Culture
2.	Time pressure	6.	Lack of communication
3.	Responsibility split	7.	
4.	mentality	8.	
Expert 8			
1.	Culture	5.	Misunderstanding(time ,background, complexed project)
2.	Poor project management	6.	
3.	Resource management	7.	
4.	Time pressure	8.	
Expert 9			

1.		5.	
2.		6.	
3.		7.	
4.		8.	
Expert 10			
1.	Poorly define role and responsibilities	5.	Personal conflict
2.	Schedule pressure	6.	personality
3.	Stubborn personality	7.	
4.	Over confidant people	8.	
Expert 11			
1.	Personal Chemistry	5.	
2.	Lack of work ethics	6.	
3.	Lack of communications	7.	
4.		8.	
Expert 12			
1.	Unclear role and responsibilities	5.	
2.	Disagreement on same issue n project	6.	
3.	misunderstanding	7.	
4.		8.	

3.1.11 What are the major causes of lack of responsibilities, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			
1.		5.	
2.		6.	
3.		7.	
4.		8.	
Expert 2			
1.	Mentality	5.	
2.	Ignorance	6.	
3.	Different ways of understanding	7.	
4.	laziness	8.	
Expert 3			
1.	Poorly define responsibilities/ position description	5.	
2.	Ignorance	6.	
3.	Communicate the responsibility matrix	7.	

	to the members		
4.		8.	
Expert 4			
1.	Responsibility and expectations is not clarified	5.	Conflict
2.	Lack of involvement an responsibilities for project team members	6.	High workload over time
3.	Lack of management involvement	7.	
4.	Monotonically work	8.	
Expert 5			
1.	Culture	5.	Too lose company rule
2.	Lack of knowledge	6.	
3.	No strict leader shop	7.	
4.	laziness	8.	
Expert 6			
1.	Low level of delectation	5.	
2.	Not clear expectations	6.	
3.	Not clear description	7.	
4.		8.	
Expert 7			

1.	Motivation	5.	Lack of communication
2.	Lack of positive feedback	6.	
3.	Time pressure	7.	
4.	Lack of competence	8.	
Expert 8			
1.	RACI not define	5.	
2.	Lack of inadequate QA system	6.	
3.	Lack of leaderships	7.	
4.		8.	
Expert 9			
1.	boring	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 10			
1.	Personality	5.	Less salary
2.	Loss of motivation	6.	How management treats

3.	Poorly define role	7.	
4.	Organization culture	8.	
	Expert 11		
1.	Don't know why	5.	
2.		6.	
3.		7.	
4.		8.	
	Expert 12		
1.	Ownership(they are not taking ownership)	5.	
2.	Unclear instruction of completing job	6.	
3.	Lack of technical knowledge	7.	
4.		8.	

3.1.12 What are the major causes of insufficient training and experience, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
	Expert 1		
1.	Fresh engineer	5.	

2.		6.	
3.		7.	
4.		8.	
Expert 2			
1.	Not enough time	5.	
2.	Not enough possibilities	6.	
3.	Not enough money	7.	
4.	Lack of motivation	8.	
Expert 3			
1.	Not prioritize training	5.	
2.	No budge for training	6.	
3.		7.	
4.		8.	
Expert 4			
1.	High workload over time, not prioritizing training	5.	
2.	Not enough management involvement	6.	
3.	Use of 'wrong' project personal	7.	
4.	Low budget	8.	

Expert 5			
1.	Fresh engineer	5.	Valuable experience
2.	Lack of resource	6.	
3.	Lack of strict leadership	7.	
4.	Cost double	8.	
Expert 6			
1.	Time and resource availability for training	5.	
2.	Level of responsibility given	6.	
3.		7.	
4.		8.	
Expert 7			
1.	Cost	5.	Sitting with over qualified team
2.	Lack of 'correct' project	6.	Time pressure
3.	Lack of plan for training	7.	
4.	Behavior/ not asking for help	8.	
Expert 8			
1.	High turnover to personal	5.	

2.	Heavy workload	6.	
3.	Time pressure	7.	
4.	Company policy(save mony , cost cut)	8.	
Expert 9			
1.	Everyone deserve it	5.	
2.	No budge issue	6.	
3.		7.	
4.		8.	
Expert 10			
1.	Cost cutting measure	5.	
2.	Resource overloaded	6.	
3.	Change field	7.	
4.	Lack of testing/training system	8.	
Expert 11			
1.	Budget	5.	
2.	Lack of senior and junior pair	6.	
3.	Jumping job again and again	7.	
4.	Socially how young one ignore old one	8.	

	, no respect		
Expert 12			
1.	Incorrect mapping of competency	5.	
2.	Budget	6.	
3.	Lack of communication between manager and employ	7.	
4.		8.	

3.1.13 What are the major causes of inadequate project planning and controlling, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			
1.		5.	
2.		6.	
3.		7.	
4.		8.	
Expert 2			
1.	Not enough understanding of scope	5.	
2.	Time problem	6.	

3.		7.	
4.		8.	
Expert 3			
1.	Not prioritize in small project	5.	
2.	Scope changes	6.	
3.	Available resources at right time	7.	
4.	Change in customer plan	8.	
Expert 4			
1.	Poor or lack of routine for planning and controlling systems	5.	Lack of management follow-up of planning and project controlling activities
2.	Not understanding of value of good planning and controlling	6.	
3.	Lack of competent resource	7.	
4.	Short delivery schedule	8.	
Expert 5			
1.	Lack of adviser	5.	
2.	Level of project management	6.	
3.		7.	
4.		8.	

Expert 6			
1.	Lack of time	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 7			
1.	Cost	5.	Time pressure on manager
2.	Management competence	6.	
3.	Poor tools	7.	
4.	Changes from customer	8.	
Expert 8			
1.	Dependence between different disciplines is unclear	5.	
2.	Lack of early involvement	6.	
3.		7.	
4.		8.	
Expert 9			

1.	Always done	5.	
2.	Good planning in stavanger	6.	
3.		7.	
4.		8.	
Expert 10			
1.	Misunderstanding scope of work	5.	
2.	Too much activities in planning	6.	
3.	Lack of leadership qualities	7.	
4.	Dependency of sub-supplier	8.	
Expert 11			
1.	Don't follow-up procedure	5.	
2.	Timing issue	6.	
3.		7.	
4.		8.	
Expert 12			
1.	Poor project management	5.	
2.	Unclear scope	6.	
3.	Unseen scope	7.	
4.	Inexperience project management	8.	

3.1.14 What are the major causes of lack of trust at work, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			
1.		5.	
2.		6.	
3.		7.	
4.		8.	
Expert 2			
1.	Want to work done	5.	Lack of communications
2.	Mentality	6.	
3.	Want to get benefits alone	7.	
4.	Not asking right question	8.	
Expert 3			
1.		5.	
2.		6.	

3.		7.	
4.		8.	
Expert 4			
1.	Poor project execution in previous project	5.	Poor management
2.	Poor project quality in previous project	6.	Mentality
3.	Communication	7.	Lack of respect and involvement
4.	Lack of follow-up on agreements done in the project	8.	Values difference
Expert 5			
1.	More careful to follow the work	5.	
2.	Cultural difference	6.	
3.		7.	
4.		8.	
Expert 6			
1.	High expectation	5.	
2.	Repeated low delivery quality(not applicable on ABB)	6.	
3.		7.	
4.		8.	

Expert 7			
1.	Lack of responsibility	5.	competition
2.	Culture	6.	
3.	Lack of communication	7.	
4.	Lack of respect	8.	
Expert 8			
1.	To little management involvement	5.	
2.	Inadequate QA systems /tools	6.	
3.	Neglecting team building to create team spirit	7.	
4.		8.	
Expert 9			
1.	Wrong engineering	5.	
2.	Because of competitor	6.	
3.	Don't strict to target date	7.	
4.		8.	
Expert 10			
1.	Organizational culture	5.	Not sharing knowledge

2.	Personalities	6.	misunderstandings
3.	Culture	7.	
4.	Experience level	8.	
Expert 11			
1.	People think they know everything	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 12			
1.	Not doing job in team (I, Me, Myself)	5.	
2.	Feel uncomfortable to ask	6.	
3.		7.	
4.		8.	

3.1.15 What are the major causes of poor post execution of project, which influence the Project completion?

Seiral.no	Possible Causes	Sr.no	Possible Causes
Expert 1			

1.	Lack of offering services to customers after execution	5.	
2.	Lack of proper feedback when customer done any changes	6.	
3.		7.	
4.		8.	
Expert 2			
1.	Lack of experience	5.	
2.	Lack of design input	6.	
3.	Lack of project team	7.	
4.		8.	
Expert 3			
1.	Lack of routines for handling as built	5.	
2.	Getting the correct resources for closing punches the project team move on to new project	6.	
3.		7.	
4.		8.	
Expert 4			
1.	Lack of reporting and lessons learned	5.	Budget

2.	No delivery of final documentation to customer	6.	No experience with close out of project
3.	Demobilization of project personal before project close out	7.	
4.	Poor routines for project close out	8.	
Expert 5			
1.	Wrong planning	5.	
2.	Engineer move to other work and not available	6.	
3.	Company behavior when they get money they its finish	7.	
4.		8.	
Expert 6			
1.	Low focus when task is done	5.	
2.	Feel more important to finish and payment then doing formal close out	6.	
3.	Other project start over	7.	
4.	Formalities give low priority	8.	
Expert 7			
1.	Cost	5.	time pressure
2.	lack of documentation	6.	
3.	Project run for a long time	7.	

4.	Engineers are moved in early stage	8.	
Expert 8			
1.	Lack of procedure	5.	
2.	High work-load	6.	
3.		7.	
4.		8.	
Expert 9			
1.	Time pressure	5.	
2.		6.	
3.		7.	
4.		8.	
Expert 10			
1.	Availability of resources after execution	5.	
2.	Poor quality of work package	6.	
3.	Implementing work packages without reading it in detail	7.	
4.		8.	
Expert 11			

1.	Time pressure	5.	
2.	New project start	6.	
3.	Boring old work	7.	
4.		8.	
Expert 12			
1.	Lack of documentation	5.	
2.	Mistake done during execution	6.	
3.		7.	
4.		8.	

8.2 Stage Number 1 of Interview, Alignment of Comparable Causes

3.1.1 What are the major causes of Project Complexity and Design Errors, which influence the Project completion?

Serial Number	Causes	Position	Common Causes
1.	Lack of new skills	1	Lack of expert knowledge competency /experience
2.	Lack of experience		
3.	Lack of competency		
4.	Missing or poor design input		
5.	Many revision of the design input		
6.	Design not agreed upon and understood		
7.	Incompetency		
8.	Lack of knowledge		
9.	No complex overview		
10.	Lack of competency(vender)		
11.	Lack of competency(customer)		
12.	Wrong understanding of project		
13.	Lack of experience		
14.	Lack of scope understanding		
15.	Unclear functional objectives for end users after project conclusion.		
16.	Customer don't approve in time	2	Poor customer side
17.	Customer changing demand		
18.	Difficult approved from customer		
19.	Customer must involve operator		

20.	Ownership at customer		competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication
21.	Continuous scope changes		
22.	Customer requirement changes		
23.	Changes in project		
24.	Technology difference		
25.	New technology		
26.	customization of existing plane(project)		
27.	Design input readiness and quality		
28.	Project put on hold, when started again excepted to be same design as before		
29.	Lack of understanding of the design input		
30.	Design freeze in late phase		
31.	3rd part interphase		
32.	Complex system		
33.	Complexity of design		
34.	Unclear input		
35.			
36.	misinterpretation of input	3	Poor project management/planning/incorrect resource allocation/ lack of communication
37.	Communication gap		
38.	Onshore project approve but reject from offshore		
39.	Sales Vs project gap		
40.	Lack of communication		
41.	Location difference		

42.	Different ABB organization		
43.	More disciplinary changes		
44.	Parallel number of project		
45.	Changing engineers		
46.	Not ask from higher authority(feeling shy or aberrance)		
47.	Lack of motivation		
48.	Lack of responsibility		
49.	Breakdown structure		
50.	Insufficient resources		
51.	Handover of project delivery to end users in operations often very poorly handled.		
52.	Document control		
53.	Pressure to cost down		
54.	Problem at the time of execution		
55.	Many vendor involvement	4	Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers
56.	EPC competency on ABB		
57.	Administration influence		
58.	Late involvement of ABB in EPC project		
59.	Delay from supplier		

3.1.2 What are the major causes of Poorly Defined Project Scope and Scope Change, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Misunderstanding issue to customer side	1	Poor customer side competency/follow-up/too many changes/ wrong understanding of design/ requirements/lack of communication
2.	Change customer requirement		
3.	Customer don't know exactly what they want		
4.	Improper design input from customer side		
5.	Customer requirement changes		
6.	Customer continuous change demand		
7.	Extension in project increase the project scope		
8.	Missing pre study		
9.	Low 'front load'' by customer		
10.	Client interference		
11.	Scope change(poor scope)		
12.	RFQ based on incomplete FEED, or unclear project objectives		
13.	New solutions		
14.	Priority of shut down		
15.	New requirement		
16.	Lack of competence	2	Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers
17.	Project don't have the necessary competence to execute the project		
18.	Lack of experience		

19.	Lack of competency		
20.	Lack of competence in EPC		
21.	Late involvement of supplier		
22.	Competency in engineer companies		
23.	Design input not ready, bid deadline not prolonged.		
24.	Authors of RFQ not competent in all areas covered, thus Scope of Work not according to actual needs		
25.	EPCI is not necessarily familiar with the scope /technology delivered in a project		
26.	Different interpretations/ expectation		
27.	ABB involvement in late phase		
28.	Not involvement of difference department with in EPC		
29.	Unclear estimated time	3	Poor project Management/planning/incorrect resource allocation/ lack of communication
30.	Not detail focus		
31.	Hurry / not proper planning		
32.	Improper study of project		
33.	Inadequate planning		
34.	Lack of planning from engineer and customer side		
35.	Poor planning		
36.	Involvement of correct resources and suppliers (ABB)		
37.	Not involvement of relevant engineer/people		
38.	Internal transfer of project sales to		

	project execution		
39.			
40.			
41.	Project start up		
42.	Number of load changes		
43.	Too many documents to be delivered, but many of them hardly used after the project.		
44.	Internal ABB OGC silos, each area of expertise is not aware of the potential value and dependencies of the others.		
45.	Lack of communication		
46.	Communication with others		
47.	Poor communication		
48.	Expectation and scope don't clarified between the parties in the start of the project		
49.	Bad quality	4	Poor product quality/ product not fully tested/ cost issues / wrong estimation / time pressure
50.	Design budge for proper study		
51.	Time delay and increase the cost		
52.	Wrong estimation		
53.	Focus on cost cutting makes gives minimum-scope bids, with during project-scope changes (VORs)		
54.	Time pressure lead to that design is not of good quality		
55.	Schedule pressure		

3.1.3 What are the major causes of Challenges with EPC and Inappropriate and Inadequate Procurement Procedure, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
	Late involvement of EPC	1	Challenges and incorporation with EPC/EPC Competency/issues with 3rd party vendors and/or suppliers
	EPC understanding of ABB system/work		
	EPC and company decide themselves not involve engineer		
	Fresh engineer at EPC		
	Several scope mixed		
	Unclear expectation and defined scope		
	Error in design and don't know how to proceed		
	Incorrect scope		
	Incomplete scope because they don't know ABB system		
	Communication between EPC		
	Communication interphase with in discipline		
	Poorly define scope		
	Inadequate procurement procedure		
	Incorrect specification		
	Buyers and EPC support engineers not competent to choose the correct/best solution as seen from the end customer.		
	Buyers setting the agenda, no room for innovation. Price is only criteria.		
	Not enough experience	2	Lack of

	Not understanding the requirement		competency/knowledge/Training/responsibility/ cultural difference
	Improper study of installation		
	Design engineer phase slow		
	Lack of experience EPC		
	People don't know standards		
	Unexperienced people from different culture		
	Lack of training		
	Focus on the technical part		
	Different focus		
	Cultural difference		
	Mentality/ personality		
	Culture 'not in same boat'		
	Because of customer	3	Poor customer side competency/follow-up/too many changes/ wrong understanding of design/ requirements/lack of communication
1.	Purchase at customer not knowing our scope		
2.	Wrong Drawing		
3.	Changing of demand		
4.	Unclear design input		
5.	No purchase order in time of start of project execution		

6.	Lack of coordination		
7.	Lack of documentation	4	Lack of updated documentation/too much documentation
8.	Documentation dependency		
9.	Too much focus on delivery of documents, not on value for end users.		
10.	Too much time spent on irrelevant details in the bid phase, could have been giving value to the end customer.		
11.	Engineer not following procedure	5	Lack of responsibility/follow-up/laziness
12.	Not responsibility		

3.1.4 What are the major causes of Poor Quality and Delay in Delivery, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Wrong paper work	1	Lack of expert knowledge competency/experience
2.	Wrong engineering		
3.	Wrong design input		
4.	Lack in understanding of importance and use		
5.	Poor design input and many revision of design input		
6.	Lack of resources and competence		
7.	Poor design input		
8.	Lack of knowledge		
9.	Procedure not followed always		
10.	Poor quality of design input		
11.	Poor competence		
12.	Competence issue		
13.	Lack of skills in reading design		
14.	No read standers		
15.	ABB personnel not following OpX (quality system) work procedures.		
16.	Time pressure	2	Poor product quality/product not fully tested/ cost issues/ wrong estimation / time pressure
17.	Bad engineer quality		
18.	Poor quality from vendors		
19.	Supplier delay	3	Poor project management/planning /incorrect resource allocation/ lack
20.	Project members does not have		

	ownership to task		of communication
21.	Wrong resource		
22.	Wrong decision		
23.	Individual task to new one		
24.	Personal fault		
25.	Not proper candidate for job		
26.			
27.	Availability of resources		
28.	Lack of motivation to work		
29.	Risks not properly identified during sales and/or project delivery phase, and poor risk mitigation.		
30.	Role and responsibilities with in ABB		
31.	Work overload		
32.	Internal ABB issues with OTD		
33.			
34.	Lack of communication and follow- up		
35.	Personal problem		
36.	Misunderstanding and individual interpretation of procedure	4	Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication
37.	Bad software quality		
38.	Technical challenges		
39.	Design input not delivered on time		
40.	Late input from EPC		
41.	3rd part involvement		
42.	Unclear scope		

43.	Change in scope		
44.	Change in requirement at last moment		
45.	Inter-discipline coordination within ABB OGC in large projects.		
46.	Customer expectations higher than ABB is prepared for, Scope not framed properly during sales phase.		
47.	Involvement of certain disciplines too late in project, causing their scope to end up on critical line and potentially cause delays.		
48.	Scope change		
49.	Pressure on ABB scope		
50.	Late or incomplete design input from customer		
51.	Lack of information from customer	5	Challenges and incorporation with EPC/EPC Competency/issues with 3rd party vendors and/or suppliers
52.	Late design input		
53.	Dependency, customer, EPC and supplier		
54.	Many parties in one project interfaces		
55.	Delay in design input		
56.	Late delivery of hardware from supplier		
57.	Late planning		
58.	Late involvement of ABB		
59.	outsourcing		
60.	Delay in Shipping delivery		

3.1.5 What are the major causes of Lack of Proper Procedure and Documentation, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
	Not enough standardized work procedures and documentation available for activities performed in many projects. Repeated errors occur.	1	Too much documentation/ insufficient time/project delivery pressure
	Timing is short		
	Lack of time at setup		
	Lack of timing		
	Focus on delivery		
	Time pressure		
	Lack of timing		
1.	Ignorance	2	Lack of expert knowledge competency /experience
2.	Experience		
3.	Lack of understanding of proper procedure/paper work		
4.	Lack of trainings		
5.	Lack of knowledge or correct resource		
6.	Difficult to document		
7.			
8.	Company culture for adopting to change		
9.	Engineer don't like to do		
10.	Misunderstanding project management	3	Poor planning /Project Management/follow-up / incorrect resource allocation
11.	Use of trust to workman instead to plan		
12.	Lack of motivation		

13.	Lack of focus		
14.			
15.			
16.	Not always prioritized proper procedure and documentation		
17.	Low focus on documentation and dates		
18.	Poor internal procedure in the company is not a priority		
19.			
20.	Project personal assigned to new project before previous project have been closed		
21.	Lack of resource to develop and maintain procedure and documents		
22.	responsibility split		
23.	Documentation owner unclear		
24.	Different opinion of what is needed		
25.	Dual task/not fun/boring		
26.	Lack of interest		
27.	Complexity in finding right information	4	Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity of design/ requirements/lack of communication
28.	Input from customer		
29.	Customer not willing to pay		
30.	End customer don't prioritize because of budget		
31.	Approve quality		
32.	Cost		
33.	Bid not considering the project execution strategy/model to be used		

	during execution		
34.	Not considered in estimation		
35.	ABB personnel not following OpX work procedures.	5	Lack of responsibility/follow-up/laziness
36.	Project don't follow up the internal procedures. Don't updated		
37.	Procedure are heavily follow up/ made by lawyer or engineers		

3.1.6 What are the major causes of Technical and Operational Challenges, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Lack of technical training	1	Lack of expert knowledge competency /experience
2.			
3.	Lack of knowledge		
4.	Missing and poor competency in the project		
5.	Not want to do new things/not interesting in change		
6.	New engineers		
7.	Lack of understanding the whole procedure		
8.	Lack of competence		
9.	Lack of knowledge of existing systems		
10.	Not able to find equivalent component		
11.	Lack of timing	2	Poor Product quality/ Product not fully tested/ Cost Issues / Wrong Estimation / Time pressure
12.	Limited test		
13.	Dead line		
14.	Time pressure		
15.	Does sales know that it will work? 100% tested?		
16.	Bad quality when new software introduced		
17.	Technical product issues affecting the projects.		
18.	Lack of testing		

19.	Misconfiguration of system		
20.	not tested well/scaling test		
21.	Lack of documentation		
22.	Poor/wrong technical solutions	3	Poor customer side competency/follow-up/too many changes/ wrong understanding in design/ complexity in design/ unclear input/technology change
23.	New software and hardware		
24.	New technology and unproven being delivered		
25.	Generation changing in controller		
26.	Introducing new technology in complex site		
27.	Change of technology		
28.	Uncomfortable new technology and use too with old one		
29.	Resistance to change		
30.	New software		
31.	New thing effect on other things		
32.	Complexity		
33.	Complexed technology		
34.	Proper understanding of Operational needs lacking; mismatch btw delivered solution and actual need.		
35.	High expectation		
36.	Missing and poor design input		
37.	Customer give late design input		
38.	Unclear scope		
39.	Operator not involved to solution/ Or late involve		

40.	Lack of Correct resource	4	Poor planning /Project Management/ incorrect resource allocation
41.	Lack of specialists available		
42.	Resource availability		
43.	Obsolete equipment's		
44.	Involvement of many different departments		
45.		5	Lack of responsibility/follow-up/laziness
46.	Handover to end customer operations not covered by projects. Ready for Operations (RFO) follow-up		
47.	project/-phase needed: Match btw work procedures and deliveries		
48.	laziness		

3.1.7 What are the major causes of Regulatory Challenges to follow-up, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
	Customer specific specification	1	Customer specific regulations/Customer Trainings/requirements
	Access and training to customers regulation		
	Contract and frame agreement		
	Not implicating guideline into design		
	Not easy to find information		
	To many technical requirements from customer		
	No user-friendly		
	Too many regulation		
	Functional Safety Management documentation throughout project		
	Customer don't know properly		
	Misinterpretation what is allows or what is customer demand		
1.	Lack of experience	2	Lack of expert knowledge competency /experience
2.	Lack of competence		
3.	Lack of training		
4.	Knowledge and experience		
5.	Lack of knowledge and understanding of regulation		
6.	Lack of information about regulation		
7.	Standers are say different	3	

8.	Difference between standers make it complex		Different Standards
9.	Change between different physical standers		
10.	NORSOK documents		
11.	Region difference		
12.	Political resource		
13.	Employer from aboard		
14.	International regulation	4	International rules and regulation
15.	Safety system lifecycle documentation not complete (risk assessment = HAZOP, design = input to ESD & PSD system; implementation in DCS, operations follow-up of barriers; and new circle)		
16.	HSE is demanding, difficult to get customer to cover without increasing price too much.		
17.	Too strict		
18.	Recent new development(design context)		
19.	Safety		

3.1.8 What are the major causes of Poor Resource allocation and frequent Change of Project Team, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Allocation wrong competence	1	Poor planning /Project Management/ incorrect resource
2.	Poor resource planning		

3.	Bad planning		allocation
4.	Bad communication from PM		
5.	Management problem		
6.	Incorrect mapping of competency		
7.	Change in plan		
8.	Resource allocation has no committed by management		
9.	Lack of management attention		
10.	Change in schedule because of variation order		
11.	Prioritize the portrait		
12.	Poor understanding of scope of work for the requester		
13.	Poor hardware and shared knowledge		
14.	Lay off		
15.	Get better opportunity		
16.	High work load within organization		
17.	Priority of project that have higher focus		
18.	Illness		
19.	favoritism		
20.	Prioritization change		
21.	Project management and sponsors failing to understand which competency is needed; wrong compentency engineers allocated		
22.	Some engineers allocated in many projects – overload for these. Too low allocation for other engineers.		

23.	Time pressure	2	Insufficient Time/Delay in projects Lack of competent resources /frequent changes in position
24.	Delay in project mass up resource allocation		
25.	Lack of technical resource		
26.	Change in positions		
27.	Lack of resource knowing automation		
28.	Fluctuation between positions		
29.	Change in responsibilities		
30.	Overload of work(one resource involve in many task)		
31.	Not enough project personal to cover necessary competence		
32.	Lack of resource		
33.	Get other opportunity		
34.	Leaving company for change		
35.	Several offices in different locations		
36.	Personal leaving the company		
37.	Good offer from others		
38.	Incomplete competency mapping vs needs for ABB OGC	3	Lack of expert knowledge competency /experience
39.	Changes in resource needs (timing or competency) not communicated early enough from the project to the line mgmt., or vice versa when changes in one project affects another.		
40.	Change of priority in work		
41.	Reorganization challenges		
42.	misunderstanding scope of work		

3.1.9 What are the major causes of Poor Collaboration Level and Communication between project team members, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Not understanding of responsibilities	1	Poor planning /Project Management/ incorrect resource allocation
2.	Responsibilities not define		
3.	Unclear role		
4.	Ignoring their responsibilities		
5.	Poor define role		
6.	People don't know what are expectation		
7.	Don't know who is responsible for what		
8.	Project management issue		
9.	Poor management		
10.	Lack of management follow-up in the project		
11.	Low team spirit		
12.	No focus on building a project team		
13.	Missing communication matrix	2	Lack of communication/ coordination
14.	Not exactly know who is responsible for asking		
15.	Remote work		
16.	Lack of kick meeting(internal and external)		
17.	Unclear communication lines		
18.	Time pressure		
19.	Misconception that each discipline can be delivered independently of the		

	others, not parts of the same system.		
20.	Cultural change		
21.	Time difference	3	Different culture/language issues /Different Timing zone/don't want to listen (Ego issue)
22.	Cultural difference		
23.	Not motivated to listen		
24.	Different personality		
25.	Location time difference		
26.	Different culture		
27.	Different geographical location, not face to face		
28.	Not physical location		
29.	Project are located at different locations		
30.	Personality in project – to focus on own work		
31.	Language		
32.	Personality		
33.	Individual personalities		
34.	Language skills		
35.	Different nationalities		
36.	Ego issue		
37.	Different understanding of project scope	4	Lack of expert knowledge competency /experience
38.	Lack of competence		
39.	System and procedures		
40.	Project manager and lead engineers not aware of all competency areas involved in project; kick-off performed without		

	involving all relevant persons.		
41.	Handover from sales not thorough enough, competence needs not covered.		
42.	Lead and or interface engineers do not understand the inter-discipline dependencies, not sharing the appropriate information & communicating according to project needs.		

3.1.10 What are the major causes of Conflict within Team Members, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Different priorities	1	Different culture/language issues /Different Timing zone/don't want to listen (Ego issue)/ Personnel Behavior
2.	Different type of working		
3.	Different way of working		
4.	Personal issues		
5.	Stubborn personality		
6.	Cultural difference		
7.	Conflicting values		
8.	Personal conflict		
9.	Daily issue		
10.	Over confidant people		
11.	Late delivery can be cause people to blame each other for not performing		
12.	mentality		
13.	Lack of work ethics		
14.	Disagreement on same issue n project		
15.	Cultural or personality differences not identified and managed properly.		
16.	Lack of trust in other ABB discipline's personnel due to earlier experiences or unfounded biased expectations.		
17.	Responsibility split		
18.	Personal Chemistry		

19.	Different interest between project members		
20.	Competition		
21.	Misunderstanding	2	Lack of communication/coordination
22.	Lack of communication		
23.	Misunderstanding because of language barrier		
24.	Lack of coordination between project		
25.	Misunderstanding(time ,background, complexed project)		
26.	Misconception that each discipline can be delivered independently of the others, ABB-internal pointing-game when issues occur. One-ABB approach not followed.		
27.	Resource management	3	Poor planning /Project Management/ incorrect resource allocation Stress on work
28.	Poor project management		
29.	Unclear role and responsibilities		
30.	Poorly define role and responsibilities		
31.	Unclear roles and responsibilities, who is the supervisor? Who has the overall responsibility for all disciplines?		
32.	Tight project schedule and high work load		
33.	Time pressure		
34.	Stress in project		
35.	Schedule pressure		
36.	Time pressure		

3.1.11 What are the major causes of lack of responsibilities, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Poorly define responsibilities/ position description	1	Poor planning /project management/ incorrect resource allocation
2.	Lack of communicate the responsibility matrix to the members		
3.	Not clear expectations		
4.	Not clear description		
5.	Lack of management involvement		
6.	Lack of leaderships		
7.	Lack of involvement an responsibilities for project team members		
8.	Poorly define role		
9.	Unclear instruction of completing job		
10.	How management treats		
11.	Responsibility and expectations is not clarified		
12.	Lack of positive feedback		
13.	Too lose company rule		
14.	Low level of delectation		
15.	Motivation		
16.	Loss of motivation		
17.	Unclear roles and responsibilities, not clearly defined for all participants in all projects. Especially complicated with cross-discipline projects.		
18.	Execution model for cross-discipline		

	projects not good enough. Project sponsors and manager not consciously choosing the best available model for the project in question.		
19.	Monotonically work		
20.	Different ways of understanding	2	Different culture/language issues /different timing zone/stress
21.	Organization culture		
22.	Culture		
23.			
24.	Conflict		
25.	Ignorance	3	Lack of communication/coordination/lack of responsibility
26.	Mentality		
27.	Personality		
28.	laziness		
29.	Lack of communication		
30.	Ownership(they are not taking ownership)		
31.	boring		
32.			
33.			
34.	Lack of knowledge	4	Lack of expert knowledge competency /experience
35.			
36.	Lack of competence		
37.	Lack of technical knowledge		

3.1.12 What are the major causes of insufficient training and experience, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Not enough money	1	Company budget/policy
2.	No budge for training		
3.	Low budget		
4.	Cost double		
5.	Cost cutting measure		
6.	Company policy(save money , cost cut)		
7.	Fresh engineer		
8.	Budget		
9.	Not prioritize training	2	Poor planning /project management
10.	Lack of strict leadership		
11.	Sitting with over qualified team		
12.	Lack of plan for training		
13.	Incorrect mapping of competency		
14.	Level of responsibility given		
15.	Lack of testing/training system		
16.	Not enough possibilities		
17.	Not enough management involvement		
18.	Lack of resource	3	Lack of competent resources / incorrect resource allocation /frequent changes in position
19.	Lack of senior and junior pair		
20.	Competence needs for each project not clear at project start-up. Mismatch btw tasks and engineer competence.		

21.	General lack of competency overview and mapping towards organization needs. Thus appropriate training has not been conducted.		
22.	Lack of motivation		
23.	Lack of communication between manager and employ		
24.	Fresh engineer		
25.	Use of 'wrong' project personal		
26.	Resource overloaded		
27.	Jumping job again and again		
28.	Change field		
29.	Time pressure	4	Different culture/ personnel Behavior/ insufficient time/project delivery pressure
30.	Heavy workload		
31.	High workload over time, not prioritizing training		
32.	Time and resource availability for training		
33.	Project schedule too tight to accommodate the need for training.		
34.	Not enough time		
35.	Behavior/ not asking for help		
36.	High turnover to personal		
37.	Socially how young one ignore old one , no respect		

3.1.13 What are the major causes of inadequate project planning and controlling, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Management competence	1	Poor planning /project management/ follow-up
2.	Level of project management		
3.			
4.	Lack of management follow-up of planning and project controlling activities		
5.	Inexperience project management		
6.	Lack of leadership qualities		
7.	Poor project management		
8.	Not prioritize in small project		
9.	Poor or lack of routine for planning and controlling systems		
10.	Too much activities in planning		
11.	Not understanding of value of good planning and controlling		
12.	Poor tools		
13.	Lack of adviser		
14.	Cost		
15.	Too long time btw identified plan changes, and plan updates.		
16.	Sales full cost estimates not matching normal project execution model. Re-planning at project start-up not done. Too large WBS'es not split according to project phases.	2	Poor product quality/ product not fully tested/ cost issues / wrong estimation / insufficient time/project delivery pressure

17.	Project and lead engineer's too optimistic early, S-curve effect.		
18.	Time pressure on manager		
19.	Time problem		
20.	Timing issue		
21.	Short delivery schedule		
22.	Lack of early involvement		
23.	Lack of competent resource	3	Lack of expert knowledge competency /experience
24.	Not enough understanding of scope		
25.	Misunderstanding scope of work		
26.	Lack of time		
27.	Available resources at right time		
28.	Scope changes		
29.	Changes from customer		
30.	Unclear scope		
31.	Unseen scope		
32.	Change in customer plan		
33.	Dependence between different disciplines is unclear		
34.	Actual identified schedule changes needed vs customer-approved changes (covered by budgetary updates). Mismatch due to reporting needs.		
35.	Dependency of sub-supplier		

3.1.14 What are the major causes of lack of trust at work, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Lack of respect and involvement	1	Different culture/language issues /different timing zone/don't want to listen (Ego issue)/ personnel behavior
2.	Values difference		
3.	Mentality		
4.	Cultural difference		
5.	Want to get benefits alone		
6.	Personalities		
7.	People think they know everything		
8.	Not doing job in team (I, Me, Myself)		
9.	Feel uncomfortable to ask		
10.	Not sharing knowledge		
11.	misunderstandings		
12.	Not asking right question		
13.	Neglecting team building to create team spirit	2	Poor planning /project management/ incorrect resource allocation
14.	Poor management		
15.	To little management involvement		
16.	Poor project execution in previous project		
17.	Poor project quality in previous project		
18.	Want to work done		
19.	Lack of communications	3	Lack of communication/coordination
20.	High expectation		
21.	Repeated low delivery quality(not		

	applicable on ABB)		
22.	Mistrust in other discipline's engineers and/or deliveries, often unfounded. - Across disciplines - Across cities - Across countries		
23.	Too high esteem of known persons and their capabilities, and corresponding low esteem of unknown/unfamiliar persons.		
24.	competition		
25.	Experience level		
26.	Inadequate QA systems /tools		
27.	Organizational culture		
28.	Wrong engineering		
29.	Because of competitor		
30.	Don't strict to target date		
31.	Lack of responsibility	4	Lack of responsibility/follow-up/laziness
32.	Lack of follow-up on agreements done in the project		
33.	Not more careful to follow the work		

3.1.15 What are the major causes of poor post execution of project, which influence the Project completion?

Serial Number	Causes	Position	Common Reason
1.	Lack of experience	1	Lack of expert knowledge competency /experience
2.	Poor handover from project to service. Including warranty project.		
3.	Poor quality of work package		
4.	Implementing work packages without reading it in detail		
5.	Mistake done during execution		
6.	No experience with close out of project		
7.	Lack of design input		
8.	Lack of project team		
9.	Poor routines for project close out		
10.	Wrong planning		
11.	Lack of routines for handling as built		
12.	Project finished, no man hours left.	2	Poor planning /Project Management/ incorrect resource allocation
13.	Lack of offering services to customers after execution		
14.	Getting the correct resources for closing punches the project team move on to new project		
15.	Budget		
16.	Lack of proper feedback when customer done any changes		
17.	Lack of reporting and lessons learned		
18.	No delivery of final documentation to		

	customer		
19.	Demobilization of project personal before project close out		
20.	Engineer move to other work and not available		
21.	Company behavior when they get money they its finish		
22.	Low focus when task is done		
23.	Feel more important to finish and payment then doing formal close out		
24.	Other project start over		
25.	Formalities give low priority		
26.	Cost		
27.	lack of documentation	3	lack of documentation too much/ documentation/ Insufficient time/project delivery pressure
28.	Project run for a long time		
29.	Engineers are moved in early stage		
30.	time pressure		
31.	Lack of procedure		
32.	High work-load		
33.	Time pressure		
34.	Availability of resources after execution		
35.	New project start		
36.	Boring old work		

8.3 Stage Number 1 of Interview Selection of Important Causes (Causes of Interest)

Serial Number	List of Mistakes	Relevant Causes	Important Causes
3.1.1	Project Complexity and Design Errors, which influence the Project completion?	Gr. 01 Lack of expert knowledge competency /experience	Gr. 01 Lack of expert knowledge competency /experience
		Gr. 02 Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication	Gr. 02 Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication
		Gr. 03 Poor project management/planning/incorrect resource allocation/ lack of communication	Gr. 03 Poor project management/planning /incorrect resource allocation/ lack of communication
		Gr. 04 Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers	Gr. 04 Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers
3.1.2	Poorly Defined Project Scope and Scope Change, which influence the Project completion?	Gr. 02 Poor customer side competency/follow-up/too many changes/ wrong understanding in design/ requirements/lack of communication	Gr. 05 Poor product quality/ product not fully tested/ cost issues / wrong estimation / insufficient time/project delivery pressure
		Gr. 04 Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers	Gr. 06

		Gr. 03 Poor project Management/planning/incorrect resource allocation/ lack of communication	Customer specific regulations/Customer Trainings/requirements Gr. 07 Lack of competency/knowledge/Training/ cultural difference Gr. 08 Lack of updated documentation/ Too much documentation/ insufficient time/project delivery pressure Gr. 09 Different international standards/International rules and regulation Gr. 10 Insufficient Time/Delay in projects Gr. 11 Frequent changes of resources due to lack of relevant experience Gr. 12 Different culture/language issues /different timing zone/don't want to listen (Ego issue)/ personnel behavior Gr. 13
		Gr. 05 Poor product quality/ product not fully tested/ cost issues / wrong estimation / time pressure	
3.1.3	Challenges with EPC and Inappropriate and Inadequate Procurement Procedure, which influence the Project completion?	Gr. 04 Challenges and incorporation with EPC/EPC Competency/issues with 3rd party vendors and/or suppliers	
		Gr. 07 Lack of competency/knowledge/Training / cultural difference	
		Gr. 02 Poor customer side competency/follow-up/too many changes/ wrong understanding in design/ requirements/lack of communication	
		~~Gr. 08~~ ~~Lack of updated documentation/too much documentation~~	
		Gr. 15 Lack of responsibility/follow-up/laziness	

3.1.4	Poor Quality and Delay in Delivery, which influence the Project completion?	Gr. 07 Lack of expert knowledge competency/experience	Lack of coordination Gr. 14 Company budget/policy Gr. 15 Lack of responsibility/follow-up/laziness
		Gr. 05 Poor product quality/product not fully tested/ cost issues/ wrong estimation / time pressure	
		Gr. 03 Poor project management/planning /incorrect resource allocation/ lack of communication	
		Gr. 02 Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication	
		Gr. 04 Challenges and incorporation with EPC/EPC Competency/issues with 3rd party vendors and/or suppliers	
3.1.5	Lack of Proper Procedure and Documentation, which influence the Project completion?	Gr. 08 Too much documentation/ insufficient time/project delivery pressure	
		Gr. 01	

		Lack of expert knowledge competency /experience	
		Gr. 03 Poor planning /project Management/follow-up / incorrect resource allocation	
		Gr. 02 ~~Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication~~	
		Gr. 15 Lack of responsibility/follow-up/laziness	
3.1.6	Technical and Operational Challenges, which influence the Project completion?	Gr. 01 Lack of expert knowledge competency /experience	
		Gr. 05 Poor product quality/ product not fully tested/ cost issues / wrong estimation / time pressure	
		Gr. 02 Poor customer side competency/follow-up/too many changes/ wrong understanding in design/ complexity in design/ unclear input/technology change	

		Gr. 03 Poor planning /Project management/ incorrect resource allocation	
		~~Gr. 15~~ ~~Lack of responsibility/follow-up/laziness~~	
3.1.7	Regulatory Challenges to follow-up, which influence the Project completion?	Gr. 06 Customer specific regulations/Customer Trainings/requirements	
		Gr. 01 Lack of expert knowledge competency /experience	
		Gr. 09 Different standards	
		Gr. 09 International rules and regulation	
3.1.8	Poor Resource allocation and frequent Change of Project Team, which influence the Project completion?	Gr. 03 Poor planning /Project Management/ incorrect resource allocation	
		Gr. 10	

		Insufficient Time/Delay in projects Lack of competent resources /frequent changes in position	
		Gr. 01 Lack of expert knowledge competency /experience	
3.1.9	Poor Collaboration Level and Communication between project team members, which influence the Project completion?	Gr. 03 Poor planning /Project Management/ incorrect resource allocation	
		Gr. 13 Lack of communication/ coordination	
		Gr. 12 Different culture/language issues /Different Timing zone/don't want to listen (Ego issue)	
		Gr. 01 Lack of expert knowledge competency /experience	
3.1.10	Conflict within Team Members, which influence the Project completion?	Gr. 12 Different culture/language issues /Different Timing zone/don't want to listen (Ego issue)/ Personnel Behavior Lack of	

		communication/coordination	
		Gr. 03 Poor planning /Project management/ incorrect resource allocation Stress on work	
		Gr. 13 Lack of communication/coordination	
3.1.11	Lack of responsibilities, which influence the Project completion?	Gr. 03 Poor planning /project management/ incorrect resource allocation	
		Gr. 12 Different culture/language issues /different timing zone/stress	
		Gr. 13 Lack of communication/coordination/lack of responsibility	
		Gr. 01 Lack of expert knowledge competency /experience	
3.1.12	Insufficient training and experience, which influence the Project completion?	Gr. 14 Company budget/policy	

		Gr. 03 Poor planning /project management	
		Gr. 11 Lack of competent resources / incorrect resource allocation /frequent changes in position	
		Gr. 12 Different culture/ personnel behavior/ insufficient time/project delivery pressure	
3.1.13	Inadequate project planning and controlling, which influence the Project completion?	Gr. 03 Poor planning /project management/ follow-up	
		Gr. 05 Poor product quality/ product not fully tested/ cost issues / wrong estimation / insufficient time/project delivery pressure	
		Gr. 01 Lack of expert knowledge competency /experience	
3.1.14	Lack of trust at work, which influence the Project completion?	Gr. 12 Different culture/language issues	

		/different timing zone/don't want to listen (Ego issue)/ personnel behavior	
		Gr. 03 Poor planning /project management/ incorrect resource allocation	
		Gr. 13 Lack of communication/coordination/lack of responsibility	
		Gr. 15 Lack of responsibility/follow-up/laziness	
3.1.15	Poor post execution of project, which influence the Project completion?	Gr. 01 Lack of expert knowledge competency /experience	
		Gr. 03 Poor planning /Project Management/ incorrect resource allocation	
		Gr. 08 lack of documentation too much/ documentation/ Insufficient time/project delivery pressure	

8.4 Stage Number 2 of Interview Priority wise Positioning of Causes

What percentage of following causes are applicable in projects?

Position	Causes	Probability of Causes														
		R-1	R-2	R-3	R-3	R-4	R-5	R-6	R-7	R-8	R-9	R-10	R-11	R-12	Average	Std. Dev
1	Poor product quality/ product not fully tested/ cost issues / wrong estimation / insufficient time/project delivery pressure	15.0	80.0	80.0	80.0	70.0	90.0	70.0	60.0	40.0	90.0	75.0	80.0	85.0	70.4	21.4
2	Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication	25.0	30.0	80.0	35.0	85.0	60.0	65.0	60.0	40.0	100.0	75.0	75.0	80.0	62.3	23.4
3	Lack of coordination	25.0	65.0	35.0	70.0	35.0	60.0	75.0	60.0	40.0	80.0	65.0	75.0	70.0	58.1	18.1
4	Poor project management/planning /incorrect resource allocation/ lack of communication	25.0	90.0	30.0	75.0	50.0	75.0	55.0	70.0	30.0	40.0	65.0	60.0	55.0	55.4	19.9
5	Lack of responsibility/follow-up/laziness	35.0	90.0	50.0	20.0	40.0	65.0	65.0	40.0	45.0	70.0	70.0	50.0	80.0	55.4	19.8
6	Insufficient Time/Delay in projects	15.0	40.0	65.0	40.0	20.0	70.0	80.0	35.0	40.0	95.0	70.0	65.0	75.0	54.6	24.4
7	Frequent changes of resources due to lack of relevant experience	15.0	60.0	30.0	50.0	20.0	60.0	65.0	70.0	35.0	80.0	70.0	60.0	75.0	53.1	21.4
8	Lack of personnel motivation/Training/ cultural difference	30.0	85.0	25.0	50.0	50.0	85.0	55.0	30.0	35.0	70.0	50.0	60.0	50.0	51.9	19.5
9	Lack of expert knowledge competency /experience	15.0	85.0	25.0	50.0	50.0	80.0	45.0	35.0	25.0	80.0	55.0	60.0	65.0	51.5	22.5
10	Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers	20.0	50.0	30.0	35.0	90.0	60.0	80.0	30.0	30.0	50.0	60.0	60.0	70.0	51.2	21.4
11	Lack of updated documentation/ Too much documentation/ insufficient time/project delivery pressure	50.0	20.0	45.0	70.0	20.0	20.0	65.0	40.0	30.0	70.0	75.0	70.0	75.0	50.0	22.2
12	Different culture/language issues /different timing zone/don't want to listen (Ego issue)/ personnel behavior	10.0	25.0	30.0	60.0	15.0	20.0	60.0	65.0	45.0	50.0	70.0	60.0	70.0	44.6	21.8
13	Different international standards/International rules and regulation	15.0	20.0	25.0	70.0	15.0	30.0	65.0	30.0	15.0	90.0	70.0	50.0	70.0	43.5	26.6
14	Customer specific regulations/Customer Trainings/requirements	10.0	15.0	60.0	70.0	5.0	20.0	45.0	20.0	25.0	40.0	35.0	20.0	45.0	31.5	19.6
15	Company budget/policy	20.0	20.0	15.0	10.0	20.0	20.0	45.0	25.0	30.0	55.0	50.0	60.0	50.0	32.3	17.2

8.5 Stage Number 2 of Interview Getting Variables in Conditional Probabilities Tables

What will be the % of "M" being True if all of the conditions (C1, C2, C3……Cn) are True?
Note: Each of the condition will go into True or False state. It will take some effort to fill all the numbers. Please try to give us suitable numbers based on your expert knowledge. This will give us baseline to generate actual number that causes the delay in Projects by using BN.

Conditional Probability Table - 1																	
Project Complexity and Design Errors, which influence the Project completion?	Lack of expert knowledge competency /experience	T								F							
	Poor customer side competency follow-up/too many changes/wrong understanding and/or complexity in design /requirements/lack of communication	T				F				T				F			
	Poor project management/planning /incorrect resource allocation/ lack of communication	T		F		T		F		T		F		T		F	
	Challenges and incorporation with EPC/EPC competency /issues with 3rd party vendors and/or suppliers	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	90.0	90.0	80.0	75.0	80.0	70.0	65.0	75.0	80.0	75.0	80.0	50.0	55.0	25.0	0.0
ABB Respondent-2	TRUE(T)	98.0	95.0	80.0	78.0	80.0	78.0	60.0	55.0	70.0	68.0	50.0	40.0	50.0	48.0	25.0	20.0
ABB Respondent-3	TRUE(T)	75.0	65.0	70.0	50.0	55.0	40.0	45.0	25.0	45.0	20.0	20.0	15.0	16.0	10.0	5.0	2.0
ABB Respondent-4	TRUE(T)	100.0	95.0	90.0	80.0	90.0	80.0	60.0	50.0	85.0	85.0	70.0	60.0	70.0	60.0	20.0	10.0
ABB Respondent-5	TRUE(T)	80.0	75.0	60.0	55.0	60.0	55.0	40.0	55.0	60.0	55.0	40.0	35.0	40.0	35.0	20.0	15.0
ABB Respondent-6	TRUE(T)	100.0	95.0	98.0	60.0	85.0	75.0	50.0	50.0	90.0	80.0	85.0	30.0	75.0	20.0	15.0	0.0
ABB Respondent-7	TRUE(T)	100.0	95.0	90.0	80.0	85.0	45.0	70.0	40.0	95.0	80.0	90.0	40.0	70.0	20.0	50.0	15.0
ABB Respondent-8	TRUE(T)	95.0	90.0	85.0	50.0	80.0	50.0	70.0	40.0	80.0	80.0	60.0	30.0	80.0	40.0	20.0	5.0
ABB Respondent-9	TRUE(T)	100.0	80.0	50.0	40.0	30.0	50.0	70.0	40.0	80.0	60.0	50.0	40.0	60.0	40.0	30.0	10.0
ABB Respondent-10	TRUE(T)	100.0	90.0	90.0	80.0	90.0	70.0	40.0	30.0	70.0	60.0	60.0	50.0	40.0	30.0	20.0	10.0
ABB Respondent-11	TRUE(T)	100.0	80.0	80.0	50.0	80.0	35.0	70.0	30.0	60.0	40.0	60.0	25.0	60.0	20.0	30.0	10.0
ABB Respondent-12	TRUE(T)	100.0	99.0	95.0	70.0	80.0	40.0	65.0	35.0	95.0	75.0	95.0	35.0	65.0	20.0	55.0	15.0
	Mean Value	95.7	87.4	81.5	64.4	74.2	58.2	59.2	42.9	75.4	65.3	62.9	40.0	56.3	33.2	26.3	9.3
	Standard deviation	8.7	10.2	14.6	15.1	17.6	17.3	12.2	12.1	15.3	19.6	21.7	17.1	18.2	15.8	14.0	6.5

Conditional Probability Table -2																	
Poorly Defined Project Scope and Scope Change, which influence the Project completion?	Poor customer side competency/follow-up/too many changes/wrong understanding and/or complexity in design/	T								F							
	Challenges and incorporation with EPC/EPC competency /issues with 3rd party vendors and/or suppliers	T				F				T				F			
	Poor project management/ planning /incorrect resource allocation/ lack of communication	T		F		T		F		T		F		T		F	
	Poor product quality/ product not fully tested/ cost issues / wrong estimation / insufficient time/project delivery pressure	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	85.0	85.0	80.0	75.0	80.0	65.0	70.0	70.0	80.0	75.0	65.0	55.0	65.0	30.0	0.0
ABB Respondent-2	TRUE(T)	95.0	90.0	85.0	75.0	80.0	75.0	60.0	55.0	65.0	60.0	50.0	45.0	50.0	45.0	30.0	25.0
ABB Respondent-3	TRUE(T)	80.0	75.0	70.0	65.0	60.0	55.0	60.0	40.0	50.0	40.0	50.0	40.0	50.0	30.0	40.0	2.0
ABB Respondent-4	TRUE(T)	100.0	90.0	85.0	60.0	85.0	85.0	60.0	30.0	85.0	85.0	75.0	30.0	70.0	50.0	30.0	20.0
ABB Respondent-5	TRUE(T)	100.0	80.0	50.0	70.0	70.0	50.0	60.0	40.0	60.0	40.0	50.0	30.0	30.0	10.0	20.0	5.0
ABB Respondent-6	TRUE(T)	100.0	90.0	70.0	60.0	90.0	70.0	60.0	20.0	90.0	80.0	50.0	15.0	60.0	50.0	70.0	0.0
ABB Respondent-7	TRUE(T)	100.0	95.0	90.0	75.0	90.0	60.0	70.0	30.0	90.0	65.0	80.0	60.0	60.0	40.0	70.0	20.0
ABB Respondent-8	TRUE(T)	95.0	90.0	85.0	75.0	85.0	80.0	60.0	50.0	75.0	60.0	30.0	20.0	60.0	40.0	20.0	5.0
ABB Respondent-9	TRUE(T)	90.0	70.0	60.0	20.0	60.0	40.0	30.0	20.0	70.0	50.0	40.0	20.0	60.0	50.0	40.0	10.0
ABB Respondent-10	TRUE(T)	100.0	60.0	90.0	40.0	80.0	20.0	70.0	0.0	80.0	40.0	70.0	30.0	60.0	20.0	50.0	10.0
ABB Respondent-11	TRUE(T)	95.0	95.0	95.0	80.0	85.0	70.0	65.0	40.0	85.0	70.0	65.0	60.0	55.0	45.0	65.0	15.0
ABB Respondent-12	TRUE(T)	80.0	70.0	70.0	40.0	70.0	40.0	60.0	20.0	90.0	80.0	60.0	40.0	50.0	30.0	20.0	10.0
	Mean Value	94.6	82.5	77.9	61.7	77.5	60.4	60.0	34.6	75.8	62.5	57.9	37.9	55.0	39.6	40.4	10.2
	Standard deviation	7.5	11.4	13.7	19.0	10.6	19.9	10.2	18.8	13.1	17.0	15.4	16.8	9.8	15.0	19.1	8.3

Conditional Probability Table -3																	
Challenges with EPC and Inappropriate and Inadequate Procurement Procedure, which influence the Project completion?	Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers	T								F							
	Lack of personnel motivation/Training/ cultural difference	T				F				T				F			
	Poor customer side competency/follow-up/too many chnages/wrong	T		F		T		F		T		F		T		F	
	Lack of responsibility/follow-up/laziness	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	90.0	70.0	60.0	65.0	80.0	65.0	70.0	70.0	90.0	70.0	90.0	60.0	65.0	30.0	0.0
ABB Respondent-2	TRUE(T)	100.0	80.0	90.0	75.0	85.0	75.0	80.0	70.0	100.0	80.0	90.0	70.0	80.0	75.0	80.0	70.0
ABB Respondent-3	TRUE(T)	90.0	80.0	70.0	60.0	70.0	65.0	60.0	40.0	50.0	40.0	40.0	30.0	90.0	20.0	30.0	2.0
ABB Respondent-4	TRUE(T)	50.0	40.0	45.0	30.0	45.0	35.0	40.0	20.0	35.0	30.0	30.0	25.0	25.0	20.0	10.0	0.0
ABB Respondent-5	TRUE(T)	90.0	60.0	85.0	55.0	85.0	55.0	80.0	50.0	40.0	10.0	35.0	5.0	35.0	5.0	30.0	5.0
ABB Respondent-6	TRUE(T)	100.0	90.0	80.0	70.0	90.0	80.0	70.0	40.0	50.0	40.0	30.0	10.0	50.0	40.0	20.0	0.0
ABB Respondent-7	TRUE(T)	95.0	85.0	70.0	50.0	80.0	65.0	70.0	45.0	45.0	35.0	30.0	15.0	45.0	25.0	25.0	15.0
ABB Respondent-8	TRUE(T)	100.0	90.0	85.0	70.0	90.0	70.0	60.0	20.0	85.0	65.0	40.0	20.0	75.0	30.0	40.0	5.0
ABB Respondent-9	TRUE(T)	70.0	65.0	30.0	20.0	60.0	50.0	30.0	25.0	70.0	55.0	35.0	15.0	65.0	50.0	20.0	10.0
ABB Respondent-10	TRUE(T)	100.0	80.0	80.0	60.0	70.0	50.0	50.0	30.0	70.0	50.0	50.0	30.0	40.0	20.0	20.0	0.0
ABB Respondent-11	TRUE(T)	80.0	70.0	70.0	50.0	60.0	40.0	60.0	40.0	60.0	50.0	50.0	30.0	30.0	20.0	20.0	10.0
ABB Respondent-12	TRUE(T)	95.0	90.0	65.0	55.0	85.0	70.0	65.0	50.0	50.0	40.0	35.0	20.0	45.0	30.0	25.0	15.0
	Mean Value	89.2	76.7	70.0	54.6	73.8	61.3	60.8	41.7	60.4	48.8	44.6	30.0	53.3	33.3	29.2	11.0
	Standard deviation	15.5	15.4	17.3	16.0	14.3	15.1	14.9	16.8	19.2	21.9	18.4	25.0	20.7	20.6	17.7	19.4

Conditional Probability Table - 4																																							
Poor Quality and Delay in Delivery, which influence the Project completion?	Lack of personnel motivation/Training/ cultural difference	T																'F																				
	Poor product quality/ product not fully tested/ cost issues / wrong estimation / insufficient time/project delivery pressure	T								F								T								F												
	Poor project management/planning /incorrect resource allocation/ lack of communication	T				F				T				F				T				F				T				F								
	Poor customer side competency/follow-up/too many changes/ wrong understanding and/or complexity in design/ requirements/lack of communication	T		F		T		F		T		F		T		F		T		F		T		F		T		F		T		F						
	Challenges and incorporation with EPC/EPC competency/issues with 3rd party vendors and/or suppliers	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	80.0	90.0	80.0	90.0	65.0	65.0	80.0	75.0	80.0	80.0	90.0	60.0	70.0	70.0	55.0	80.0	90.0	80.0	90.0	70.0	75.0	60.0	65.0	70.0	45.0	65.0	70.0	50.0	60.0	25.0	0.0					
ABB Respondent-2	TRUE(T)	98.0	97.0	97.0	96.0	88.0	87.0	87.0	86.0	68.0	67.0	67.0	66.0	48.0	47.0	47.0	46.0	78.0	77.0	77.0	76.0	58.0	57.0	57.0	56.0	50.0	50.0	45.0	45.0	25.0	22.0	20.0	18.0					
ABB Respondent-3	TRUE(T)	95.0	85.0	85.0	70.0	75.0	60.0	60.0	50.0	50.0	45.0	45.0	35.0	40.0	35.0	35.0	30.0	70.0	65.0	65.0	60.0	50.0	45.0	45.0	40.0	35.0	30.0	30.0	20.0	25.0	20.0	15.0	2.0					
ABB Respondent-4	TRUE(T)	100.0	90.0	90.0	85.0	80.0	75.0	60.0	50.0	70.0	65.0	60.0	60.0	20.0	10.0	10.0	20.0	85.0	80.0	60.0	60.0	50.0	50.0	40.0	50.0	75.0	65.0	50.0	35.0	35.0	30.0	20.0	15.0					
ABB Respondent-5	TRUE(T)	90.0	75.0	80.0	65.0	75.0	60.0	65.0	50.0	70.0	55.0	60.0	45.0	55.0	40.0	45.0	30.0	60.0	45.0	50.0	35.0	45.0	30.0	35.0	20.0	40.0	25.0	30.0	15.0	25.0	10.0	15.0	5.0					
ABB Respondent-6	TRUE(T)	100.0	99.0	95.0	90.0	85.0	80.0	75.0	65.0	60.0	60.0	55.0	50.0	40.0	35.0	30.0	45.0	55.0	51.0	45.0	40.0	35.0	30.0	20.0	10.0	12.0	8.0	5.0	3.0	2.0	1.0	3.0	5.0					
ABB Respondent-7	TRUE(T)	100.0	100.0	100.0	90.0	100.0	90.0	85.0	85.0	95.0	70.0	75.0	30.0	80.0	30.0	30.0	20.0	100.0	95.0	80.0	70.0	95.0	70.0	75.0	10.0	70.0	30.0	40.0	20.0	60.0	45.0	45.0	15.0					
ABB Respondent-8	TRUE(T)	100.0	95.0	85.0	80.0	90.0	85.0	70.0	60.0	90.0	80.0	70.0	60.0	60.0	50.0	40.0	40.0	95.0	95.0	85.0	80.0	85.0	80.0	70.0	60.0	90.0	60.0	85.0	80.0	50.0	30.0	20.0	5.0					
ABB Respondent-9	TRUE(T)	85.0	70.0	65.0	55.0	75.0	65.0	40.0	30.0	85.0	65.0	55.0	50.0	50.0	45.0	30.0	20.0	80.0	65.0	60.0	55.0	45.0	35.0	30.0	25.0	60.0	50.0	40.0	30.0	30.0	25.0	25.0	10.0					
ABB Respondent-10	TRUE(T)	100.0	80.0	80.0	60.0	70.0	50.0	50.0	30.0	70.0	50.0	50.0	30.0	40.0	20.0	20.0	15.0	90.0	60.0	60.0	40.0	50.0	30.0	30.0	10.0	50.0	30.0	30.0	10.0	20.0	0.0	0.0	0.0					
ABB Respondent-11	TRUE(T)	100.0	70.0	80.0	50.0	70.0	40.0	50.0	30.0	80.0	50.0	70.0	50.0	70.0	50.0	60.0	30.0	70.0	55.0	60.0	30.0	50.0	20.0	40.0	30.0	50.0	30.0	40.0	20.0	40.0	20.0	30.0	10.0					
ABB Respondent-12	TRUE(T)	99.0	95.0	97.0	90.0	95.0	95.0	80.0	90.0	95.0	70.0	65.0	35.0	80.0	30.0	30.0	20.0	97.0	90.0	85.0	75.0	95.0	75.0	70.0	15.0	75.0	25.0	45.0	25.0	55.0	40.0	45.0	10.0					
	Mean Value	97.3	86.3	87.0	75.9	82.8	71.0	65.6	58.8	75.7	63.1	62.7	50.1	53.6	38.5	37.3	30.9	80.0	72.3	67.3	59.3	60.7	49.8	47.7	32.6	56.4	37.3	42.1	31.1	34.8	25.3	21.9	7.9					
	Standard deviation	4.9	11.2	10.0	15.5	10.0	17.1	14.6	22.6	13.9	11.4	10.4	17.4	17.8	15.7	16.5	12.9	14.4	17.8	13.7	19.6	20.6	21.2	18.2	20.8	21.4	16.6	19.7	23.4	16.9	17.5	13.8	6.0					

Conditional Probability Table -5																	
Lack of Proper Procedure and Documentation, which influence the Project completion?	Lack of updated documantation/Too much documentation/insufficient time/project delivery pressure	T								F							
	Lack of expert knowledge competency /experience	T				F				T				F			
	Poor project management/planning /incorrect resource allocation/ lack of communication	T		F		T		F		T		F		T		F	
	Lack of responsibility/follow-up/laziness	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	85.0	85.0	75.0	75.0	85.0	65.0	70.0	75.0	85.0	70.0	75.0	40.0	50.0	30.0	0.0
ABB Respondent-2	TRUE(T)	80.0	60.0	75.0	70.0	60.0	50.0	55.0	35.0	70.0	45.0	50.0	35.0	45.0	40.0	40.0	20.0
ABB Respondent-3	TRUE(T)	80.0	60.0	60.0	40.0	50.0	40.0	50.0	30.0	60.0	30.0	40.0	20.0	30.0	20.0	20.0	2.0
ABB Respondent-4	TRUE(T)	75.0	70.0	60.0	45.0	70.0	65.0	40.0	35.0	75.0	70.0	45.0	35.0	65.0	55.0	35.0	5.0
ABB Respondent-5	TRUE(T)	90.0	70.0	80.0	60.0	70.0	50.0	60.0	40.0	50.0	30.0	40.0	20.0	30.0	10.0	20.0	5.0
ABB Respondent-6	TRUE(T)	100.0	70.0	60.0	40.0	50.0	35.0	30.0	20.0	70.0	60.0	40.0	30.0	20.0	10.0	0.0	0.0
ABB Respondent-7	TRUE(T)	90.0	75.0	75.0	45.0	75.0	40.0	70.0	35.0	85.0	65.0	70.0	35.0	55.0	20.0	40.0	20.0
ABB Respondent-8	TRUE(T)	95.0	85.0	80.0	50.0	75.0	65.0	60.0	30.0	80.0	70.0	40.0	30.0	75.0	60.0	30.0	5.0
ABB Respondent-9	TRUE(T)	70.0	60.0	50.0	30.0	60.0	50.0	30.0	25.0	60.0	40.0	35.0	25.0	35.0	30.0	25.0	10.0
ABB Respondent-10	TRUE(T)	100.0	90.0	90.0	80.0	70.0	60.0	60.0	50.0	60.0	50.0	50.0	40.0	30.0	20.0	20.0	10.0
ABB Respondent-11	TRUE(T)	40.0	50.0	30.0	25.0	45.0	30.0	40.0	20.0	50.0	25.0	50.0	25.0	40.0	35.0	30.0	10.0
ABB Respondent-12	TRUE(T)	95.0	80.0	75.0	45.0	70.0	45.0	75.0	40.0	85.0	70.0	70.0	35.0	55.0	25.0	40.0	20.0
	Mean Value	84.6	71.3	68.3	50.4	64.2	51.3	52.9	35.8	68.3	53.3	50.0	33.8	43.3	31.3	27.5	8.9
	Standard deviation	17.4	12.3	17.0	17.4	10.8	15.4	15.0	13.8	12.3	19.5	13.0	14.5	16.3	16.9	11.6	7.5

Conditional Probability Table - 6																	
Technical and Operational Challenges, which influence the Project completion?	Lack of expert knowledge/ competency /experience	T								F							
	Poor product quality/ product not fully tested/ cost issues /wrong estimation / insufficient time/project delivery pressure	T				F				T				F			
	Poor customer side competency /follow-up/too many changes/wrong understanding and/or complexity in design/ requirements/lack of communication	T		F		T		F		T		F		T		F	
	Poor project management/planning /incorrect resource allocation/ lack of communication	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	80.0	80.0	70.0	60.0	80.0	65.0	70.0	75.0	90.0	80.0	85.0	60.0	50.0	25.0	0.0
ABB Respondent-2	TRUE(T)	80.0	50.0	70.0	50.0	70.0	50.0	70.0	50.0	60.0	55.0	60.0	60.0	40.0	30.0	20.0	20.0
ABB Respondent-3	TRUE(T)	95.0	85.0	85.0	80.0	75.0	70.0	70.0	60.0	50.0	45.0	45.0	40.0	30.0	25.0	15.0	2.0
ABB Respondent-4	TRUE(T)	100.0	80.0	85.0	75.0	75.0	50.0	50.0	20.0	80.0	35.0	95.0	35.0	50.0	35.0	35.0	10.0
ABB Respondent-5	TRUE(T)	100.0	80.0	90.0	70.0	70.0	50.0	60.0	40.0	60.0	40.0	50.0	30.0	30.0	10.0	20.0	10.0
ABB Respondent-6	TRUE(T)	100.0	100.0	90.0	90.0	80.0	80.0	60.0	60.0	50.0	50.0	20.0	20.0	5.0	5.0	0.0	0.0
ABB Respondent-7	TRUE(T)	95.0	90.0	85.0	85.0	80.0	70.0	60.0	55.0	65.0	70.0	55.0	50.0	45.0	40.0	25.0	15.0
ABB Respondent-8	TRUE(T)	100.0	90.0	95.0	85.0	90.0	80.0	95.0	70.0	75.0	40.0	60.0	40.0	70.0	30.0	25.0	5.0
ABB Respondent-9	TRUE(T)	85.0	60.0	70.0	40.0	40.0	30.0	40.0	20.0	70.0	50.0	40.0	30.0	60.0	40.0	30.0	10.0
ABB Respondent-10	TRUE(T)	100.0	80.0	80.0	60.0	80.0	60.0	60.0	40.0	60.0	40.0	40.0	20.0	40.0	20.0	20.0	0.0
ABB Respondent-11	TRUE(T)	70.0	50.0	65.0	45.0	60.0	50.0	45.0	35.0	70.0	50.0	50.0	30.0	60.0	25.0	20.0	10.0
ABB Respondent-12	TRUE(T)	95.0	85.0	85.0	90.0	80.0	70.0	60.0	55.0	65.0	70.0	50.0	55.0	45.0	40.0	20.0	20.0
	Mean Value	93.3	77.5	81.7	70.0	71.7	61.7	61.3	47.9	65.0	52.9	53.8	41.3	44.6	29.2	21.3	8.5
	Standard deviation	9.8	15.9	9.1	17.6	13.2	15.9	14.0	17.1	9.5	16.2	19.3	18.7	17.6	13.1	8.6	7.3

Conditional Probability Table -7									
Regulatory Challenges to follow-up, which influence the Project completion?	Customer specific regulations/ Customer Trainings/ requirements	T				F			
	Lack of expert knowledge / competency /experience	T		F		T		F	
	Different international standards/International rules and regulation	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	50.0	40.0	30.0	25.0	20.0	10.0	0.0
ABB Respondent-2	TRUE(T)	60.0	50.0	40.0	35.0	40.0	35.0	25.0	20.0
ABB Respondent-3	TRUE(T)	65.0	50.0	40.0	30.0	40.0	30.0	20.0	2.0
ABB Respondent-4	TRUE(T)	75.0	70.0	55.0	45.0	40.0	20.0	30.0	0.0
ABB Respondent-5	TRUE(T)	55.0	40.0	40.0	30.0	20.0	10.0	10.0	0.0
ABB Respondent-6	TRUE(T)	80.0	60.0	40.0	20.0	50.0	30.0	15.0	10.0
ABB Respondent-7	TRUE(T)	90.0	80.0	55.0	50.0	40.0	25.0	25.0	10.0
ABB Respondent-8	TRUE(T)	90.0	75.0	60.0	40.0	55.0	35.0	20.0	10.0
ABB Respondent-9	TRUE(T)	65.0	40.0	35.0	20.0	45.0	30.0	20.0	10.0
ABB Respondent-10	TRUE(T)	100.0	90.0	50.0	40.0	50.0	40.0	0.0	0.0
ABB Respondent-11	TRUE(T)	40.0	30.0	30.0	25.0	30.0	25.0	20.0	15.0
ABB Respondent-12	TRUE(T)	90.0	65.0	45.0	55.0	35.0	30.0	25.0	10.0
	Mean Value	75.8	58.3	44.2	35.0	39.2	27.5	18.3	7.3
	Standard deviation	19.0	18.1	9.0	11.3	10.4	8.1	8.3	6.7

Conditional Probability Table - 8									
Poor Resource allocation and frequent Change of Project Team, which influence the Project completion?	Poor project management/planning / incorrect resource allocation/ lack of communication	T				F			
	Insufficient Time/Delay in project	T		F		T		F	
	Lack of expert knowledge / competency /experience	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	90.0	80.0	70.0	60.0	45.0	40.0	30.0	0.0
ABB Respondent-2	TRUE(T)	90.0	75.0	80.0	60.0	70.0	50.0	45.0	20.0
ABB Respondent-3	TRUE(T)	90.0	80.0	75.0	50.0	60.0	40.0	50.0	2.0
ABB Respondent-4	TRUE(T)	95.0	80.0	85.0	70.0	80.0	50.0	25.0	5.0
ABB Respondent-5	TRUE(T)	80.0	70.0	50.0	40.0	40.0	30.0	10.0	0.0
ABB Respondent-6	TRUE(T)	80.0	70.0	70.0	60.0	50.0	40.0	5.0	0.0
ABB Respondent-7	TRUE(T)	95.0	90.0	75.0	55.0	45.0	45.0	20.0	15.0
ABB Respondent-8	TRUE(T)	95.0	90.0	35.0	30.0	66.0	80.0	10.0	5.0
ABB Respondent-9	TRUE(T)	65.0	50.0	45.0	30.0	40.0	30.0	30.0	10.0
ABB Respondent-10	TRUE(T)	100.0	90.0	70.0	60.0	50.0	40.0	30.0	20.0
ABB Respondent-11	TRUE(T)	75.0	45.0	40.0	30.0	40.0	30.0	35.0	20.0
ABB Respondent-12	TRUE(T)	90.0	90.0	70.0	60.0	45.0	40.0	15.0	15.0
	Mean Value	87.1	75.8	63.8	50.4	52.6	42.9	25.4	9.3
	Standard deviation	10.1	15.2	16.7	14.2	13.3	13.6	14.1	8.3

Conditional Probability Table - 9																	
Poor Collaboration Level and Communication between project team members, which influence the Project completion?	Poor project management /planning /incorrect resource allocation/lack of communication	T								F							
	Lack of coordination	T				F				T				F			
	Different culture/language issues /different timing zone/ don't want to listen (Ego issue)/personnel behavior	T		F		T		F		T		F		T		F	
	Lack of expert knowledge / competency /experience	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	85.0	85.0	60.0	70.0	80.0	60.0	70.0	70.0	90.0	75.0	85.0	50.0	60.0	40.0	0.0
ABB Respondent-2	TRUE(T)	90.0	85.0	85.0	80.0	85.0	80.0	75.0	60.0	70.0	65.0	65.0	50.0	50.0	40.0	40.0	20.0
ABB Respondent-3	TRUE(T)	90.0	80.0	85.0	75.0	60.0	50.0	50.0	30.0	50.0	45.0	45.0	40.0	30.0	25.0	20.0	2.0
ABB Respondent-4	TRUE(T)	85.0	80.0	75.0	70.0	75.0	65.0	55.0	50.0	80.0	70.0	70.0	35.0	35.0	20.0	10.0	5.0
ABB Respondent-5	TRUE(T)	80.0	60.0	70.0	50.0	50.0	30.0	40.0	20.0	60.0	40.0	50.0	30.0	30.0	10.0	20.0	5.0
ABB Respondent-6	TRUE(T)	90.0	95.0	80.0	70.0	45.0	40.0	20.0	10.0	65.0	60.0	45.0	40.0	40.0	30.0	5.0	0.0
ABB Respondent-7	TRUE(T)	95.0	85.0	75.0	55.0	70.0	65.0	45.0	25.0	60.0	70.0	40.0	35.0	40.0	35.0	10.0	10.0
ABB Respondent-8	TRUE(T)	90.0	85.0	90.0	80.0	70.0	50.0	70.0	50.0	70.0	40.0	70.0	40.0	40.0	30.0	10.0	5.0
ABB Respondent-9	TRUE(T)	70.0	65.0	55.0	45.0	55.0	45.0	40.0	35.0	60.0	50.0	40.0	30.0	40.0	20.0	30.0	10.0
ABB Respondent-10	TRUE(T)	100.0	80.0	50.0	30.0	50.0	30.0	0.0	0.0	100.0	80.0	50.0	30.0	50.0	30.0	0.0	0.0
ABB Respondent-11	TRUE(T)	75.0	55.0	55.0	35.0	45.0	40.0	55.0	30.0	25.0	40.0	35.0	35.0	30.0	25.0	20.0	5.0
ABB Respondent-12	TRUE(T)	95.0	80.0	70.0	50.0	75.0	70.0	40.0	20.0	70.0	75.0	35.0	30.0	35.0	30.0	10.0	10.0
	Mean Value	88.3	77.9	72.9	58.3	62.5	53.8	45.8	33.3	65.0	60.4	51.7	40.0	39.2	29.6	17.9	6.0
	Standard deviation	9.4	11.8	13.4	17.0	13.4	17.9	20.7	20.7	17.7	17.2	14.5	15.4	7.6	12.3	13.0	5.8

Conditional Probability Table - 10									
Conflict within Team Members, which influence the Project completion?	Different culture/language issues /different timing zone/ don't want to listen (Ego issue)/personnel behavior	T				F			
	Lack of coordination	T		F		T		F	
	Poor project management/planning / incorrect resource allocation/ lack of communication	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	80.0	80.0	65.0	50.0	40.0	25.0	0.0
ABB Respondent-2	TRUE(T)	90.0	60.0	75.0	50.0	70.0	50.0	60.0	25.0
ABB Respondent-3	TRUE(T)	90.0	80.0	60.0	45.0	50.0	40.0	30.0	2.0
ABB Respondent-4	TRUE(T)	80.0	65.0	70.0	30.0	70.0	30.0	45.0	0.0
ABB Respondent-5	TRUE(T)	50.0	40.0	35.0	35.0	40.0	30.0	10.0	5.0
ABB Respondent-6	TRUE(T)	50.0	55.0	30.0	26.0	35.0	30.0	15.0	10.0
ABB Respondent-7	TRUE(T)	100.0	95.0	75.0	55.0	50.0	35.0	20.0	15.0
ABB Respondent-8	TRUE(T)	95.0	90.0	65.0	40.0	85.0	40.0	40.0	5.0
ABB Respondent-9	TRUE(T)	70.0	50.0	45.0	30.0	55.0	25.0	40.0	10.0
ABB Respondent-10	TRUE(T)	100.0	100.0	70.0	60.0	50.0	50.0	30.0	30.0
ABB Respondent-11	TRUE(T)	80.0	50.0	60.0	40.0	60.0	30.0	20.0	10.0
ABB Respondent-12	TRUE(T)	95.0	95.0	70.0	60.0	55.0	30.0	25.0	20.0
	Mean Value	83.3	71.7	61.3	44.7	55.8	35.8	30.0	11.0
	Standard deviation	18.1	20.8	16.3	13.3	13.8	8.2	14.1	9.8

Conditional Probability Table - 11																	
Lack of responsibilities, which influence the Project completion?	Poor project management /planning /incorrect resource allocation/lack of communication	T								F							
	Different culture/language issues /different timing zone/ don't want to listen (Ego issue)/personnel behavior	T				F				T				F			
	Lack of coordination	T		F		T		F		T		F		T		F	
	Lack of expert knowledge / competency /experience	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	80.0	80.0	70.0	75.0	80.0	60.0	70.0	70.0	85.0	70.0	80.0	50.0	60.0	50.0	0.0
ABB Respondent-2	TRUE(T)	95.0	90.0	80.0	75.0	90.0	85.0	80.0	50.0	60.0	55.0	55.0	50.0	60.0	50.0	30.0	20.0
ABB Respondent-3	TRUE(T)	90.0	80.0	75.0	60.0	75.0	65.0	50.0	30.0	60.0	40.0	50.0	45.0	50.0	40.0	30.0	2.0
ABB Respondent-4	TRUE(T)	90.0	80.0	80.0	75.0	80.0	75.0	65.0	60.0	75.0	60.0	45.0	35.0	20.0	20.0	15.0	0.0
ABB Respondent-5	TRUE(T)	50.0	40.0	30.0	20.0	40.0	30.0	20.0	10.0	40.0	30.0	20.0	45.0	30.0	20.0	10.0	5.0
ABB Respondent-6	TRUE(T)	90.0	85.0	70.0	60.0	40.0	35.0	30.0	20.0	60.0	50.0	30.0	38.0	35.0	30.0	5.0	0.0
ABB Respondent-7	TRUE(T)	95.0	95.0	90.0	80.0	75.0	65.0	55.0	20.0	75.0	80.0	70.0	45.0	30.0	35.0	20.0	15.0
ABB Respondent-8	TRUE(T)	95.0	90.0	90.0	90.0	90.0	85.0	60.0	60.0	80.0	70.0	75.0	62.0	60.0	40.0	10.0	5.0
ABB Respondent-9	TRUE(T)	75.0	60.0	55.0	50.0	65.0	50.0	40.0	35.0	45.0	30.0	35.0	45.0	35.0	20.0	20.0	10.0
ABB Respondent-10	TRUE(T)	100.0	90.0	60.0	50.0	70.0	60.0	30.0	20.0	80.0	70.0	40.0	30.0	30.0	40.0	10.0	0.0
ABB Respondent-11	TRUE(T)	80.0	50.0	70.0	40.0	70.0	50.0	60.0	40.0	50.0	50.0	40.0	25.0	40.0	40.0	30.0	20.0
ABB Respondent-12	TRUE(T)	100.0	90.0	95.0	75.0	70.0	65.0	50.0	30.0	80.0	85.0	65.0	45.0	35.0	30.0	15.0	10.0
	Mean Value	88.3	77.5	72.9	62.1	70.0	62.1	50.0	37.1	64.6	58.8	49.6	45.4	39.6	35.4	20.4	7.3
	Standard deviation	14.4	17.8	18.0	19.6	16.0	18.1	17.2	19.1	14.2	19.7	17.6	14.5	12.7	12.3	12.7	7.7

Conditional Probability Table - 12																	
Insufficient training and experience, which influence the Project completion?	Company budget/policy	T								F							
	Poor project management/ planning /incorrect resource allocation/ lack of communication	T				F				T				F			
	Frequent changes of resources due to lack of relevant experience	T		F		T		F		T		F		T		F	
	Different culture/language issues /different timing zone/ don't want to listen (Ego issue)/personnel behavior	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	66.0	80.0	75.0	70.0	80.0	60.0	70.0	80.0	45.0	55.0	45.0	50.0	60.0	50.0	0.0
ABB Respondent-2	TRUE(T)	60.0	60.0	50.0	50.0	60.0	60.0	50.0	50.0	60.0	60.0	50.0	40.0	45.0	60.0	50.0	40.0
ABB Respondent-3	TRUE(T)	80.0	75.0	65.0	60.0	60.0	55.0	50.0	30.0	50.0	45.0	40.0	30.0	20.0	15.0	10.0	2.0
ABB Respondent-4	TRUE(T)	70.0	65.0	60.0	60.0	50.0	50.0	25.0	20.0	70.0	50.0	60.0	55.0	40.0	35.0	15.0	5.0
ABB Respondent-5	TRUE(T)	65.0	35.0	35.0	25.0	40.0	30.0	30.0	20.0	25.0	15.0	35.0	35.0	20.0	10.0	10.0	5.0
ABB Respondent-6	TRUE(T)	100.0	76.0	40.0	40.0	70.0	70.0	5.0	5.0	40.0	40.0	26.0	25.0	30.0	30.0	0.0	0.0
ABB Respondent-7	TRUE(T)	95.0	85.0	80.0	65.0	75.0	65.0	45.0	45.0	50.0	30.0	35.0	20.0	25.0	20.0	15.0	10.0
ABB Respondent-8	TRUE(T)	95.0	85.0	85.0	85.0	80.0	60.0	40.0	30.0	85.0	60.0	60.0	40.0	55.0	40.0	10.0	5.0
ABB Respondent-9	TRUE(T)	75.0	55.0	35.0	30.0	45.0	35.0	30.0	20.0	50.0	40.0	35.0	30.0	30.0	20.0	20.0	10.0
ABB Respondent-10	TRUE(T)	100.0	70.0	70.0	50.0	90.0	70.0	30.0	40.0	50.0	30.0	30.0	20.0	40.0	20.0	10.0	0.0
ABB Respondent-11	TRUE(T)	70.0	50.0	30.0	30.0	60.0	40.0	30.0	20.0	50.0	30.0	30.0	20.0	50.0	40.0	30.0	10.0
ABB Respondent-12	TRUE(T)	90.0	80.0	75.0	60.0	70.0	65.0	40.0	35.0	45.0	35.0	30.0	20.0	25.0	20.0	15.0	10.0
	Mean Value	83.3	66.8	58.8	52.5	64.2	56.7	36.3	32.1	54.6	40.0	40.5	31.7	35.8	30.8	19.6	8.1
	Standard deviation	15.0	15.0	20.0	18.6	14.6	15.3	14.5	17.4	16.8	13.1	12.4	11.5	12.4	16.6	15.9	10.8

Conditional Probability Table - 13									
Inadequate project planning and controlling, which influence the Project completion	Poor project management/ planning /incorrect resource allocation/ lack of communication	T				F			
	Poor product quality/ product not fully tested/cost issues / wrong estimation / insufficient time/project delivery pressure	T		F		T		F	
	Lack of expert knowledge competency /experience	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	55.0	50.0	55.0	70.0	55.0	0.0	0.0
ABB Respondent-2	TRUE(T)	100.0	98.0	80.0	70.0	75.0	70.0	50.0	20.0
ABB Respondent-3	TRUE(T)	80.0	60.0	70.0	45.0	55.0	45.0	30.0	2.0
ABB Respondent-4	TRUE(T)	95.0	95.0	80.0	75.0	70.0	60.0	30.0	5.0
ABB Respondent-5	TRUE(T)	50.0	70.0	40.0	40.0	35.0	25.0	10.0	5.0
ABB Respondent-6	TRUE(T)	100.0	98.0	95.0	85.0	40.0	20.0	2.0	0.0
ABB Respondent-7	TRUE(T)	95.0	90.0	65.0	50.0	45.0	40.0	25.0	20.0
ABB Respondent-8	TRUE(T)	95.0	90.0	95.0	90.0	90.0	70.0	30.0	10.0
ABB Respondent-9	TRUE(T)	75.0	65.0	50.0	55.0	40.0	55.0	25.0	10.0
ABB Respondent-10	TRUE(T)	100.0	80.0	70.0	50.0	50.0	65.0	20.0	0.0
ABB Respondent-11	TRUE(T)	60.0	45.0	40.0	35.0	50.0	30.0	40.0	10.0
ABB Respondent-12	TRUE(T)	90.0	90.0	70.0	45.0	50.0	35.0	20.0	15.0
	Mean Value	86.7	78.0	67.1	57.9	55.8	47.5	23.5	8.1
	Standard deviation	17.0	18.3	19.0	17.9	16.8	17.5	14.5	7.4

Conditional Probability Table - 14																	
Lack of trust at work, which influence the Project completion?	Different culture/language issues /different timing zone/ don't want to listen (Ego issue)/personnel behavior	'T								F							
	Poor project management /planning /incorrect resource allocation/ lack of communication	T				F				T				F			
	Lack of coordination	T		F		T		F		T		F		T		F	
	Lack of responsibility/follow-up/laziness	T	F	T	F	T	F	T	F	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	100.0	95.0	95.0	80.0	75.0	75.0	60.0	70.0	65.0	70.0	80.0	55.0	75.0	50.0	25.0	0.0
ABB Respondent-2	TRUE(T)	90.0	85.0	85.0	80.0	65.0	60.0	60.0	50.0	70.0	65.0	70.0	60.0	50.0	45.0	40.0	20.0
ABB Respondent-3	TRUE(T)	80.0	70.0	60.0	50.0	60.0	45.0	40.0	20.0	70.0	60.0	50.0	30.0	40.0	30.0	25.0	2.0
ABB Respondent-4	TRUE(T)	100.0	100.0	90.0	85.0	85.0	80.0	65.0	55.0	80.0	75.0	75.0	65.0	60.0	50.0	20.0	0.0
ABB Respondent-5	TRUE(T)	70.0	55.0	60.0	45.0	60.0	30.0	50.0	35.0	50.0	45.0	40.0	35.0	40.0	10.0	30.0	5.0
ABB Respondent-6	TRUE(T)	80.0	70.0	60.0	50.0	65.0	25.0	40.0	25.0	70.0	60.0	50.0	40.0	15.0	10.0	5.0	0.0
ABB Respondent-7	TRUE(T)	90.0	75.0	70.0	50.0	70.0	55.0	45.0	35.0	50.0	45.0	45.0	35.0	35.0	35.0	35.0	20.0
ABB Respondent-8	TRUE(T)	100.0	95.0	95.0	80.0	80.0	70.0	80.0	70.0	95.0	75.0	85.0	70.0	60.0	30.0	25.0	5.0
ABB Respondent-9	TRUE(T)	70.0	60.0	50.0	65.0	55.0	40.0	60.0	25.0	60.0	50.0	40.0	30.0	30.0	25.0	20.0	10.0
ABB Respondent-10	TRUE(T)	100.0	50.0	90.0	55.0	100.0	50.0	90.0	40.0	60.0	20.0	50.0	20.0	60.0	10.0	50.0	0.0
ABB Respondent-11	TRUE(T)	75.0	65.0	50.0	40.0	50.0	40.0	55.0	20.0	50.0	40.0	40.0	20.0	40.0	35.0	40.0	10.0
ABB Respondent-12	TRUE(T)	85.0	70.0	65.0	45.0	55.0	50.0	50.0	40.0	45.0	50.0	45.0	30.0	35.0	35.0	35.0	10.0
	Mean Value	86.7	74.2	72.5	60.4	68.3	51.7	57.9	40.4	63.8	54.6	55.8	40.8	45.0	30.4	29.2	6.8
	Standard deviation	11.7	16.4	17.4	16.6	14.5	17.2	15.1	17.6	14.5	16.2	16.8	17.3	16.5	14.5	11.8	7.3

Conditional Probability Table - 15									
Poor post execution of project, which influence the Project completion?	Lack of expert knowledge competency /experience	T				F			
	Poor project management/planning /incorrect resource allocation/ lack of communication	T		F		T		F	
	Lack of updated documentation/ too much documentation/ insufficient time/project delivery pressure	T	F	T	F	T	F	T	F
ABB Respondent-1	TRUE(T)	95.0	90.0	70.0	65.0	50.0	45.0	25.0	5.0
ABB Respondent-2	TRUE(T)	80.0	80.0	60.0	60.0	60.0	60.0	20.0	20.0
ABB Respondent-3	TRUE(T)	60.0	65.0	30.0	25.0	45.0	30.0	15.0	2.0
ABB Respondent-4	TRUE(T)	100.0	75.0	85.0	30.0	55.0	30.0	20.0	5.0
ABB Respondent-5	TRUE(T)	80.0	75.0	65.0	45.0	70.0	65.0	20.0	15.0
ABB Respondent-6	TRUE(T)	60.0	50.0	55.0	10.0	30.0	20.0	25.0	0.0
ABB Respondent-7	TRUE(T)	75.0	50.0	45.0	20.0	35.0	30.0	20.0	5.0
ABB Respondent-8	TRUE(T)	95.0	90.0	85.0	40.0	75.0	50.0	30.0	5.0
ABB Respondent-9	TRUE(T)	80.0	45.0	50.0	20.0	70.0	70.0	30.0	10.0
ABB Respondent-10	TRUE(T)	70.0	50.0	45.0	10.0	40.0	20.0	30.0	15.0
ABB Respondent-11	TRUE(T)	80.0	60.0	60.0	30.0	60.0	20.0	30.0	10.0
ABB Respondent-12	TRUE(T)	70.0	50.0	45.0	25.0	40.0	25.0	20.0	10.0
	Mean Value	78.8	65.0	57.9	31.7	52.5	38.8	23.8	8.5
	Standard deviation	13.0	16.5	16.6	17.8	14.8	18.5	5.3	5.9