

A STUDY ON EFFECTIVENESS OF SAP HANA DBMS MIGRATION PROCESS IN FIVE FEED LEARNING SOLUTIONS

Submitted in partial fulfillment of the requirements for the award of Degree in

MASTER OF BUSINESS ADMINISTRATION

by

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DEPARTMENT OF BUSINESS ADMINISTRATION

SCHOOL OF MANAGEMENT STUDIES

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC I 12B Status by UGC I Approved by AICTE

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **KISHORE.K 40410172** who carried out the project entitled **A Comparative Study on the role of Women in Top Managerial Positions and its Impact on Company's performance** under my supervision from August 2022 to November 2022.

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PLACE: Chennai



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ABSTRACT

This project titled “A study on effectiveness of SAP HANA DBMS migration process in Five Feed Learning Solutions” aims to improve the effectiveness of the migration process from Oracle to SAP HANA DBMS. The other important objectives are to determine the various problems faced during the migration process for the SAP team and get the perception of respondents towards the merits offered by SAP HANA DBMS database over the Oracle database.

Through this study, the researcher aims to know the effectiveness of training given for SAP HANA DBMS database in the SAP HANA DBMS migration process for the SAP team. SAP HANA DBMS can improve the performance to the SAP used in the organization. SAP HANA DBMS might help the organization to handle a large volume of data.

Success of any database migration depends upon the user’s experience after the database migration. There arises the need for an effective migration process to make the technology transfer a success. Thus it is important to study about perception of employees towards the SAP HANA DBMS migration process and eradicate the issues faced during the migration process.

Multiple choice questions have been chosen to collect the responses from 110 employees. Convenience sampling method has used in the research work. Percentage analysis has been to interpret the collected data. The data collected has been analyzed through various statistical tools like Karl Pearson’s Correlation, Chi-

square test and One-way Anova test. Numerous new findings has been derived from this research has helped to provide few suggestions to the management of Five Feed Learning Solutions to improve the effectiveness of the migration process from Oracle to SAP HANA DBMS.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

At the core of the SAP HANA DBMS real-time platform is the SAP HANA DBMS database. Unlike other database management systems on the market today, the SAP HANA DBMS database processes both transactional and analytical workloads fully in-memory. By consolidating two landscapes (OLAP and OLTP) into a single database, you can benefit from a dramatically lower TCO – in addition to mind-blowing speed.

SAP HANA DBMS originates from developed or acquired technologies, including TREX search engine, an in-memory column-oriented search engine, P*TIME, an in-memory OLTP database acquired by SAP in 2005, and MaxDB with its in-memory liveCache engine. In 2008, teams from SAP AG working with Hasso Plattner Institute and Stanford University demonstrated an application architecture for real-time analytics and aggregation, mentioned as "Hasso's New Architecture" in SAP executive Vishal Sikka's blog. Before the name HANA settled in, people referred to this product as New Database.

The product was officially announced in May 2010. In November 2010, SAP AG announced the release of SAP HANA DBMS 1.0, an in-memory appliance for business applications and business Intelligence allowing real-time response. The first product shipped in late November 2010. By mid-2011, the technology had attracted interest but the conservative business customers still considered it "in early days". HANA support

for SAP NetWeaver Business Warehouse was announced in September 2011 for availability by November.

In 2012, SAP promoted aspects of cloud computing. In October 2012, SAP announced a variant called HANA One that used a smaller amount of memory on Amazon Web Services for an hourly fee.

In January 2013, SAP enterprise resource planning software from its Business Suite was announced for HANA, and became available by May. In May 2013, a software as a service offering called the HANA Enterprise Cloud service was announced.

Rather than versioning, the software utilizes service packs

1.2 INDUSTRY PROFILE

Education of a nation is one of the foremost requirements for its development. India's advantage of having a large population of youth presents a huge opportunity to the players in the education sector as well as scope to the government for development of this sector and consequently, the country.

Several factors such as growing income levels and favourable foreign policies have attracted many foreign players into the Indian education market. The Government of India has also taken several initiatives to provide quality education to the youth in the country.

A Deloitte study has recognised the Indian education sector as a 'sunrise sector' for investments. This is because this sector offers huge potential to investors in the regulated as well as non-regulated markets. The vast diversity in ethnicities coupled with varying demographics has prompted different players to invest in the sector.

Market Size

The education market in India, which is presently worth around Rs 5.9 trillion (US\$ 92.98 billion), is poised for some major growth in the years to come, as by 2020, India will have the world's largest tertiary-age population, and second largest graduate talent pipeline globally. Presently, higher education contributes 59.7 per cent of the market size, school education 38.1 per cent, pre-school segment 1.6 per cent, and technology

and multi-media the remaining 0.6 per cent. The higher education sector in India is poised for an average growth of 18 per cent per year till 2020.

The education sector in India has earned global recognition from several quarters. For instance, the Mumbai University has featured in the world top 10 list for institutes with billionaire alumni and is ranked ninth, according to a report by Wealth-X and UBS.

Due to the growth advantages, this sector has also received number of investments from several foreign organisations. In the period from April 2000—September, 2014, the education sector in India has attracted FDI equity to the tune of US\$ 964.03 million, according to the Department of Industrial Policies and Promotion (DIPP).

Investments

The education and training sector in India has witnessed some major investments and developments in the recent past. Some of them are:

- Safran, a global aerospace and defence company has announced the research and development (R&D) collaborations with Foundation for Innovation and Technology Transfer (IIT, Delhi), and Society for Innovation and Development (IISc, Bangalore) to initiate research and development in the field of advanced avionics systems for the development of next generation aerospace technologies.
- Vietnam is looking forward to Indian investment in several of its sectors where India has advantages such as infrastructure, power, IT, education and pharmaceutical research sectors.
- Aspada Investment Co has invested around US\$ 1.8 million in PI Policy Innovations Pvt Ltd, which is a school test design and assessment company. The company provides assessments, test design and feedback solutions for primary and secondary education schools in India.
- In line with its strategy to deepen partnerships with global academic institutes, Infosys has set up a US\$ 2 million fund along with Princeton University, which will enable up to two scholars to pursue research at the University's Institute of Advanced Study.
- Infosys Ltd has entered into a strategic partnership with Stanford University's Institute for Computational and Mathematical Engineering (ICME) to research on industry issues with the use of data science and analytics. Under this

arrangement, Infosys will work with ICME to develop curriculum in data science and analytics, focused on real-world problem areas, in addition to the research on solving industry issues

- The University of Cambridge through the department of Cambridge English Language Assessment has signed memorandums of understandings (MoU) with some Indian institutes. The Cambridge English department works with 200 technical institutions in India in addition to companies which conduct assessments for employees.
- The Government of Victoria has planned to sign an agreement with the Government of India to deliver retail training in India. This will enable the ARA Retail Institute to partner with India's peak organisation for retailers, the Retail Association of India, to deliver retail training in Maharashtra over the next three years.

Government Initiatives

The Government of India is all set to roll out a new educational policy by year 2015, according to Ms Smriti Irani, Union Minister of Human resource Development (HRD), Government of India.

Some of the other major initiatives taken by the Indian government in the recent past are:

- To make learning more holistic, the Government of India has decided to introduce a credit transfer scheme in the education system. The HRD Ministry is also working towards setting up placement cells at all central varsities in the country.
- The Government of India has launched the first Skill Development Training programs of Maulana Azad National Academy for Skills (MANAS) on pilot basis. In this regard two memoranda of understanding (MOUs) were signed by MANAS, one with the representatives of Health Sector Council and the other with Security Sector Council.
- Funded by the National Mission on Education through ICT (NMICT), the Indian Institute of Technology-Bombay (IIT-B) has developed a prototype of a 10.1-inch netbook that costs less than US\$ 100. The device is aimed primarily at

programmers, students and teachers in government-run colleges and institutions.

- The Government of India has given its approval to sign a joint declaration with the United States of America to initiate a programme called Global Initiative of Academic Networks (GIAN) in the field of higher education.

Road Ahead

Higher education in India is undergoing a huge change since last decade. There are over 600 million people in India, under 25 years' old, potential candidates who would continue education, given the right kind of opportunity and convenience.

The Government of India has taken several steps including opening of IIT's and IIM's in new locations as well as allocating educational grants for research scholars in most government institutions. Furthermore, with online modes of education being used by several educational organisations, the higher education sector in India is set for some major changes and developments in the years to come.

[India Ratings](#) expects the Indian education sector's [market size](#) to increase to Rs 602,410 crore (\$109.84 billion) by [FY15](#) due to the expected strong demand for quality education. Indian education sector's market size in FY12 is estimated to be Rs 341,180 crore.

The sector grew at a compounded annual growth rate of 16.5% during FY05-FY12. The higher education (HE) segment was at 34.04% (\$17.02billion) of the total size in FY10 and grew by a [CAGR](#) of 18.13% during FY04-FY10.

India Ratings, a Fitch Group Company, said that it has a stable outlook on the Indian education sector which includes both school and higher education.

Despite a high demand for education within India, India Ratings has concerns of the sector. In 2012, the sector faced liquidity issues due to a fall in enrolment growth and delays in HE students' fee reimbursements by a few state governments.

“Some segments in the education sector face enrolment slowdown due to macro-economic factors, lack of industry appeal and employability issues. Management institutes with less or no industry association witness low enrolment and revenues leading to loan defaults or closures. India Ratings does not expect enrolments for these entities to rebound in the short term,” said the report.

In the recent past several education institutes have discontinued programmes due to fewer demand. A case in point is Mumbai-based Narsee Monjee Institute of Management Studies (NMIMS) which has decided to discontinue the MBA programme in actuarial science.

This fall in enrolment growth and delays in HE students’ fee reimbursements by a few state governments has created liquidity issues for many. “Fee ceilings in HE institutes (both for the government and management quota) and schools curb the financial prowess of the entities. Even though the fee reimbursements scheme (applicable only to HE) propelled enrolments and made education affordable to certain educationally disadvantaged sections of the society, delays in reimbursements by a few states tightened the liquidity for education institutes,” said the report.

Irrespective of an institutes’ size, loan repayments depend on its relationship with lenders. Due to tightly-regulated operations such as restrictions on student intake, fees and infrastructure, an institution’s autonomy is restricted, leading to weak finances and credit indiscipline. In India Ratings’ opinion, the upcoming regulatory changes could possibly provide autonomy and enhance the credit quality of the issuers.

The stipulation to keep education as a not-for-profit structure is seeing evolution of new structures. “Although the institutes were formed as ‘not-for-profit’, they plough back profits through associates. Associate companies provide facilities management and charges management fees, lease rentals and other fees. India Ratings views the structure evolution as a positive,” said the report.

Although, foreign investment is allowed under automatic route in education, there are regulatory issues. Nevertheless, twining programs with foreign institutions are recognised by the regulators.

The other key positive for the sector is the federal government's 12th Five Year Plan to propel the gross enrolment rate across levels, establish new entities, liberalising the sector (allow private universities and foreign players) and take other measures including access enhancement, might revive the demand for the sector. These measures, combined with adherence to contractual provisions, would result in a positive outlook.

1.3 Company Profile:



Five Feed Learning Solutions Pvt. Ltd.

We are a team of professionals delivering niche content development services and high-end learning solutions to a wide spectrum of users. FFLSPL is a well-renowned name and a pioneer in providing academic, e-learning, instructional and PhD consulting to vast number of scholars, corporate houses, organisations, institutes and academies, etc.

Five Feed Learning Solutions Pvt Ltd (FFLSPL) came into business with the aim of serving as a one-stop destination for all diverse content needs of the different sects of users across industries. Our mission is to be a world-class learning solutions provider by offering training, education, and learning solutions that help people and organizations all across the globe to grow.

At Five Feed Learning Solutions Pvt Ltd, we cater to research scholars, education institutes, technical authors, corporate trainers, PhD candidates, and anyone interested in acquiring informative, interactive and engaging content delivered with utmost quality and diligence.

How do we provide competent learning solutions?

- **Preparation** - Understand the goal targeted for learning solutions, prepare a strategy, and discuss every design phase with our clients.
- **Incorporation** - A learning solution is implemented effectively to expand the knowledge of users.
- **Assessment** - We analyse how a learning solution helped its users to improve their knowledge base and skill set.

Our PhD consultancy services include an array of services to provide custom-made research solutions to help scholars. The academic writers at FFLSPL are adept in guiding you throughout your research journey and providing full-fledged consultation regarding:

- A Research Proposal
- Literature Survey
- Problem Definition
- Research Methodology
- Research Design
- Data Analysis
- Thesis Preparation
- Thesis Editing and Proofreading

Growth Trajectory Of FFLSPL

We nurture the tree of knowledge, education and skills by our expertise and professional outlook.

01 ESTABLISH IN 2015

02 WITH 40 RESEARCH EDITOR

03 PROGRESS TILL 2018

04 WITH 100+ EDITORS

1.4 OBJECTIVES:

PRIMARY OBJECTIVES:

A study on effectiveness of SAP HANA DBMS migration process among the SAP employees in Five Feed Learning Solutions

SECONDARY OBJECTIVES:

- To analyse the effectiveness of the migration process from Oracle database to SAP HANA DBMS among the technical employees
- To determine the various problems faced during the migration process for the SAP team
- To know the effectiveness of training given for SAP HANA DBMS database in the SAP HANA DBMS migration process for the SAP team
- To identify the user's experience of SAP EMPLOYEES with the new SAP HANA DBMS database
- To determine the perception of respondents towards the merits offered by SAP HANA DBMS database over the Oracle database
- To develop an actionable solutions to smoothen the SAP HANA DBMS migration process

1.5 NEED FOR THE STUDY:

SAP HANA DBMS, short for "High-Performance Analytic Appliance" is an in-memory, column-oriented, relational database management system developed and marketed by SAP AG. The management of Five Feed Learning Solutions wants to conduct the research to assess the effectiveness of the SAP HANA DBMS migration process from Oracle to SAP HANA DBMS.

Success of any database migration depends upon the user's experience after the database migration. There arises the need for an effective migration process to make the technology transfer a success. Thus it is important to study about perception of employees towards the SAP HANA DBMS migration process and eradicate the issues faced during the migration process.

1.6 SCOPE OF THE STUDY:

Organizations consider the SAP system a vital organizational tool because it integrates varied organizational systems and facilitates error-free transactions and production. Every organizational prefers to handle a large volume of data at a faster pace. So they prefer to migrate to the latest database. The scopes of this project are as follows:

- SAP HANA DBMS might help the organization to handle a large volume of data
- Improves the effectiveness of the migration process from Oracle to SAP HANA DBMS
- SAP HANA DBMS can improve the performance to the SAP used in the organization
- SAP HANA DBMS might help the users to retrieve the data faster

- Additional software and business processes will make a much better integration among the departments
- Adjust the organizational objectives in real time and respond quickly to market variations and the needs of customers and suppliers.

CHAPTER 2

REVIEW OF LITERATURE

2.1 REVIEW OF LITERATURE

1. A Study on Current Literature and Recent researches on Migration : United Nations Population Division, Replacement Migration

Population ageing is an inevitable outcome of the demographic transition. Primarily, as a result of declines in fertility and, secondarily, mortality declines, the age structure of a population becomes older, with a growing number and proportion of elderly persons. In recent years, the issue of population ageing has received renewed attention in many countries, especially those in the more developed regions, owing to the continuance of fertility below the replacement level and on-going trends towards lower mortality. While there is great variation among them in terms of the level and pace of population ageing, this demographic process is expected to increase further in these countries, and eventually their populations are projected to level off and decline in the foreseeable future. These changes have profound consequences and far-reaching implications, especially for pension schemes, health-care systems, education programmes and housing plans, as well as for the economic vitality and growth of a country.

This chapter reviews selected literature that concerns the impacts of migration on the size and age structure of population. Whereas existing studies have paid a great deal of attention to population ageing and its social and economic implications (see, for instance, United Nations, 2000b; Korea Institute for Health and Social Affairs, 2000; Organisation for Economic Cooperation and Development, 1997), the review that follows primarily gathers the literature that investigates the impact of international migration on population dynamics in a low-fertility setting.

The future population size and age-sex structure of any country depend basically on three demographic components: fertility, mortality and net international migration. As no policies to increase the mortality of a population are socially desirable, there are, in theory, two possible ways of retarding or reversing demographic ageing. First, a reversal of declines of fertility would lead the age structure of the population back

towards a younger one, thus slowing down the ageing process. However, the recent experience of low-fertility countries suggests that there is no reason to assume that their fertility will return anytime soon to the above-replacement level (United Nations, 2000c; Lutz, 2000). Although Governments in those countries have introduced, instead of explicit pronatalist policies, a variety of social welfare measures favourable for higher fertility (Demeny, 2000), the long-term effectiveness of such measures is often called into question. A number of previous studies have examined the demographic impact of a constant influx of migrants on the growth of a population with below-replacement fertility. For example, taking the twelve countries in Europe or members of the then European Community (EC) together, Lesthaeghe and others (1988) carried out population projections. With the present below-replacement fertility and with no further immigration, the total population of these European countries would be reduced by approximately 20 to 25 per cent by the year 2050. The calculations showed that an overall population decline during the first half of the twenty-first century can be avoided if about one million immigrants move into the area every year. Assuming the same annual migration gain of one million, Lutz (2000) recently showed that the total population of Western Europe would grow by 13 per cent (to 505 million in 2050), as opposed to declining by three percent (to 422 million) in the case of no migration.

2. Internal migration: a review of the literature Etzo, Ivan (2008)

The interest of interregional migration flows in economics covers two important aspects. The first aspect concerns the role played by the main macroeconomic variables in determining the intensity and the directions of the migration flows. The second aspect focuses on migration as an important variable that might affect the growth rate. This study reviews and discusses the main literature on migration with respect to these two branches of study.

3. IZA - Database for Migration Literature

In the age of globalization, the importance of migration for the industrialized countries has increased. Inflows of migrants have steadily risen in the 1980s and the early 1990s. Not only the traditional immigration countries are affected, but also many European countries. Although policy responses to these developments are widely

debated in public, the fast-growing economic research on many aspects of migration is often ignored.

Against this background, IZA Director Klaus F. Zimmermann and IZA Research Fellow Thomas Bauer have edited a four-volume collection entitled "The Economics of Migration". It contains some of the most significant contributions to the economics of migration, which provide an overview of the present state of empirical migration research. The collection is meant to act as a helpful point of departure for economists who want to start research in this area as well as a possible reading list for lecturers and graduate students. It includes 103 articles, dating from 1919 to 2000 from contributors such as G.J. Borjas, D.E. Card, B.R. Chiswick, R.B. Freeman, T.J. Hatton, J. Mincer, C.A. Pissarides, J.L. Simon, and J.G. Williamson.

The book is available (for IZA Research Fellows at a discount) from Edward Elgar Publishing [download PDF leaflet].

Since it is impossible to include all major articles on migration in four volumes, we have created an online database for literature on migration. This database is constantly updated and contains thousands of references, including articles in journals and collective volumes as well as recent working papers. Some of the papers are downloadable in PDF format.

4. Data Migration: Farah Habib Chanchary

The introduction of new technologies, architectures and systems or organizational restructuring often requires a company to reorganize its databases either by transferring data from old applications to the new ones, or reorganize data in an existing application according to the new organizational structure. Migration of data, services, and processes to the Cloud platform must be achieved based on well-defined models/strategies. Every migration model involves specific objectives, according to the policies of the organization, the control, and security of information. It must be achieved by keeping the optimal balance between data accuracy, speed of migration, time of non-operation and minimal costs. The challenge in all these cases lies in guaranteeing complete and accurate migration of all data, in other words, ensuring that no data is lost, placed in the wrong location or altered in the course of the migration process. The main vision of this work is to integrate data management

functionality for large organization and also to provide outsourcing data management to a cloud based service provider for smaller organizations. Users should have access to database functionality without worrying about provisioning hardware and configuring software, while providers should be able to manage several databases without dedicating hardware and administrators to each database. A design has been proposed, which hosts multiple data centers in different geographical region where each data center may hold multiple databases on a pool of commodity servers.

5. Schema Design Database Migration: A Literature Review and Case Study By (2004)

This literature review provides an overview of various areas of research in database migration. Specific areas which are addressed are legacy migration, migrating between different database models, reverse engineering, schema design and translation, and security. Additional literature is considered which provides a general overview of the topic. Some case study literature is included with an emphasis on library science studies. This literature review is then applied to a case study migration project at the University of North Carolina at Chapel Hill in order to determine where the literature was helpful and where not, as well as where more research may be needed. Conclusions are drawn that the theoretical literature is quite comprehensive, but that literature having more practical

6. Database Migration: A Literature Review and Case Study. Creator: Bansleben, Erik Peter

Data migration is the process of transferring data between storage types, formats, or computer systems. It is a key consideration for any system implementation, upgrade, or consolidation. Data migration is usually performed programmatically to achieve an automated migration, freeing up human resources from tedious tasks. Data migration occurs for a variety of reasons, including: Server or storage equipment replacements or upgrades; Website consolidation; Server maintenance; and Data center relocation.

To achieve an effective data migration procedure, data on the old system is mapped to the new system providing a design for data extraction and data loading. The design

relates old data formats to the new system's formats and requirements. Programmatic data migration may involve many phases but it minimally includes data extraction where data is read from the old system and data loading where data is written to the new system.

If a decision has been made to provide a set input file specification for loading data onto the target system, this allows a pre-load 'data validation' step to be put in place, interrupting the standard E(T)L process. Such a data validation process can be designed to interrogate the data to be transferred, to ensure that it meets the predefined criteria of the target environment, and the input file specification. An alternative strategy is to have on-the-fly data validation occurring at the point of loading, which can be designed to report on load rejection errors as the load progresses. However, in the event that the extracted and transformed data elements are highly 'integrated' with one another, and the presence of all extracted data in the target system is essential to system functionality, this strategy can have detrimental, and not easily quantifiable effects.

After loading into the new system, results are subjected to data verification to determine whether data was accurately translated, is complete, and supports processes in the new system. During verification, there may be a need for a parallel run of both systems to identify areas of disparity and forestall erroneous data loss.

Automated and manual data cleaning is commonly performed in migration to improve data quality, eliminate redundant or obsolete information, and match the requirements of the new system.

7. Migration in the Development Studies Literature

This paper explores the role migration has played in development studies, and in debates on economic growth and poverty. It argues that, despite a recent surge of interest in international migration and remittances, research on human mobility particularly for labour within poor countries does not have the place it deserves, and that it used to have in the classical development literature. Review of the empirical literature suggests that in fact much is known about the migration–development relationship, provided we are careful with definitions, and allow for context-specificity

to be a key component of analyses. Against this richness of empirical detail, the paper reviews theoretical models of migration, finding significant differences in understandings of migration and its role in shaping wellbeing, but also complementarities. This highlights the importance of interdisciplinarity, and institutional understanding of processes of economic growth. In particular, it stresses that development economics need to draw more strongly on the insights by and approaches of non-economist social sciences.

8. Effective Testing & Quality Assurance in Data Migration Projects

Data migration is the process of moving data from one environment to another. It is different from ETL where the data is moved between the existing environments. However, these ETL processes are sometimes used to support the migration program. Data Migration is usually supported by a variety of tools and techniques in order to accomplish the efficient migration. Migration of data is a process of moving data from one system to another i.e. from the legacy source systems into a new system, known as the target system or the application. It is considered as an opportunity for evaluating and improving data quality that can have a critical impact on business after the new application goes into production.

Data Migration is frequent in IT business and covers considerable budget and resources. The combination of the occurrence of data migration processes and the resources consumed in a data migration project results in significant amount of the IT budget for any company. As data storage architecture becomes larger and more complex, data migrations are also becoming more complex and risky. Organizations should manage their migration projects more effectively as it involves large share of their IT budgets.

When is data migration done?

- ☐ Change in one database to another, like from SQL server to Oracle database
- ☐ A change in version of the database in use
- ☐ Upgrades or changes in servers or storage equipments

- Data storage centers are relocated

Data migration – a big challenge

Data migration has become one of the most demanding proposals for IT companies. Due to bulk data, a high level of risk is involved in these projects. The major challenge of the migration project is to ensure that the data is retained in its original i.e. the content and metadata remains unchanged. In order to reduce risk and guarantee that the data has been migrated and transformed successfully, it is essential to employ a thorough Quality assurance

strategy in migration projects. Testing is a key phase of migration project that delivers a successful migrated data and addresses issues which occur prior and after the migration. This paper first covers the risks involved in the data migration process, points out how to mitigate these migration risks by effective quality assurance techniques, and how to achieve success in the data migration projects.

9. Literature Review on Circular Migration: Dovelyn Rannveig Agunias

For an increasing number of scholars, international migration has undergone a transformation particularly in the last decade or so. The recently released UN Secretary-

General's Report on international Migration and Development suggests a "new era of mobility" characterized in part by a greater degree of nonpermanent, or circular, migration.¹ Hugo, among others, has noted circular migration's "unprecedentedly large scale, involving a greater cross-section of groups and taking a wider variety of forms than ever before."² Although circular migration's impact on development is far from settled, a review of the current literature suggests increasing optimism about its developmental potential.

This optimism stems mainly from the erosion of the traditionally polarized migration framework, where migrants who depart (emigrants) are seen as "lost" to the sending country and arriving immigrants are therefore "gained" by the receiving country. Instead, a transnational framework is gaining ground where migrants contin

ually forge and sustain multiple attachments across nation-states and/or communities. As these transnational migrants return home, it is argued that they can facilitate the transfer of the critical financial and human capital to the developing world needs.

However, the optimism pervading the current literature is not without a healthy dose of caution. Although the pendulum has started to move away from the dominant zero-sum scenario of previous decades toward a more positive “win-win” scenario, there are calls to keep the pendulum from moving too far. Indeed, amidst the optimism, also evident in the current literature, is a simmering concern that the impact of policies encouraging more circular migration is still very much conditioned by the political, economic, and social conditions in the countries of origin and destination, as well as by the characteristics of the migrants, their respective diasporic communities, and the dynamics of return.

Notwithstanding this concern, however, it is very clear that the previous decades’ abrupt dismissal of the developmental impact of circularity as negligible or even negative is no longer warranted especially in an increasingly transnational world.

10. Data migration strategies Originating Author: Robert Levine

Data migration is the process of making a copy of data and moving it from one device or system to another, preferably without disrupting or disabling active business processing. After data is transferred, processing uses the new device or system. There are a variety of business drivers that cause enterprises to undertake a data migration, including:

1. Deployment of a new operating or application system
2. Take-on of new users or businesses onto an existing system (mergers, acquisitions, etc.)
3. Server or storage technology replacement or upgrade
4. Server or storage consolidation
5. Changes to database schemas and structure
6. Relocation of the data center
7. Server or storage equipment maintenance
8. Workload balancing or other performance-related tuning

In most organizations, data migrations are routine operations – according to a 2005 survey by Softek, more than 60% of respondents migrate data quarterly or more often - with 19% migrating weekly. So they have to be done effectively and in a controlled environment to assure data integrity, compatibility, low downtime, and security as well as a seamless migration process.

Effective data migration strategies

Many organizations migrate data as part of the process of upgrading controls (think Sarbanes-Oxley), systems, or storage. Enterprises need to minimize the business impacts of data migration - downtime, data integrity issues, costs, control problems, and so on. The way to do this is to utilize a robust methodology for migrations, which we discuss in this note. A majority of respondents to data migration surveys report one problem or another with these migrations. Simply scheduling migrations during “off-hours” is not always a sufficient strategy, since:

- it increases migration costs and decreases employee morale due to staff overtime
- migrations which go over schedule can disrupt processing during normal hours
- most enterprises no longer have a significant “off-hour” window for activities like data backups or data migrations due to their global operations or other customer demands for availability

Effective data migration strategies go a step further and can avoid such risks, as we will see.

Specific operational goals of effective data Migration

Primarily, data must be migrated from the source platform to the target platform completely and accurately, and according to company and regulatory policies on information controls and security. This means no dropped or incomplete records, and no data fields that fail validation or other quality controls in the target environment. Another goal of data migration is that the process be done quickly, with as short a downtime window as possible (given the enterprise's Maintenance Time Objective

targets.) Finally, the cost of data migration must be manageable, in terms of technology and staff requirements.

- There are many metrics that can measure the effectiveness and efficiency of data migrations:
 - Number of online customizations required
 - Percentage of migrated records
 - Percentage of migrated tables
 - Percentage of migrated records by technology
 - Percentage of migrated records by application
 - Percentage of data with quality problems
 - Number of migration errors
 - Migration impact on database size
 - Downtime due to migration
 - Required staging storage / hardware
 - Percentage of reconciliation errors
 - Percentage of cleansed data

Risks of implementing an effective data migration strategy

Migrating data brings many risks and challenges:

- Migration might be done as part of a larger chain of dependencies (operating system upgrades, application upgrades or implementations, database structural changes, etc.) – thereby increasing complexity.
- Data requirements are not clearly defined - data rules for integrity, controls, security, availability and recoverability are often ill-defined. In the absence of such rules, data is migrated incorrectly.
- Migration acceptance criteria may not be defined.
- Data is often too distributed to be migrated easily (think end-user computing).
- Budgets may limit technology options for performing migrations.
- Expertise in data migration and management may not be present.
- Management attention might be insufficient (migrations are typically “routine” operations and not major attention-getting projects).
- There could be poor support from the storage vendor(s), making migrations all the more taxing.

The effective data migration strategy

The business driver for effective data migrations is to strike the optimal balance between data accuracy, migration speed, low or no downtime, and minimum costs. We will see how to formulate such a strategy.

Expectations (Out-of-scope)

To a large extent the enterprise's storage technology, storage management tools, and storage network capabilities define the range of possibilities for data migration strategies. Selection of such is out of scope of this note; however, we will introduce a methodology for data migration strategy that can work under most technology environments.

Analyze phase

The first stage of data migration is data classification. It is important to know how and where data is stored, backed up, and archived. Data structures must be well understood, and there should be visibility into the data's usage, capacity, and growth patterns. Various interfaces and reports utilizing the to-be-migrated data must be considered. It is also important to understand the network connections between data points (especially required bandwidth and controls). Data classification also describes conditions for data access, retention requirements and control & security measures such as encryption. Next, migration requirements are determined. Beyond the "top three" requirements of what must be migrated, how much downtime is acceptable, and how much budget is available, there are other needs that must be considered. These can include quality requirements, new or modified service-level agreements, expectations for the new storage infrastructure, and objectives such as reduced management costs, reduced storage expenditures, greater insight into expenditure, a simplified vendor model or greater technical flexibility or stability. If the organization has standards or policies concerning data, these must be factored in. Finally, analysts must take into account historical data to be migrated (which is often forgotten until it is late in the game).

Then there are technology considerations, such as:

- How old is the operating system(s) under which data is to be migrated? Some migration tools do not support legacy operating systems.
- Which storage tiers and devices are involved?

- Can identical data structures be used for the target data (this will reduce the time and complexity of migration)?
- What staging area requirements are present, given current technologies and data migration requirements?
- Do you need or want the option to recover quickly from the source disk, or to fall back to the original storage device as a fail-over? There are both procedural and technological ways of accomplishing this.
- Is a central console needed to manage data migrations across multiple servers?
- Is there a need to control the data migration from a local server – or a remote server? If remote, which protocols must be supported?
- Is there a requirement to throttle or control data flows between servers?
- Must data integrity be checked during (not just after) migration?
- Which staff or consultants are available to assist with migration analysis, design, and deployment?

Data may be migrated in several ways:

1. All at once
2. In logical sections (by application, operating system, database, business function, etc.)
3. Via a pilot migration or parallel run for “proof of concept” or risk mitigation.
4. In phases (first critical data, then less critical or historical data).

Acceptance Test Considerations

The Analyze Phase is complete when data has been classified, data migration requirements are clear, and technology considerations have been considered. For organizations with an established data classification program (that typically includes government entities, regulated firms, and enterprises complying with quality standards) this can be done in a week or two. If a full data classification must be done as well, that can add another few weeks.

Key analysis milestones

Milestones in the Analysis Phase typically include the following:

- Legacy data and report analysis and profiles has been completed.
- There is an updated data classification document.

- The data migration strategy document has been written.
- Data exception report requirements are clear.
- Audit and reconciliation report requirements are defined.
- Data migration requirements (business and technology) are documented.

Design phase

The design phase involves taking the data classification and requirements defined in the analysis phase and puts definition around how these will be realized:

- The responsibilities, roles and tasks for each individual, department, or external consultant involved in migration are determined.
- Data elements are mapped from source to target.
- A plan for freezing physical data structures during the migration is put together.
- Any tools to be used in the migration (data transformation tools, migration options, data mapping tools, CASE or other data modeling tools, simple spreadsheets, etc.) are identified or acquired.
- Any software to facilitate data extraction or checking is developed.
- Clear acceptance criteria are determined and agreed.

Where economically viable (large volumes of data to migrate, frequent mission-critical migrations, complex data structures, high data quality requirements) data transformation tools can offer the following advantages over simple spreadsheets:

- They provide flexible reporting of data elements and rules.
- They can generate migration code or scripts directly from the mapping rules.
- They can detect data integrity violations.

Acceptance test considerations

The Design Phase is complete when migration staffing has been confirmed, data mapping is complete, a plan for freezing data structures is in place, tools have been identified, and acceptance criteria have been agreed. The length of the design phase depends mainly on the need to acquire additional migration tools and the need to develop extraction, loading, and quality checking software. If such tools and software are in place and simply need to be customized, the design phase can take place in a few weeks; otherwise, this process can take a few months.

Key design milestones

Milestones in the Design Phase include the following:

- Roles, responsibilities, and task assignments are clear and accepted.
- Data elements are mapped from source to target.
- A plan for freezing physical data structures during the migration is put together.
- Migration tools are identified.
- Migration software is developed.
- A migration strategy is chosen.
- Acceptance criteria are agreed.
- Funding for staff, consultants, and tools has been secured.

Deploy phase

The first step in the design stage is to put together a project plan and structure. As part of this process there should be close analysis of any dependencies in data migrations; where possible, such dependencies and complexities should be reduced to better manage deployment risk. During the deploy phase the following occurs:

- Physical data structures are frozen on source and target.
- Interfaces and processing on source and target are brought down where required.
- Data is staged from the source location.
- Quality reports are run and any data errors or inconsistencies identified.
- Data quality issues are fixed in the staging area.
- A preliminary reconciliation takes place in the staging area, and any reconciling items are investigated and resolved.
- Data is migrated to the target location.
- Reconciliation reports are run.
- Acceptance criteria are checked; if reconciliation errors or other criteria are not met, the system is rolled back to the original data source. Otherwise, interfaces and processing from the source is discontinued and then activated on the target.
- The above may be conducted in phases, or as part of a parallel run or pilot depending upon the migration approach chosen.

Acceptance Test Considerations

Testing and implementation are inseparable in a data migration. Physical errors are typically syntactical in nature and can be easily identified and resolved through syntax corrections in the migration scripts. Logical errors are due to problems with the data mapping. Looking into these requires asking questions like:

- How many records did we expect this script to create?
- Did the correct number of records get created? If not, why?
- Has the data been loaded into the correct fields?
- Is the data load complete – or are certain fields missing?
- Has the data been formatted correctly?
- Are any post-migration clean-up tasks in order?

The goal of a successful data migration is to keep the length of the deploy phase(s) to a minimum. What is acceptable depends upon the organization – some will want this phase to last no more than a day (or less), others can tolerate a deployment that lasts a few days if availability is not a major concern.

Key deployment milestones

Milestones in the Deploy Phase include the following:

- Project plan in place and agreed.
- Project team is formed.
- A test plan is written.
- The migration takes place.
- Reconciliation / data checking reports are run.
- Acceptance criteria and performance metrics are evaluated.
- A go / no-go decision takes place.
- Data issues may be resolved post-migration.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 RESEARCH METHODOLOGY

Fundamental to the success of any formal marketing research project is a sound research design. A good research design has the characteristics of problem definition, specific methods of data collection and analysis, time required for research project and estimate of expenses to be incurred. The function of a research design is to ensure that the require data are collected accurately and economically. A research design is purely and simply the framework or plan for an analysis of data. It is a blue print that is followed in completing a study. It resembles the architect`s blue-print (map) for constructing a house. It may be worthwhile to mention here that a research design is nothing more than the framework for the study ensures that the study will be relevant to the problem and the study will employ economical procedures.

Claire seltizetal defines Research Design as “Research design is a catalogue of the phases and facts relating to the formulation of a research effort. It is the arrangement of collection and analysis of data in a manner that aims to combine relevant to the research purpose with economy in procedure”.

Three important about research design are

1. The design of investigation should stem from the problem
2. Whether the designs are productive in a given problem setting depends on how imaginatively they are applied. An understanding of the basic design is needed so that they can be modified to suit specific purpose
3. The three basic design are as follows
 - i. Exploratory Research design
 - ii. Descriptive Research design
 - iii. Casual Research design

The Research design used in the study is descriptive research design

3.1.1 RESEARCH DESIGN

Descriptive research design is also called explanatory design. This is the one that simply describes something such as demographic characteristics. The descriptive study is typically concerned with determining frequency with which something occurs or how two variables vary together.

3.1.2 AREA OF STUDY

The study is on database migration from Oracle to SAP HANA DBMS. The sample size is 110.

3.1.3 DATA SOURCES

After identifying and defining the research problem and determining specific information required to solve the problem, the researcher's task is to look the type and sources of data which may yield the desired results. Data sources are of two types through which data is collected.

Data sources may be classified as

1. Primary data
2. Secondary data

3.1.4 PRIMARY DATA

Primary data is the original data collected by the researcher first hand. It is collected for the first time through field survey. These are those that are gathered specifically, for the problem at hand. The various sources for collecting primary data are questionnaire, observation, interview etc. The primary source used for the study is questionnaire.

3.1.5 SECONDARY DATA

Secondary data is the information which is already available in published or unpublished form. When the needed information is collected from the census of population available in a library means then it is a secondary data. It is also used for collecting historical data. The various sources of secondary data are books, periodicals, journals, directories, magazines, statistical data sources etc. The secondary source used for this study is company profile, scope, need, review of literature.

3.1.6 RESEARCH INSTRUMENTS

Research instrument are the instruments which is used for gathering or collecting information. The instruments used in the study are

1. Direct questions
2. Close end questions
3. Dichotomous questions
4. Multiple choice questions

3.1.7 DIRECT QUESTIONS

Direct questions are just what their names indicate. They explicitly ask for the desired data. However the directness of the question also relates to the way a response is interpreted.

3.1.8 CLOSE END QUESTIONS

Such questions are also called fixed alternative questions they refer to those questions in which the respondent is given a limited number of alternative response frame which he/she is to select one that most closely matches his/her opinion or attitude.

3.1.9 DICHOTOMOUS QUESTIONS

A dichotomous question refers to one which offers the respondent a choice between only two alternatives and reduces the issue to its simple terms. The fixed alternatives are of the type, yes/no, agree/disagree, true/false etc.

3.1.10 MULTIPLE CHOICE QUESTIONS

A multiple choice question refers to one which provides several set alternatives for its answers. Thus, it is a middle ground between free answers and dichotomous question.

3.1.11 SAMPLING

Collecting data about each and every unit of the population is called census method. The approach, where only a few units of population under study are considered for analysis is called sampling method. There are two main categories under which various sampling method can be put.

The two categories are

1. Probability sampling

2. Non-probability sampling

The sampling method adopted for the study is convenience sampling under non-probability sampling.

3.1.12 NON-PROBABILITY SAMPLING

In non-probability sampling, the chance of any particular unit in the population being selected is unknown, since randomness is not involved in the selection process. But this does not mean that the findings obtained from non-probability sampling are of questionable value. If properly conducted their findings can be accurate as those obtained from probability sampling. The three frequencies used non-probability designs are

1. Judgment sampling
2. Convenience sampling
3. Quota sampling

3.1.13 CONVENIENCE SAMPLING:

In this method, the sample units are chosen primarily on the basis of the convenience to the investigator. The units selected may be each person who comes across the investigator.

3.1.14 SAMPLE FRAME:

A Sample frame may be defined as the listing of the general components of the individual units that comprise the defined population.

3.1.15 SAMPLE DESIGN

Sample design is the theoretical basis and the practice means by generalizing from characteristics of relatively few of the comprising population. It is the method by which the sample is chosen.

3.1.16 SAMPLE SIZE

It refers to the number of elements of the population to sample. The sample size chosen for the survey is 110.

ANALYTICAL TOOLS

ANALYSIS USING KARL PEARSON'S CORRELATION:

Correlation analysis is the statistical tool used to measure the degree to which two variables are linearly related to each other. Correlation measures the degree of association between two variables. The Pearson product-moment correlation coefficient is a measure of the strength and direction of association that exists between two variables measured on at least an interval scale. It is denoted by the symbol r .

$$r = \frac{N\sum XY - \sum X \sum Y}{\sqrt{N\sum X^2 - (\sum X)^2} \sqrt{N\sum Y^2 - (\sum Y)^2}}$$

CHI- SQUARE TEST I – (χ^2)

A chi-squared test, also referred to as chi-square test or χ^2 test, is any statistical hypothesis test in which the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true, or any in which this is asymptotically true, meaning that the sampling distribution (if the null hypothesis is true) can be made to approximate a chi-squared distribution as closely as desired by making the sample size large enough.

The χ^2 test was first used by Karl Pearson in the year 1980. The quantity χ^2 describes the magnitude of the discrepancy between theory and observation.

It is calculated using:

$$\chi^2 = \sum [(O_i - E_i)^2 / E_i] \text{ with } (n - 1) \text{ degrees of freedom.}$$
 Where, O_i refers to the observed frequency & E_i to the expected frequencies. χ^2 was used as a test of independence and goodness of fit.

PERCENTAGES

Percentages refer to a special kind of ratio. Percentages are used in making comparison between two or more series of data. Percentages are used to describe relationships, it is expressed as.

Percentage = (no of employees/total no of employees) 100

CHARTS:

Charts are graphic displays of data for easy understanding of relative positions that is not always possible with descriptive words or numbers. Types of charts commonly used in business data presentation are: Bar and pie.

BAR CHARTS:

The bar chart is commonly used for presentation of qualitative data. The data can be continuous or discrete data, which are plotted against discrete data intervals. The vertical bar diagram, also called bar chart where the length or height of bars represent the numerical value of the event or measurement. Width or gap between the bars is of no significance to the bar chart data, but they are uniform in a diagram.

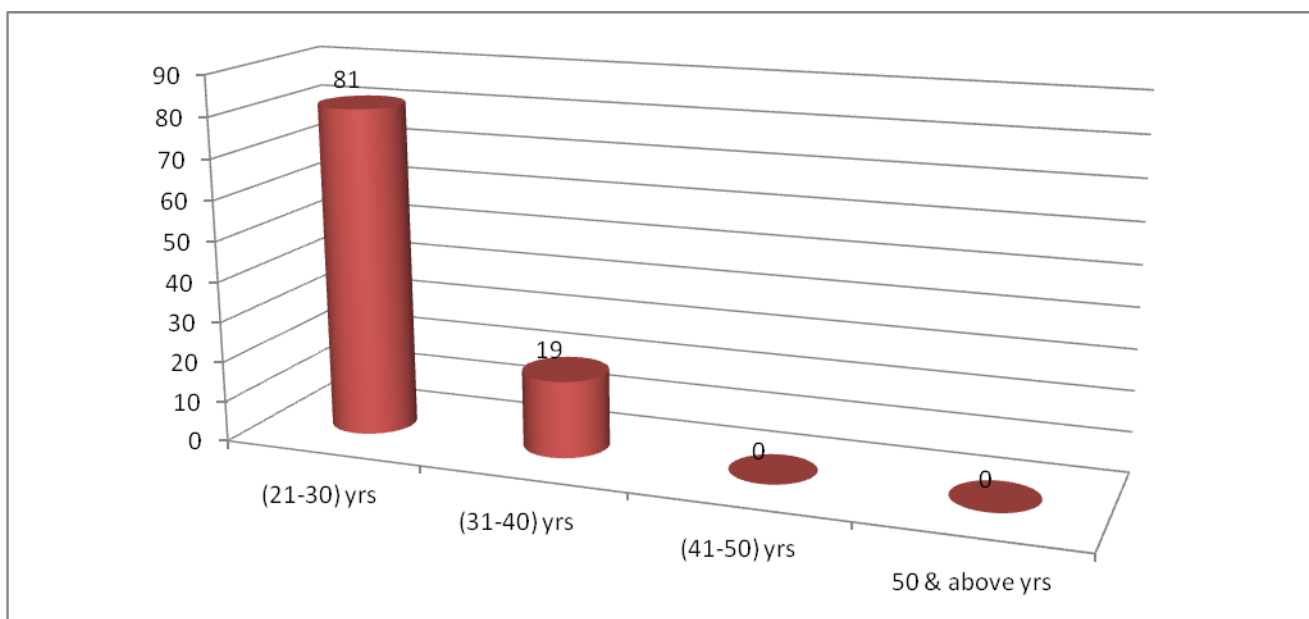
DATA ANALYSIS AND INTERPRETATION

DATA ANALYSIS AND INTERPRETATION

TABLE 1: AGE GROUP

PARTICULARS	FREQUENCY	PERCENTAGE
(21-30) yrs	89	81
(31-40) yrs	21	19
(41-50) yrs	0	0
50 & above yrs	0	0
TOTAL	110	100

CHART 1: AGE GROUP



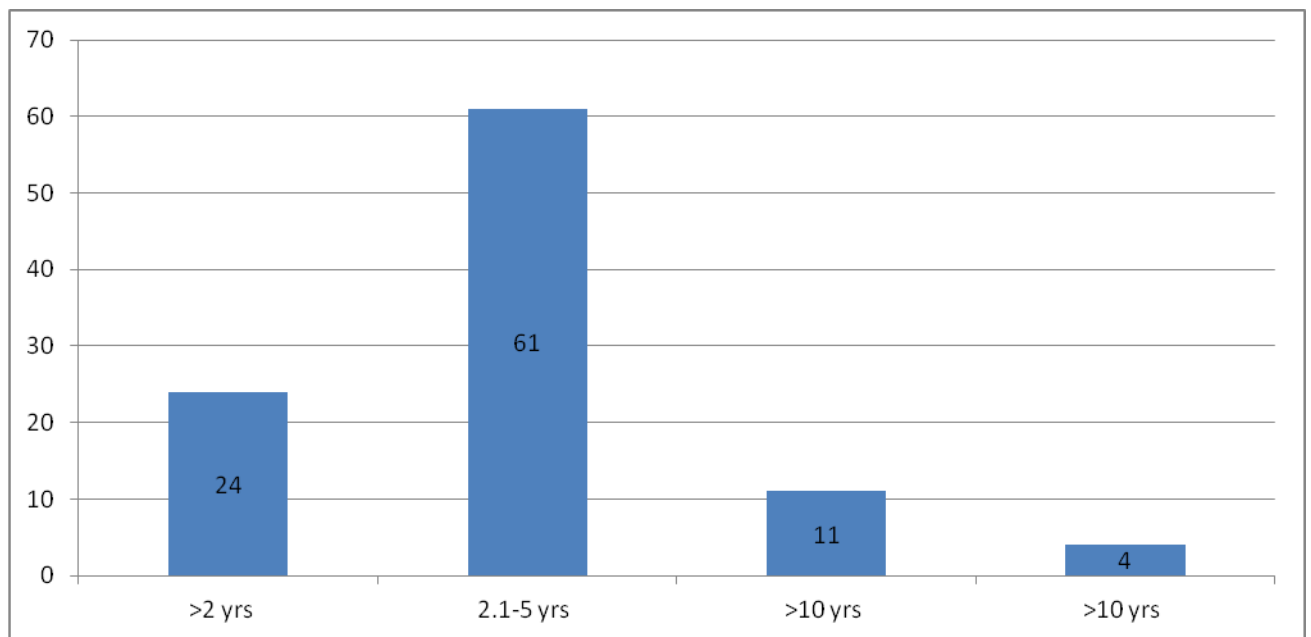
INFERENCE

From the above table it is inferred that 81% of the respondents in the age group 21-30 years and 19% of the respondents in the age group 31-40 years. Most of the respondents in the age group 21-30 years.

TABLE 2: EXPERIENCE

PARTICULARS	FREQUENCY	PERCENTAGE
>2 yrs	26	24
2.1-5 yrs	68	61
5.1 – 10 yrs	12	11
>10 yrs	4	4
TOTAL	110	100

CHART 2: EXPERIENCE



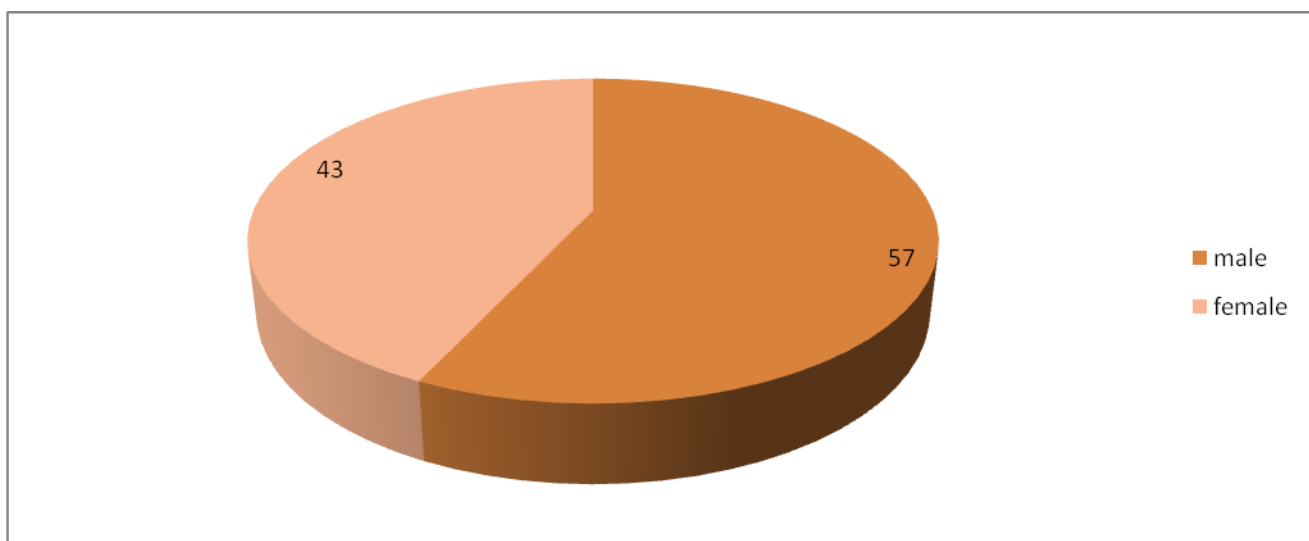
INFERENCE

From the above table it is inferred that 61% of the respondents have 2.1-5 years of experience and 24% of the respondents have more than two years of experience. Most of the respondents have 2.1-5 years of experience.

TABLE 3: GENDER

PARTICULARS	FREQUENCY	PERCENTAGE
Male	63	57
female	47	43
TOTAL	110	100

CHART 3: GENDER



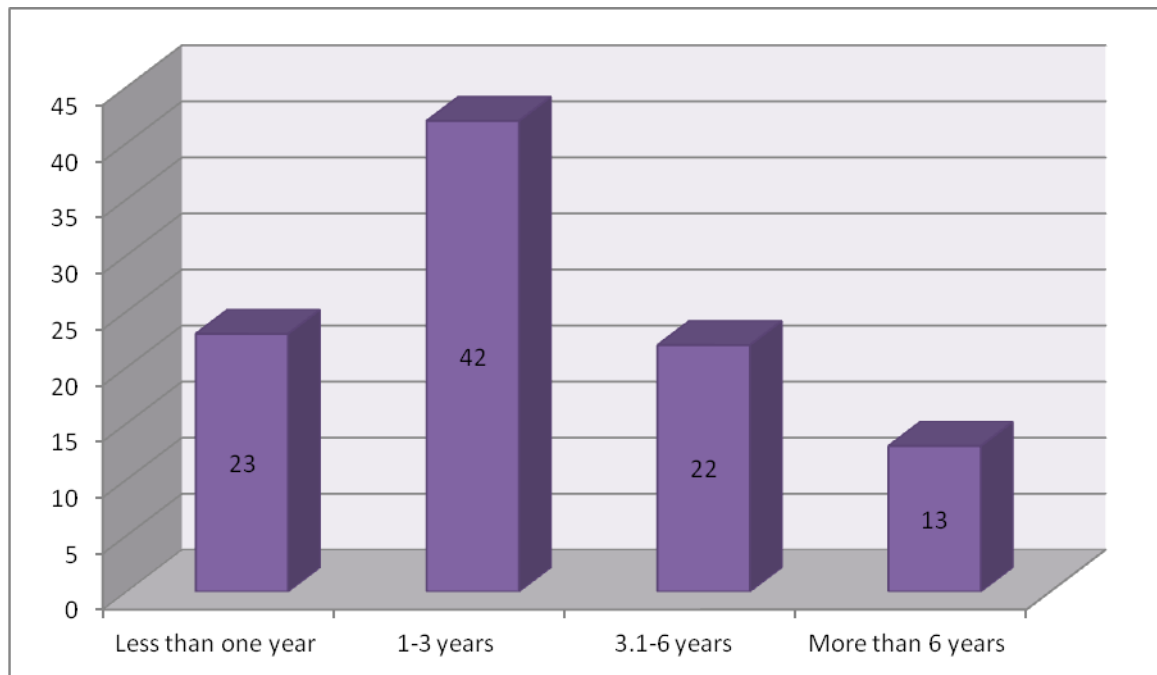
INFERENCE

From the above table it is inferred that 57% of the respondents are male and 43% of the respondents are female. Most of the respondents are male.

TABLE 4: DURATION OF USING THE ORACLE DATABASE

PARTICULARS	FREQUENCY	PERCENTAGE
Less than one year	26	23
1-3 years	46	42
3.1-6 years	24	22
More than 6 years	14	13
TOTAL	110	100

CHART 4: DURATION OF USING THE ORACLE DATABASE



INFERENCE

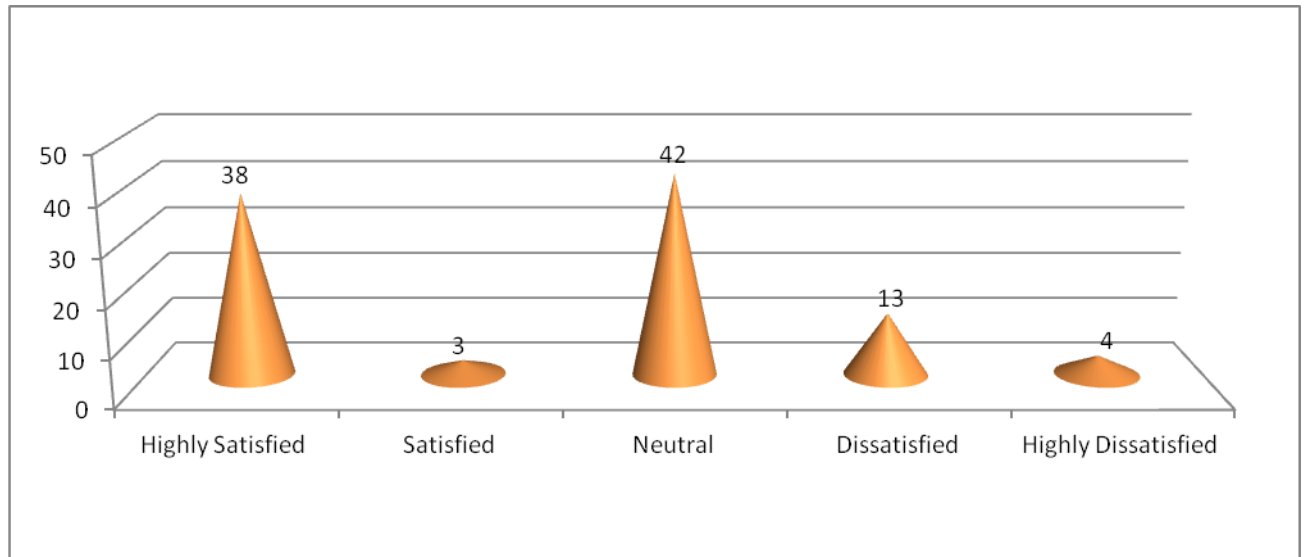
From the above table it is inferred that 42% of the respondents using the oracle database for 1-3 years and 23% of the respondents using the oracle database for less than one year. Most of the respondents are using oracle database for 1-3 years.

TABLE 5: SATISFACTION LEVEL OF USING ORACLE DATABASE

PARTICULARS	FREQUENCY	PERCENTAGE
Highly Satisfied	42	38
Satisfied	4	3
Neutral	45	42
Dissatisfied	14	13

Highly Dissatisfied	5	4
TOTAL	110	100

CHART 5: SATISFACTION LEVEL OF USING ORACLE DATABASE



INFERENCE

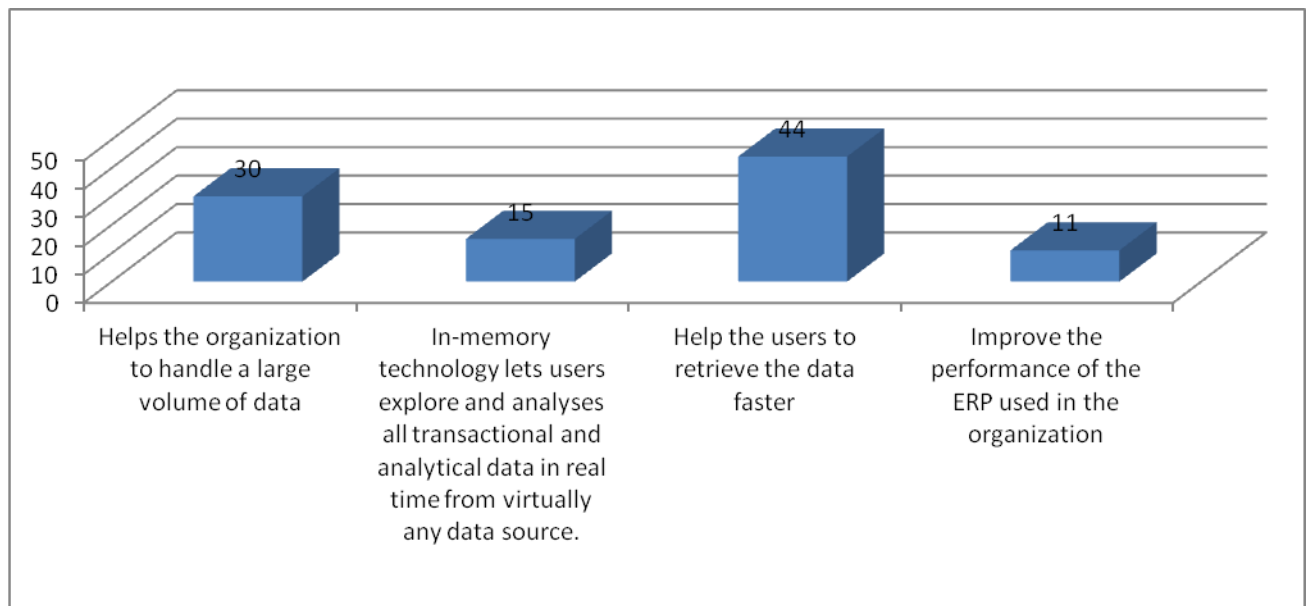
From the above table it is inferred that 42% of the respondents neither agree nor disagree in the satisfaction level of using oracle database and 38% of the respondents highly satisfied in the satisfaction level of using oracle database. Most of the respondents neither agree nor disagree in the satisfaction level of using oracle database.

TABLE 6: BIG NECESSITY FOR SAP HANA DBMS IN FIVE FEED LEARNING SOLUTIONS

PARTICULARS	FREQUENCY	PERCENTAGE
Helps the organization to handle a large volume of data	33	30

In-memory technology lets users explore and analyses all transactional and analytical data in real time from virtually any data source.	17	15
Help the users to retrieve the data faster	48	44
Improve the performance of the SAP used in the organization	12	11
TOTAL	110	100

CHART 6: BIG NECESSITY FOR SAP HANA DBMS IN FIVE FEED LEARNING SOLUTIONS



INFERENCE

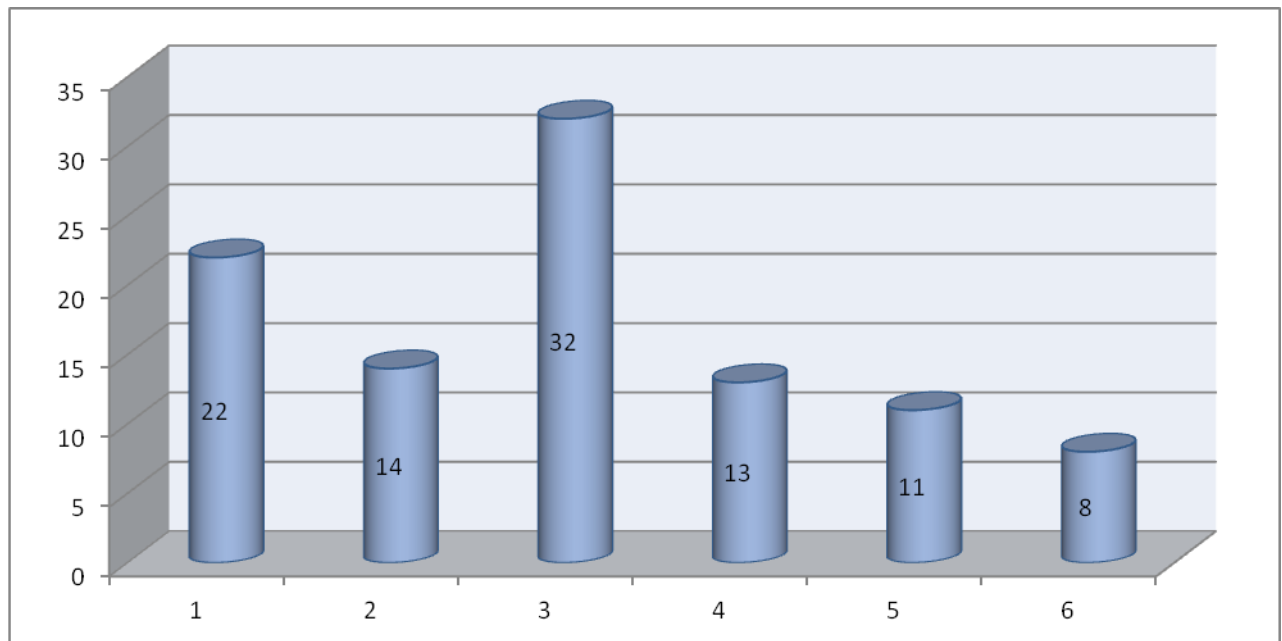
From the above table it is inferred that 44% of the respondent's big necessities are retrieving the data faster and 30% of the respondent's big necessities are to handle a large volume of data. Most of the respondent's big necessities are retrieving the data faster.

TABLE 7: TECHNICAL ADVANTAGE OF SAP HANA DBMS OVER THE ORACLE DATABASE

PARTICULARS	FREQUENCY	PERCENTAGE
Views of business information can be persisted in a Persistent Data Repository, and	24	22

reconstituted in case of a crash		
Consolidates two landscapes (OLAP and OLTP) into a single database	16	14
Tight integration with SAP Business Objects BI solutions for insight and analytics	35	32
Real-time Replication Service can be used to access and replicate data from SAP ERP	14	13
Implified Operations and Monitoring with the integration of basic HANA administration capabilities with the BW Admin Cockpit	12	11
SQL and MDX interfaces for third- party application access	9	8
TOTAL	110	100

CHART 7: TECHNICAL ADVANTAGE OF SAP HANA DBMS OVER THE ORACLE DATABASE



INFERENCE

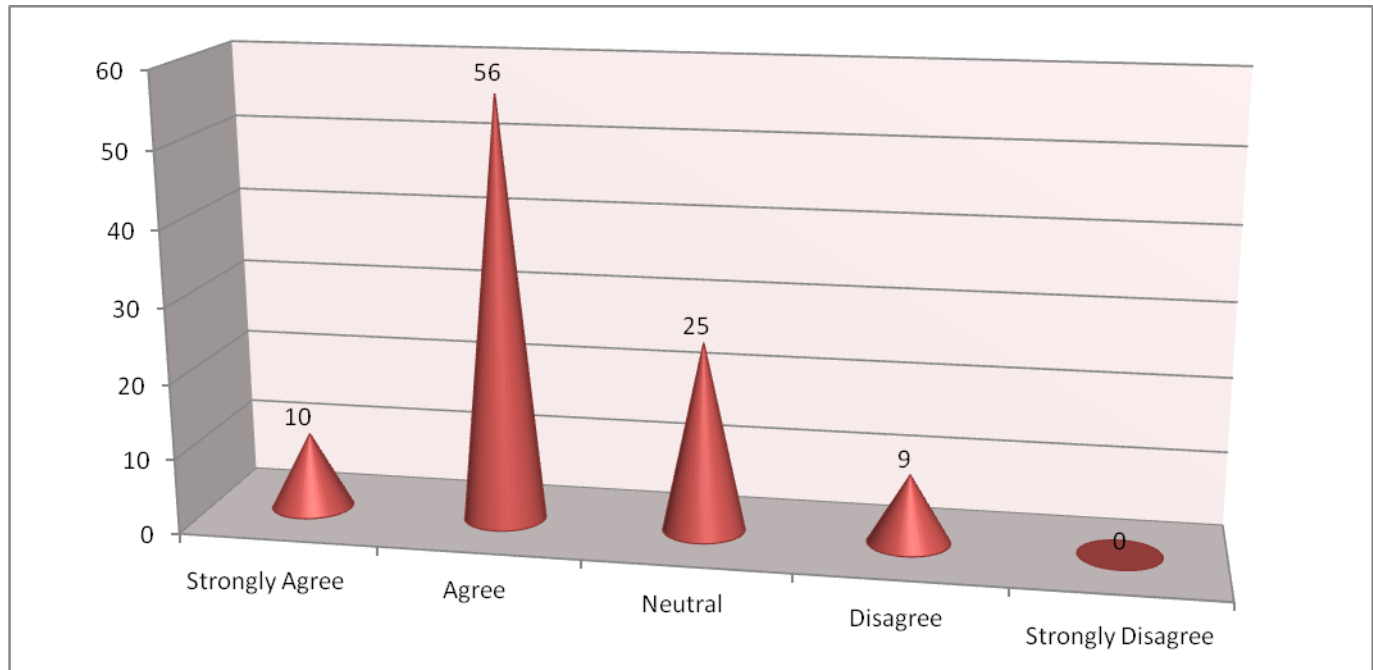
From the above table it is inferred that 32% of the respondents says that tight integration with sap business objects bi solutions for insight and analytics are the technical advantage of SAP HANA DBMS over the oracle database and 22% of the respondents says that views of business information can be persisted in a persistent data repository, and reconstituted in case of a crash are the technical advantage of SAP HANA DBMS over the oracle database. Most of the respondents say that tight integration with sap business objects bi solutions for insight and analytics are the technical advantage of SAP HANA DBMS over the oracle database.

TABLE 8: REDUCTION OF COSTS THROUGH SIMPLIFICATIONS

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly Agree	11	10
Agree	62	56
Neutral	27	25
Disagree	10	9

Strongly Disagree	0	0
TOTAL	110	100

CHART 8: REDUCTION OF COSTS THROUGH SIMPLIFICATIONS



INFERENCE

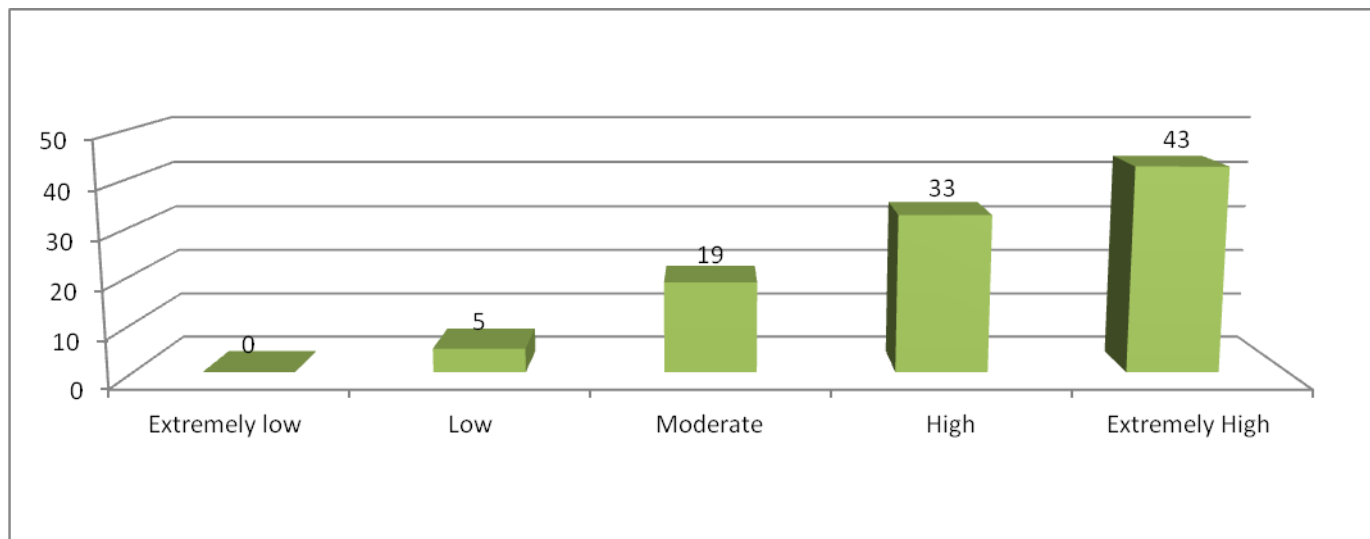
From the above table it is inferred that 56% of the respondents agree the reduction of costs through simplifications and 25% of the respondents neither agree nor disagreeing the reduction of costs through simplifications. Most of the respondents agree the reduction of costs through simplifications.

TABLE 9: IMPORTANCE OF COMMUNICATION FACTOR PRIOR TO DATABASE MIGRATION

PARTICULARS	FREQUENCY	PERCENTAGE
Extremely low	0	0
Low	6	5
Moderate	21	19

High	36	33
Extremely High	47	43
TOTAL	110	100

CHART 9: IMPORTANCE OF COMMUNICATION FACTOR PRIOR TO DATABASE MIGRATION



INFERENCE

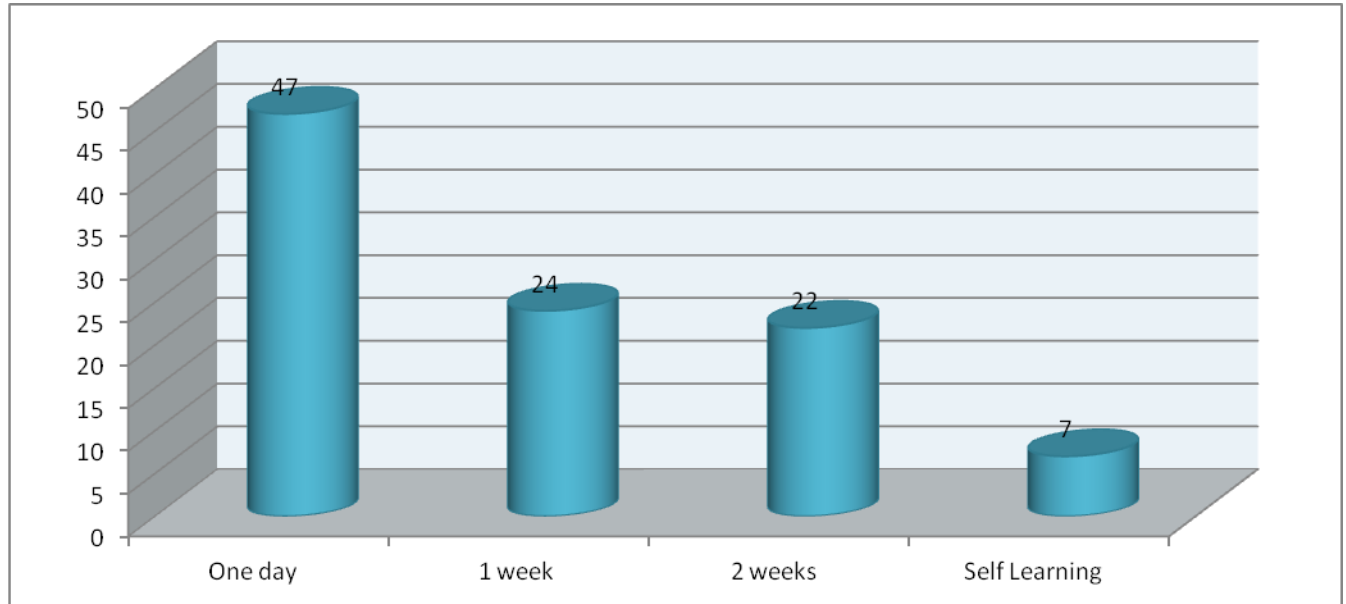
From the above table it is inferred that 43% of the respondents extremely high in the importance of communication factor and 33% of the respondents high in importance of communication factor. Most of the respondents give extremely high importance for communication factor.

TABLE 10: DURATION OF TRAINING ATTENDED FOR SAP HANA DBMS

PARTICULARS	FREQUENCY	PERCENTAGE
One day	52	47
1 week	26	24
2 weeks	24	22
Self Learning	8	7

TOTAL	110	100
--------------	-----	-----

CHART 10: DURATION OF TRAINING ATTENDED FOR SAP HANA DBMS



INFERENCE

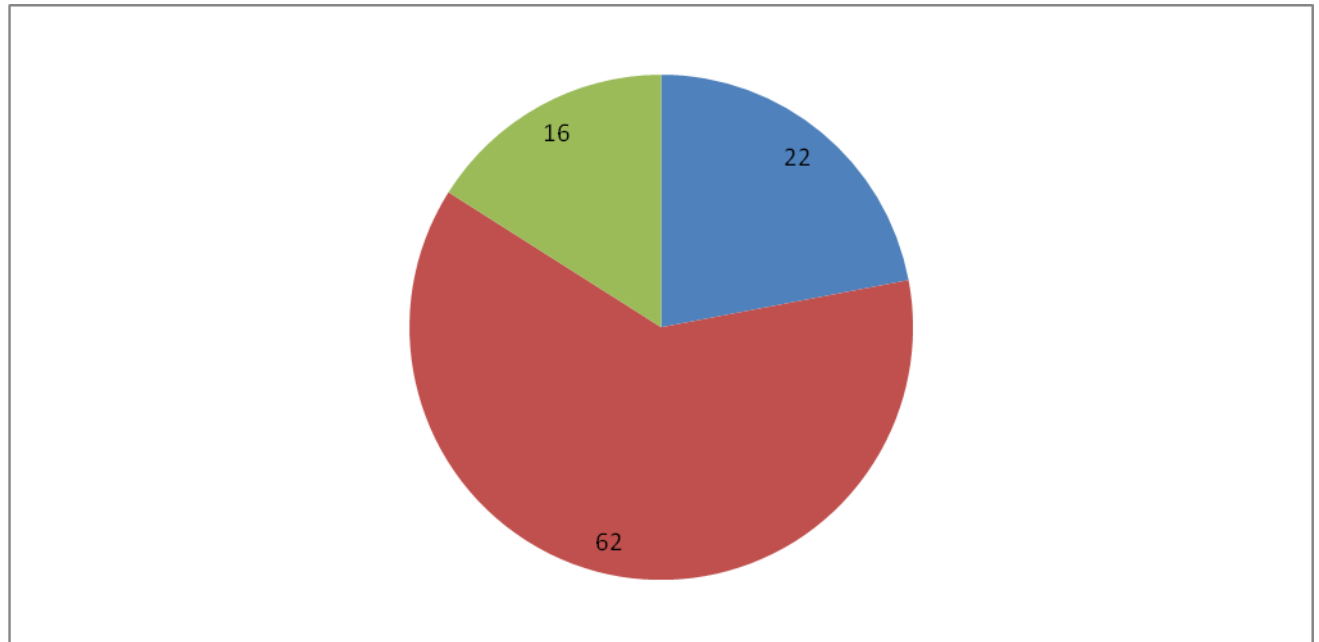
From the above table it is inferred that 47% of the respondents attended training for one day and 24% of the respondents attended training for 1 week. Most of the respondents attended training for one day.

TABLE 11: TYPE OF TRAINER IS USED FOR CONDUCTING THE SAP HANA DBMS TRAINING PROGRAMME

PARTICULARS	FREQUENCY	PERCENTAGE
Internal	24	22
External	68	62
Both	18	16

TOTAL	110	100
--------------	-----	-----

CHART 11: TYPE OF TRAINER IS USED FOR CONDUCTING THE SAP HANA DBMS TRAINING PROGRAMME



INFERENCE

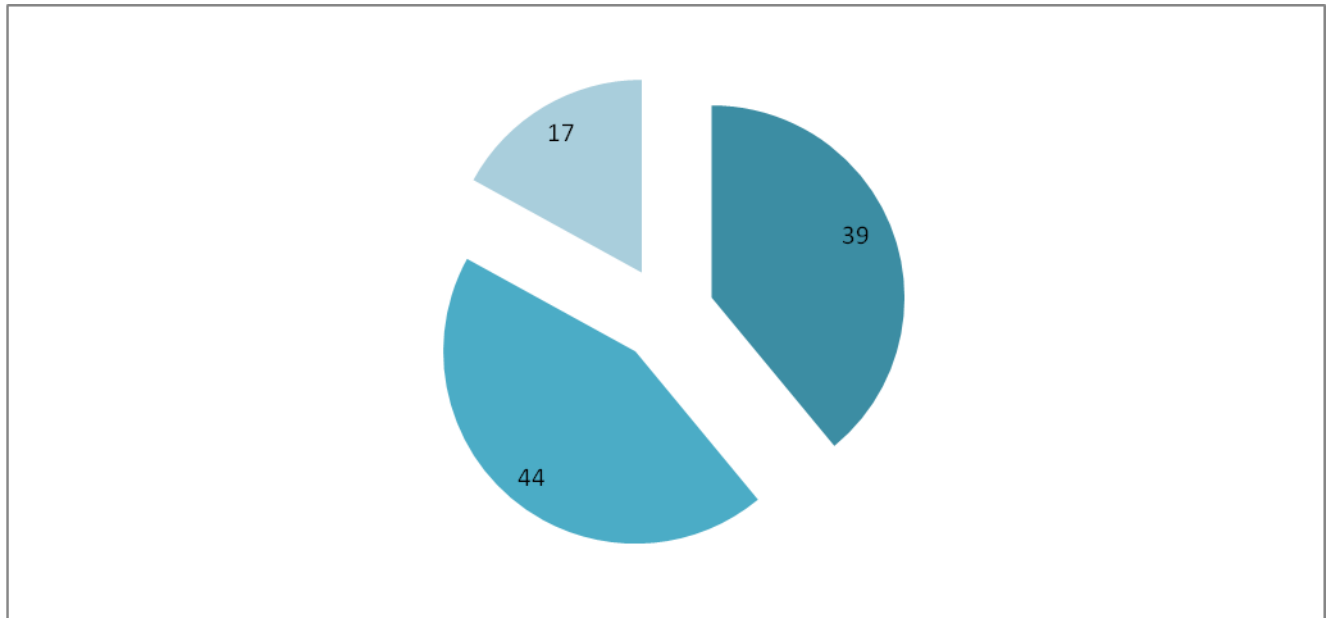
From the above table it is inferred that 62% of the respondents used external type of trainer and 22% of the respondents used internal type of trainer and 16% of the respondents used both the type of trainer. Most of the respondents used external type of trainer.

TABLE 12: TRAINING PROGRAMME EASES THE SAP HANA DBMS MIGRATION PROCESS

PARTICULARS	FREQUENCY	PERCENTAGE
Yes	43	39
No	49	44
No idea	18	17

TOTAL	110	100
-------	-----	-----

CHART 12: TRAINING PROGRAMME EASES THE SAP HANA DBMS MIGRATION PROCESS



INFERENCE

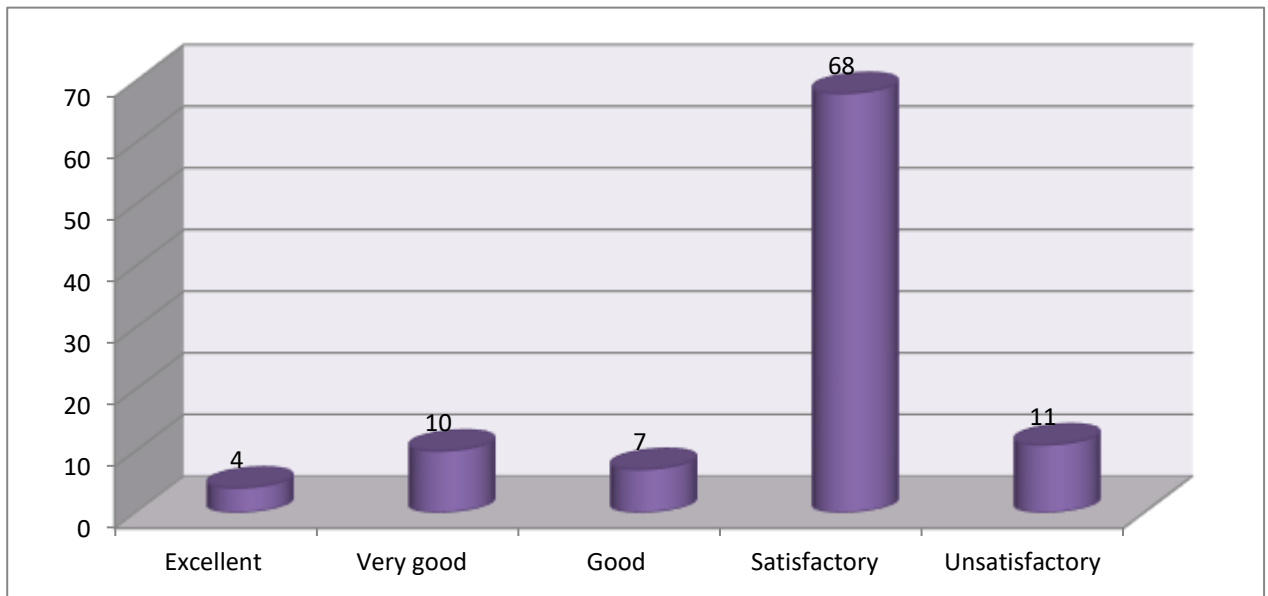
From the above table it is inferred that 44% of the respondents say no that training programme not eases the SAP HANA DBMS migration process 39% of the respondents say yes that training programme eases the SAP HANA DBMS migration process and 17% of the respondents say no idea that training programme eases the SAP HANA DBMS migration process. Most of the respondents say no that training programme not eases the SAP HANA DBMS migration process.

TABLE 13: TRAINING PROGRAMME ORGANIZED IN FIVE FEED LEARNING SOLUTIONS

PARTICULARS	FREQUENCY	PERCENTAGE
Excellent	5	4
Very good	11	10
Good	8	7

Satisfactory	74	68
Unsatisfactory	12	11
TOTAL	110	100

CHART 13: TRAINING PROGRAMME ORGANIZED IN FIVE FEED LEARNING SOLUTION



INFERENCE

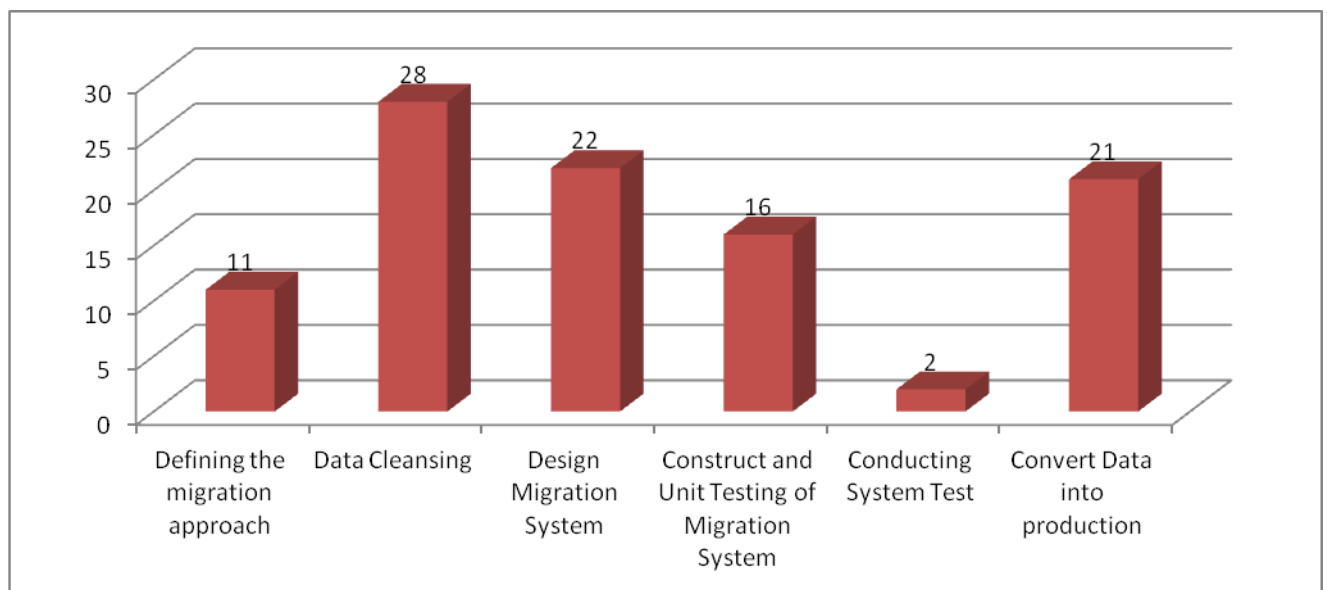
From the above table it is inferred that 68% of the respondents satisfactory in training programme organized in Five Feed Learning Solutions and 11% of the respondents unsatisfactory in training programme organized in Five Feed Learning Solutions. Most of the respondents satisfactory in training programme organized in Five Feed Learning Solutions.

TABLE 14: MOST IMPORTANT PROCESS IN DATABASE MIGRATION

PARTICULARS	FREQUENCY	PERCENTAGE
Defining the migration approach	12	11
Data Cleansing	31	28
Design Migration System	24	22

Construct and Unit Testing of Migration System	18	16
Conducting System Test	2	2
Convert Data into production	23	21
TOTAL	110	100

CHART 14: MOST IMPORTANT PROCESS IN DATABASE MIGRATION



INFERENCE

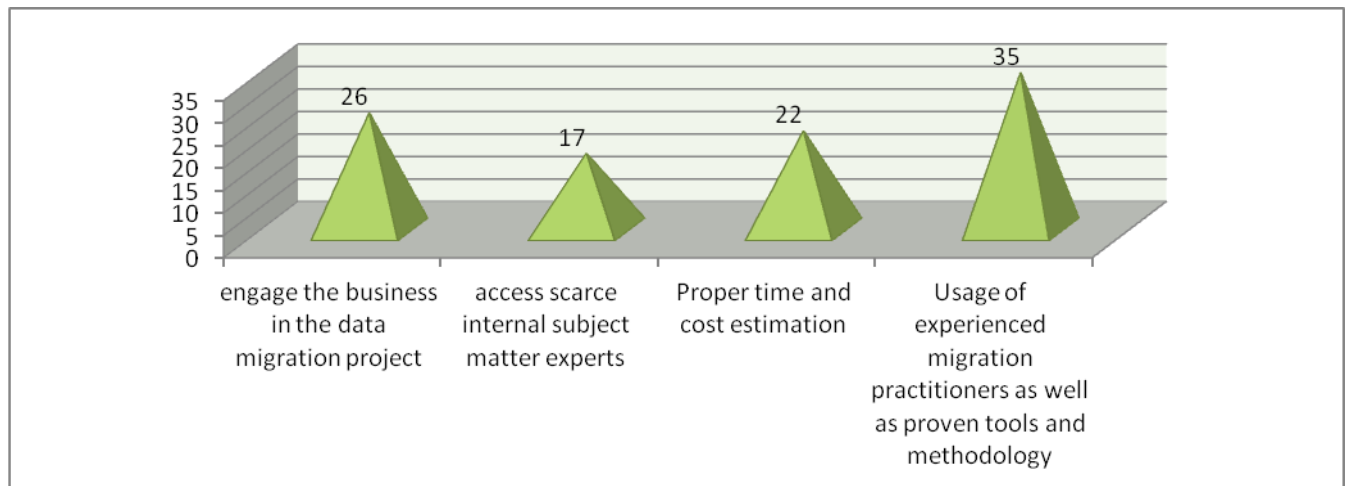
From the above table it is inferred that 28% of the respondents says that data cleansing are the most important process in database migration and 22% of the respondents says that design migration system are the most important process in database migration. Most of the respondents says that data cleansing are the most important process in database migration.

TABLE 15: KEY FOR THE SUCCESS OF THIS SAP HANA DBMS SAP HANA DBMS MIGRATION PROCESS

PARTICULARS	FREQUENCY	PERCENTAGE
Engage the business in the data migration project	29	26
Access scarce internal subject matter experts	19	17

Proper time and cost estimation	24	22
Usage of experienced migration practitioners as well as proven tools and methodology	38	35
TOTAL	110	100

CHART 15: KEY FOR THE SUCCESS OF THIS SAP HANA DBMS SAP HANA DBMS MIGRATION PROCESS

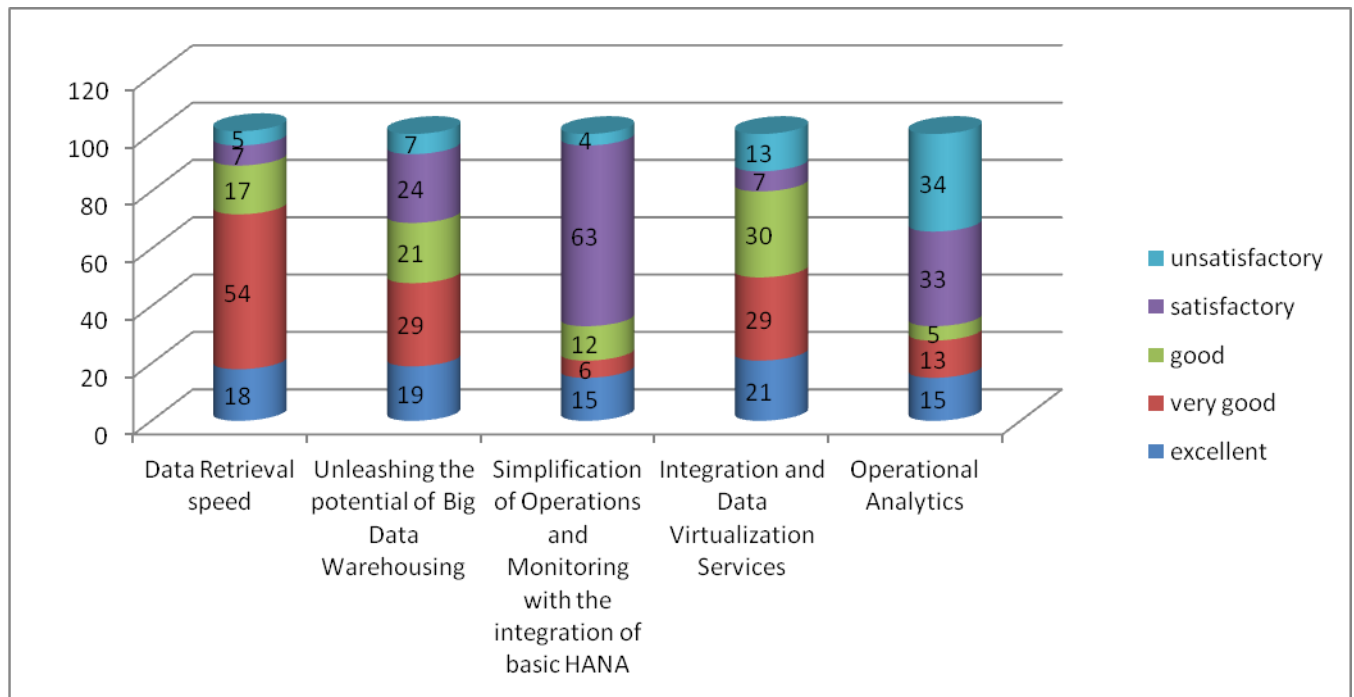


INFERENCE

From the above table it is inferred that 35% of the respondents say that usage of experienced migration practitioners as well as proven tools and methodology are the key for the success of SAP HANA DBMS and 22% of the respondents say that proper time and cost estimation. Most of the respondents say that usage of experienced migration practitioners as well as proven tools and methodology are the key for the success of SAP HANA DBMS.

1. Data Retrieval speed	19	18	59	54	18	17	8	7	6	5
2. Unleashing the potential of Big Data Warehousing	21	19	32	29	23	21	26	24	8	7
3. Simplification of Operations and Monitoring with the integration of basic HANA administration capabilities with the BW Admin Cockpit	16	15	7	6	13	12	69	63	5	4
4. Integration and Data Virtualization Services	22	21	32	29	34	30	8	7	14	13
5. Operational Analytics	16	15	14	13	6	5	36	33	38	34

CHART 16: OPINION ABOUT THE NEW SAP HANA DBMS DATABASE



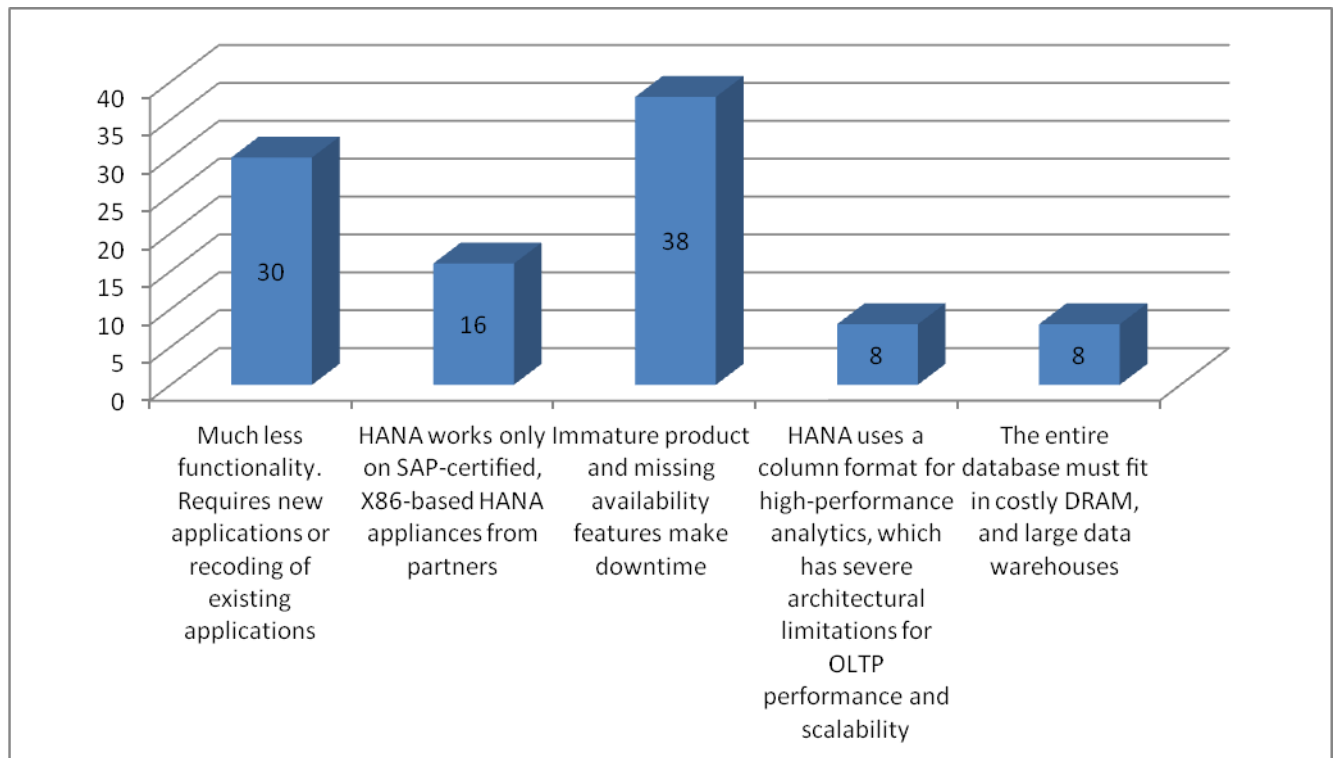
INFERENCE

From the above table it is inferred that 54% of the respondent's opinion in data retrieval speed is very good and 18% of the respondent's opinion in data retrieval speed is excellent and 29% respondents opinion in unleashing the potential of big data warehousing is very good and 24% of the respondents opinion in unleashing the potential of big data warehousing is satisfactory and 63% of the respondents opinion in simplification of operations and monitoring with the integration of basic HANA administration capabilities with the BW Admin Cockpit is satisfactory and 15% of the respondents opinion in simplification of operations and monitoring with the integration of basic HANA administration capabilities with the BW Admin Cockpit is excellent and 30% of the respondents opinion in integration and data virtualization services is good and 29% of the respondents opinion in integration and data virtualization services is very good and 34% of the respondents opinion in operational analytics is unsatisfactory and 33% of the respondents opinion in operational analytics is satisfactory. Most of the respondent's opinions are simplification of operations and monitoring with the integration of basic HANA administration capabilities with the BW Admin Cockpit and data retrieval speed.

TABLE 17: BIGGEST DRAWBACK OF SAP HANA DBMS OVER ORACLE DATABASE

PARTICULARS	FREQUENCY	PERCENTAGE
Much less functionality. Requires new applications or recoding of existing applications	33	30
HANA works only on SAP-certified, X86-based HANA appliances from partners.	17	16
Immature product and missing availability features make downtime Unavoidable	42	38
HANA uses a column format for high-performance analytics, which has severe architectural limitations for OLTP performance and scalability	9	8
The entire database must fit in costly DRAM, and large data warehouses and big data will not fit	9	8
TOTAL	110	100

CHART 17: BIGGEST DRAWBACK OF SAP HANA DBMS OVER ORACLE DATABASE



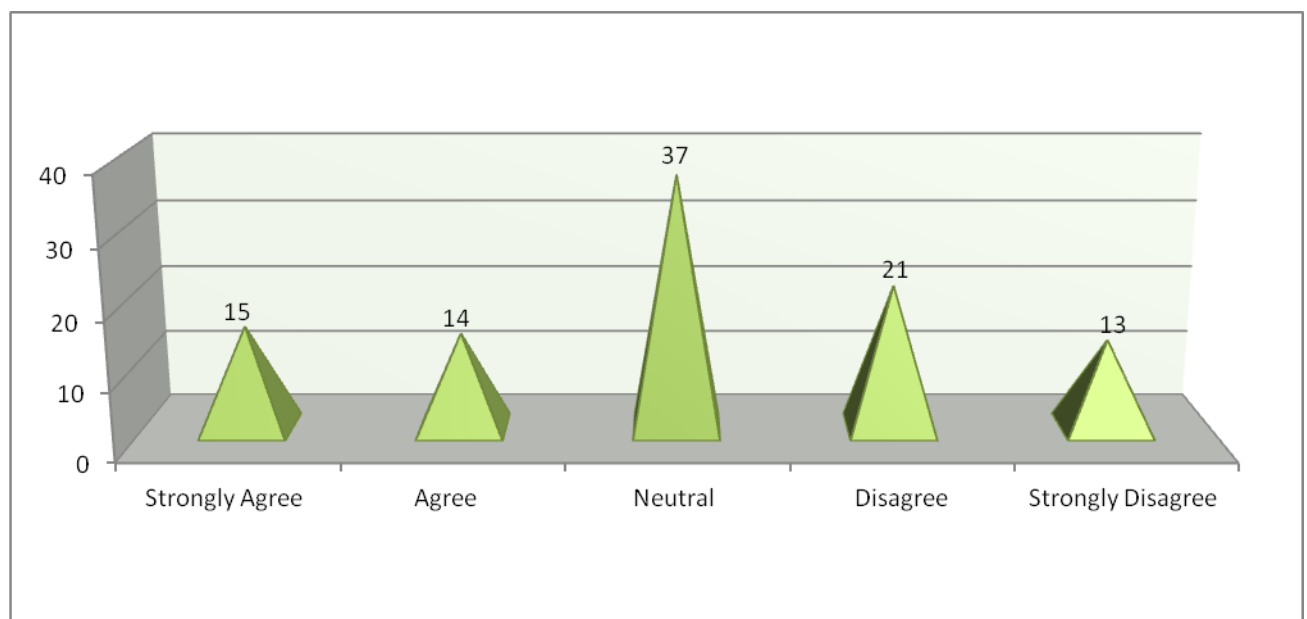
INFERENCE

From the above table it is inferred that 38% of the respondents say that the biggest drawback is immature product and missing availability features make downtime Unavoidable and 30% of the respondents say that the biggest drawback is much less functionality requires new applications or recoding of existing applications. Most of the respondents say that the biggest drawback is immature product and missing availability features make downtime Unavoidable.

TABLE 18: MIGRATING TO SAP HANA DBMS DATABASE HAS ACCELERATED OUR CORE BUSINESS PROCESS AND CUSTOM APPLICATIONS

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly Agree	17	15
Agree	16	14
Neutral	41	37
Disagree	22	21
Strongly Disagree	14	13
TOTAL	110	100

CHART 18: MIGRATING TO SAP HANA DBMS DATABASE HAS ACCELERATED OUR CORE BUSINESS PROCESS AND CUSTOM APPLICATIONS



INFERENCE

From the above table it is inferred that 37% of the respondents neither agree nor disagree in migrating to SAP HANA DBMS database and 21% of the respondents

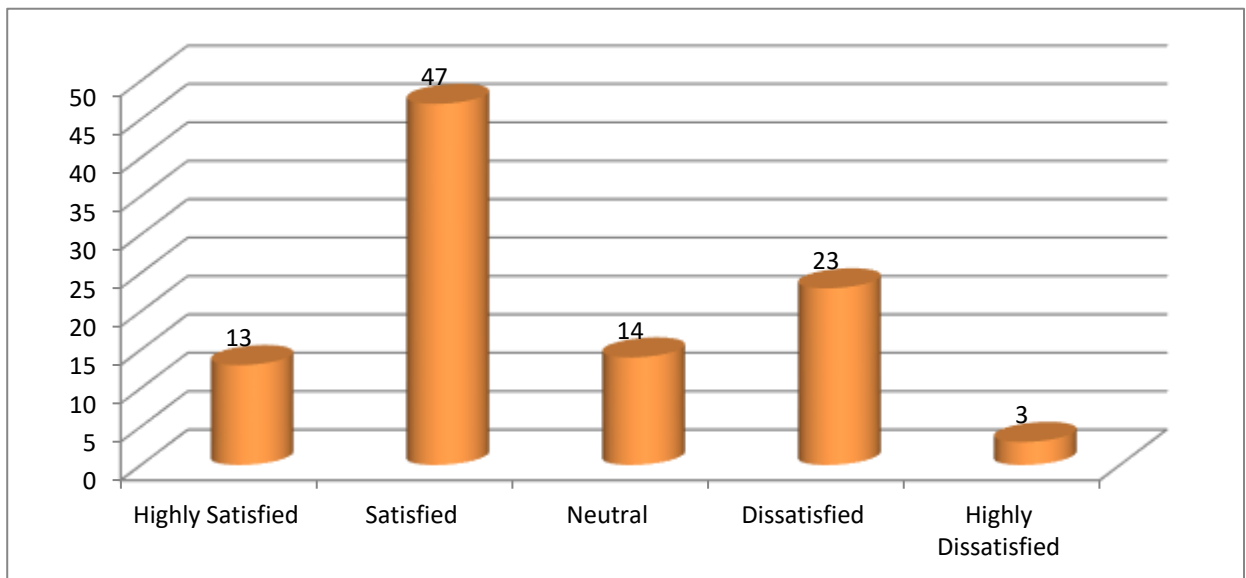
disagree in migrating to SAP HANA DBMS database. Most of the respondents neither agree nor disagree in migrating to SAP HANA DBMS database.

TABLE 19: SATISFACTION LEVEL ON THE MIGRATION PROCESS OF SAP HANA DBMS FROM ORACLE DATABASE

PARTICULARS	FREQUENCY	PERCENTAGE
-------------	-----------	------------

Highly Satisfied	14	13
Satisfied	52	47
Neutral	15	14
Dissatisfied	25	23
Highly Dissatisfied	4	3
TOTAL	110	100

CHART 19: SATISFACTION LEVEL ON THE MIGRATION PROCESS OF SAP HANADBMS FROM M ORACLE DATABASE.



INFERENCE

From the above table it is inferred that 47% of the respondents satisfied with the migration process of SAP HANA DBMS from oracle database and 23% of the

respondents dissatisfied with the migration process of SAP HANA DBMS from oracle database. Most of the respondents satisfied with the migration process of SAP HANA DBMS from oracle database.

STATISTICAL TOOLS AND ANALYSIS

CHI- SQUARE TEST I – (ψ^2)

Chi-square is the sum of the squared difference observed (o) and the expected (e) data (or the deviation, d), divided by the expected data in all possible categories.

Null hypothesis (Ho):

There is no relationship between the age group duration of training attended for saphana

Alternate hypothesis (H1):

There is relationship between the age group duration of training attended for saphana

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
AGEGROUP * DURATIONOFTRAININGATTENDEDFOR SAPHANA	110	100.0%	0	0.0%	110	100.0%

AGE GROUP *

DURATIONOF TRAINING ATTENDED FOR SAPHANA Crosstabulation

	DURATIONOFTRAININGATTENDEDFOR SAPHANA	Total
--	--	-------

		One day	1 week	2 weeks	Self Learning	
AGEGROU	Count	52	26	11	0	89
	% within AGEGR	58.4%	29.2%	12.4%	0.0%	100.0%
	% within DURA					
	(21-30) yrs TIONO					
	FTRAINING	100.0%	100.0%	45.8%	0.0%	80.9%
	TTENT					
	EDFOR					
AGEGR	RSAP					
	HANA					
	% of Total	47.3%	23.6%	10.0%	0.0%	80.9%
	Count	0	0	13	8	21
(31-40) yrs	% within AGEGR	0.0%	0.0%	61.9%	38.1%	100.0%
	ROUP					

Total	% within DURATION OF TRAINING ATTENDED FOR SAPHANA	0.0%	0.0%	54.2%	100.0%	19.1%
	% of Total	0.0%	0.0%	11.8%	7.3%	19.1%
	Count	52	26	24	8	110
	% within AGE GROUP	47.3%	23.6%	21.8%	7.3%	100.0%
	% within DURATION OF TRAINING ATTENDED FOR SAPHANA	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	47.3%	23.6%	21.8%	7.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	71.425 ^a	3	.010

Likelihood Ratio	74.154	3	.020
Linear-by-Linear Association	58.873	1	.030
N of Valid Cases	110		

a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is 1.53.

Degree of Freedom= $(r-1) * (c-1)$

= $1*3= 3$

Calculated value = 71.425

Tabulated value = 7.815

$Z = Z_{cal} > Z_{tab}$

$Z = 71.425 > 7.815$

Hence, the Alternate hypothesis [H1] is accepted.

INFERENCE:

Since the calculated value is greater than the tabulated value, we accept the alternate hypothesis and hence there is a relationship between the age group duration of training attended for saphana

ONE-WAY ANOVA CLASSIFICATION

Null hypothesis (Ho):

There is a significance difference between the training programme eases the SAP HANA DBMS migration process and importance of communication factor prior to database migration

Alternate hypothesis (H1):

There is no significance difference between the training programme eases the SAP HANA DBMS migration process and importance of communication factor prior to database migration

Descriptives

TRAININGPROGRAMMEEASESTHEDATABASEMIGRATIONPROCESS

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Low	6	1.00	.000	.000	1.00	1.00	1	1
Moderate	21	1.00	.000	.000	1.00	1.00	1	1
High	36	1.56	.504	.084	1.39	1.73	1	2
Extremely High	47	2.43	.617	.090	2.24	2.61	2	5
Total	110	1.79	.767	.073	1.65	1.94	1	5

Test of Homogeneity of Variances

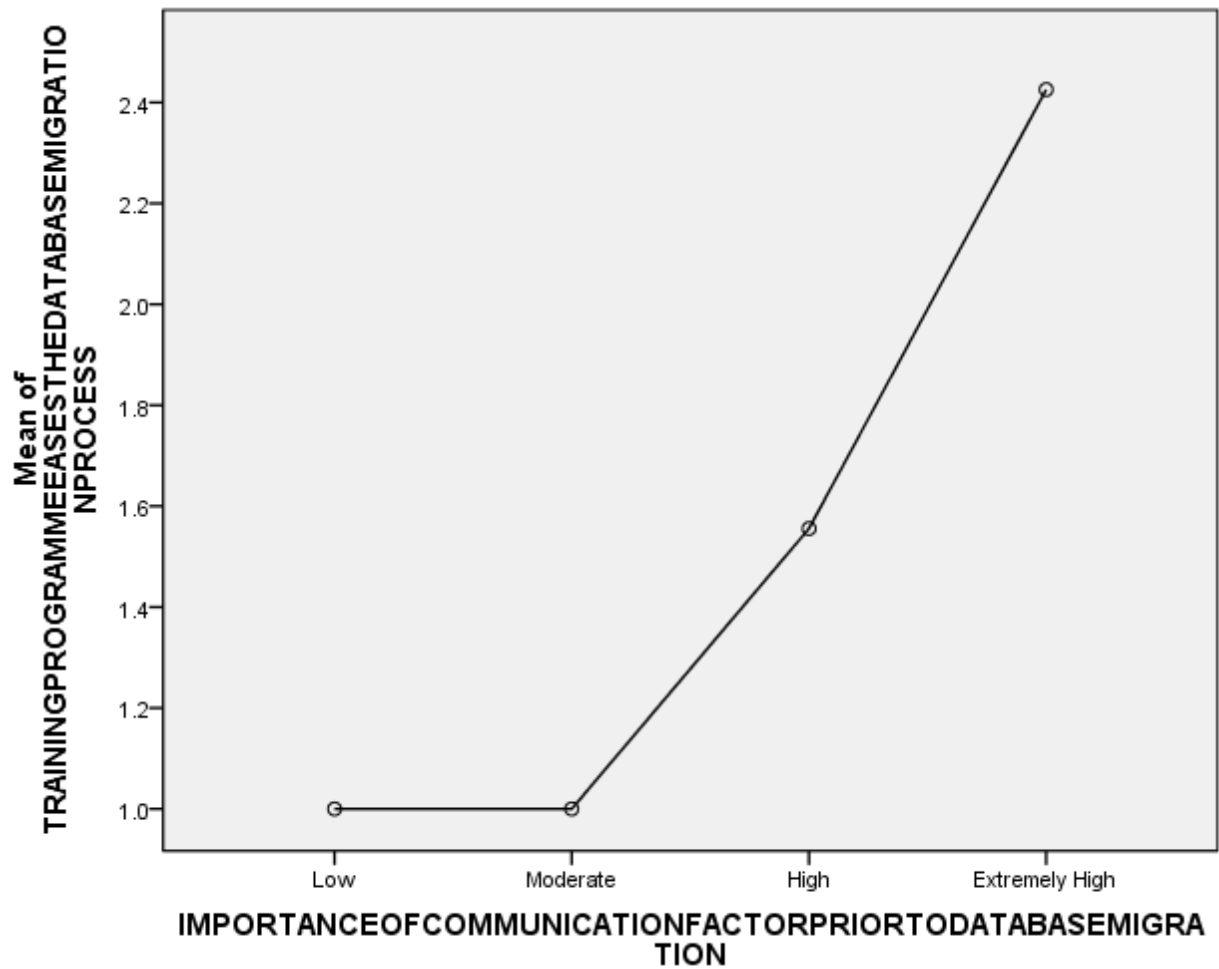
TRAININGPROGRAMMEEASESTHEDATABASEMIGRATIONPROCESS

Levene Statistic	df1	df2	Sig.
40.761	3	106	.010

ANOVA

TRAININGPROGRAMMEEASESTHEDATABASEMIGRATIONPROC
ESS

	Sum Squares	of df	Mean Square	F	Sig.
Between Groups	37.813	3	12.604	50.650	.040
Within Groups	26.378	106	.249		
Total	64.191	109			



Tabulated value = 2.6802

Calculated value = 50.650

$F = F_{cal} > F_{tab}$ $F = 50.650 > 2.6802$

Hence, the Alternate hypothesis [H1] is accepted.

INFERENCE:

The calculated value of F is greater than the tabulated value. Hence, we reject the null hypothesis and conclude that there is a significance difference between training programme eases the SAP HANA DBMS migration process and importance of communication factor prior to database migration

ANALYSIS USING KARL PEARSON'S CORRELATION

Correlation analysis is the statistical tool used to measure the degree to which two variables are linearly related to each other. Correlation measures the degree of association between two variables.

Null hypothesis (H0):

There is positive relationship between the most important process in database migration and satisfaction level on the migration process

Alternate hypothesis (H1):

There is negative relationship between the most important process in database migration and satisfaction level on the migration process.

Correlations

		MOSTIMPO RTANTPR OCESSIND ATABASEM IGRATION	SATISFAC TIONLEVE LONTHEMI GRATIONP ROCESS
MOSTIMPORTANTP ROCESSINDATABA SEMIGRATION	Pearson	1	.942**
	Correlation		
	Sig. (2-tailed)		.000
	N	110	110
SATISFACTIONLEV ELONTHEMIGRATI ONPROCESS	Pearson	.942**	1
	Correlation		
	Sig. (2-tailed)	.000	
	N	110	110

** . Correlation is significant at the 0.01 level (2-tailed).

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{n}} \sqrt{\sum Y^2 - \frac{(\sum Y)^2}{n}}}$$

$$r = .942$$

INFERENCE:

Since r is positive, there is positive relationship between the most important process in database migration and satisfaction level on the migration process

.

CHAPTER 5

FINDINGS

5.1 FINDINGS:

- 1) Most of the respondents in the age group 21-30 years.
- 2) Most of the respondents have 2.1-5 years of experience.
- 3) Most of the respondents are male.
- 4) Most of the respondents using oracle database for 1-3 years.
- 5) Most of the respondents neither agree nor disagree the satisfaction level of using oracle database.
- 6) Most of the respondent's big necessities are retrieving the data faster.
- 7) Most of the respondents say that tight integration with sap business objects bi solutions for insight and analytics are the technical advantage of SAP HANA DBMS over the oracle database.
- 8) Most of the respondents agree the reduction of costs through simplifications.
- 9) Most of the respondents extremely high in importance of communication factor.
- 10) Most of the respondents attended training for one day.
- 11) Most of the respondents used external type of trainer.
- 12) Most of the respondents say no that training programme not eases the SAP HANA DBMS migration process.
- 13) Most of the respondents satisfactory in training programme organized in Five Feed Learning Solutions.
- 14) Most of the respondents say that data cleansing are the most important process in database migration.
- 15) Most of the respondents say that usage of experienced migration practitioners as well as proven tools and methodology are the key for the success of SAP HANA DBMS.
- 16) Most of the respondent's opinions are simplification of operations and monitoring with the integration of basic HANA administration capabilities with the BW Admin Cockpit and data retrieval speed.
- 17) Most of the respondents say that the biggest drawback is immature product and missing availability features make downtime Unavoidable.
- 18) Most of the respondents neither agree nor disagree in migrating to SAP HANA DBMS database.
- 19) Most of the respondents satisfied with the migration process of SAP HANA DBMS from oracle database.

5.1 SUGGESTIONS:

1. Effectiveness of the data migration process from Oracle to SAP HANA DBMS can be improved through usage of experienced migration practitioners as well as proven tools and methodology
2. Engage the entire business in the data migration project to improve its effectiveness. It also acts as a change management technique.
3. Training duration of SAP HANA DBMS can be increase from 1 day to 1 week. This will create better awareness about the new technical features and ease the process of database migration
4. Special attention can be given for data cleansing process in database migration.
5. Proper communication need to be given prior to the SAP HANA DBMS migration process. This will enhance the morale of the employees towards the new database.
6. Operational Analytics of SAP HANA DBMS can be improved to make the usage of new database easier for the technical employees.
7. Functionalities in SAP HANA DBMS have to be increased. SAP HANA DBMS always requires new applications or recoding of existing applications. These technical difficulties need to be fixed.

5.3 LIMITATIONS OF THE STUDY:

Time constraint:

The defined time limit passed a constraint for increasing the sample size due to which sample size was restricted to 110.

The respondent chosen were selected by using simple random sampling.

The responses of the consumers may not be genuine.

The questions included in the questionnaire may not be comprehensive.

Continuous and reliable information was not available.

5.4 CONCLUSION

The management of Five Feed Learning Solutions wants to conduct the research to assess the effectiveness of the SAP HANA DBMS migration process from Oracle to SAP HANA DBMS. This study has been undertaken to determine the various problems faced during the migration process for the SAP team as well as to identify the user's experience of SAP with the new SAP HANA DBMS database.

Through this study, the researcher has understood the various technical issues in SAP HANA DBMS migration process. Shortage of training duration for SAP HANA DBMS & the need for more functionality in SAP HANA DBMS have been identified. Actionable solutions have been proposed to the Five Feed Learning Solutions to smoothen the SAP HANA DBMS migration process

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ANNEXURE

QUESTIONNAIRE

A STUDY ON EFFECTIVENESS OF SAP HANA DBMS MIGRATION PROCESS IN FIVE FEED LEARNING SOLUTIONS

PERSONAL DETAILS:

Age group : ☐ (21-30) yrs ☐ (31-40) yrs

(41-50) yrs ☐ 50 & above yrs ☐

Experience : ☐ 2 yrs ☐ 2.1-5 y ☐ (5.1 ☐ 10 yrs
>10 yrs

Gender : ☐ Male ☐ Female

1. How long you have been using the Oracle Database

- a) Less than one year
- b) 1-3 years
- c) 3.1-6 years
- d) More than 6 years

2. What is your satisfaction level with the previously used Oracle Database?

Highly Satisfied ☐ Satisfied ☐ Neutral ☐ Dissatisfied ☐ Highly
Dissatisfied

3. What is the big necessity for SAP HANA DBMS in Five Feed Learning Solutions?

- a. Helps the organization to handle a large volume of data

- b. In-memory technology lets users explore and analyze all transactional and analytical data in real time from virtually any data source.
 - c. Help the users to retrieve the data faster
 - d. Improve the performance of the SAP used in the organization
4. What is the technical advantage of SAP HANA DBMS over the Oracle database?

- i. Views of business information can be persisted in a Persistent Data Repository, and reconstituted in case of a crash
- ii. Consolidates two landscapes (OLAP and OLTP) into a single database
- iii. Tight integration with SAP Business Objects BI solutions for insight and analytics.
- iv. Real-time Replication Service can be used to access and replicate data from SAP ERP.
- v. Simplified Operations and Monitoring with the integration of basic HANA administration capabilities with the BW Admin Cockpit
- vi. SQL and MDX interfaces for third- party application access

5. SAP HANA DBMS reduces the costs through simplifications in hardware, maintenance and testing?

☒ Strongly Agree
 ☐ Agree
 ☐ Neutral
 ☐ Disagree
 ☐ Strongly Disagree

6. What is the importance of communication factor prior to database migration?

a) Extremely low b) Low c) Moderate d) High e) Extremely High

7. How many days of training did you attend for SAP HANA DBMS prior to migration?

a. One day

- b. 1 week
- c. 2 weeks
- d. Self Learning

8. What type of trainer is used for conducting the SAP HANA DBMS training programme?

- a) Internal () b) External () c) Both ()

9. Does the training programme ease the SAP HANA DBMS migration process of SAP HANA DBMS?

- a) Yes b) No c) No idea

10. How is the SAP HANA DBMS training programme organized in Five Feed Learning Solutions?

- i. Excellent
- ii. Very good
- iii. Good
- iv. Satisfactory
- v. Unsatisfactory

11. Which is the most important process in Database migration?

- a. Defining the migration approach
- b. Data Cleansing
- c. Design Migration System
- d. Construct and Unit Testing of Migration System
- e. Conducting System Test
- f. Convert Data into production

12. Which is the key for the success of this SAP HANA DBMS migration process?

- a. engage the business in the data migration project
- b. access scarce internal subject matter experts
- c. Proper time and cost estimation
- d. Usage of experienced migration practitioners as well as proven tools and methodology

13. Share your opinion about the new SAP HANA DBMS database?

FACTORS	Excellent	Very Good	Good	Satisfactory	Unsatisfactory
1. Data Retrieval speed					
2. Unleashing the potential of Big Data Warehousing					
3. Simplification of Operations and Monitoring with the integration of basic HANA administration capabilities with the BW Admin Cockpit					
4. Integration and Data Virtualization Services					
5. Operational Analytics					

14. After using SAP HANA DBMS, what do you feel as the biggest drawback of SAP HANA DBMS over Oracle database?

- a. Much less functionality. Requires new applications or recoding of existing applications.
- b. HANA works only on SAP-certified, X86-based HANA appliances from partners.
- c. Immature product and missing availability features make downtime Unavoidable
- d. HANA uses a column format for high-performance analytics, which has severe architectural limitations for OLTP performance and scalability.
- e. The entire database must fit in costly DRAM, and large data warehouses and big data will not fit.

15. Migrating to SAP HANA DBMS database has accelerated our core business process and custom applications?

☒ Strongly Agree ☒ Agree ☒ Neutral ☒ Disagree ☐ Strongly Disagree

16. What is your satisfaction level on the migration process of SAP HANA DBMS from Oracle database?

☒ Highly Satisfied ☒ Satisfied ☐ Neutral ☒ Dissatisfied ☐ Highly Dissatisfied

17. Any other suggestions to improve the effectiveness of SAP HANA DBMS migration process?
