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## A STUDY ON SERVICE QUALITY OF INDIAN TELECOMMUNICATION COMPANIES

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**ABSTRACT**

*The speed of development, intense competition, technological developments and confrontation with complex and dynamic environments has led to a survival challenge. Service quality in telecommunication sector plays a major role in customer satisfaction as telecommunication has emerged as one of the critical component of economic growth required for overall socio-economic development of the country and is now the second largest telecom market globally. With the liberalisation and internationalisation in telecommunication, service quality has become an important means of differentiation and path to achieve business success. Delivered service will become the Quality Service if it meets the customer expectations which depends upon the customer perception and may differ from person to person. As customer satisfaction is also influenced by customer perception. The present study is an endeavour to assess the comparative service quality level of the Government owned BSNL and Private Sector Airtel Telecommunication Companies in Himachal Pradesh. For analysing the customers' perception and their expectation towards service quality of telecommunication companies, a self-administered questionnaire relevant to telecommunication industry was constructed. The data was collected from 600 respondents. An attempt has been made to examine the significant gap between the service quality of Airtel and BSNL companies by using five point Likert scale and t-test on all eight dimensions of service quality. The results of the study indicated that there is a significant gap between the perceived satisfaction and expectation on service quality dimensions. Based on the findings it is recommended that telecom companies should provide excellent and desired service by improving the quality of service.*

**KEYWORDS**

service quality, customer, telecommunication.

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**INTRODUCTION**

In present time, the service sector is one of the most important sectors for almost all the countries and is a key contributor to the GDP. In today's competitive environment, any service organization cannot survive successfully without delivering high quality service. Now-a-days, the telecommunication sector is one of the most important service sectors of a country and emerged as one of the critical component of economic growth required for overall socio-economic development of the country and is now the second largest telecom market globally. Being a globalized market, the customers seek and demand world class products and set a benchmark and compare it. The telecom market is vast, subscribers are in huge number and their needs and expectations differ from each other. With the liberalisation and internationalisation in the entire telecommunication industry, the competition has increased and service quality has become a key factor in the creation of worth and in influencing customer satisfaction. Service quality can be defined as the personal experience of the customer with the service provider. Customers want to avail the different types of services provided by the telecom service providers. Delivered service will become quality service if it meets the customer expectations and customer expectation depends upon the customer perception which may differ from person to person. Service quality is a comparison of expectations about a service with performance. If the customer experience the same service as they expect then this difference will be zero and we can say that the service quality is very good. Higher the difference of above equation lower will be service quality.

Most customers prefer good service to lower prices. This will lead to customer's perceptions exceeding their expectations and greater customer satisfaction. Customer satisfaction is also influenced by customer perception. Customer satisfaction is an estimate of how well the products or services offered by a firm meet or exceed customer expectation. If perceived performance is less than expected, customers will be dissatisfied. On the other hand, if the perceived performance exceeds the expectations, customers will be satisfied.

By offering either services or products no business organisation can survive for a long time. To remain in the market, the organisations have to build its customer base by meeting the needs of its customers. Customers are requiring and demanding better services, these circumstances are exerting pressure on the existing players in the industry to rewrite their strategies and policies. They will have to raise their level of service to fight for the survival in the market. To provide improved quality service, telecommunication companies need to investigate degree of customers' sensitivity and expectations toward service quality in order to overcome the competitors and attract and retain the customers.

**REVIEW OF LITERATURE**

**Joshi (2011)** conducted a study to compare Service Quality perception of customers across selected telecom service providers of Chandigarh, Mohali and Panchkula. A sample of 720 respondents was selected. The study shows that there was a high degree of instability among customers due to poor network, expensive mobile sets and poor customer care services. It has been found that service providers should more focus on network coverage, customer care services and should provide proper training to staff.

**Malik (2012)** in her paper titled "A Study on Customer Satisfaction towards Service Quality of Organized Retail Stores in Haryana" made an attempt to examine the relationship of dimensions of service quality and customer satisfaction. The data was collected through 500 questionnaires and was analysed by using SPSS. The paper revealed that the dimensions of service quality that is product quality, physical aspects and promotional schemes were positively related with customer satisfaction. A significant difference was found in physical aspects, promotional schemes, personnel interaction and after sale service. The study suggested that the retailers should ensure the availability of branded variety of products, store convenience, after sale services and should keep in mind the different perceptions and need of different categories of respondents to enhance customer satisfaction.

**Kant, Jaiswal and Mishra (2017)** in their study "The Investigation of Service Quality Dimensions, Customer Satisfaction and Corporate Image in Indian Public Sector Banks" investigated whether five dimensions of Service Quality namely, Tangibility, Reliability, Responsiveness, Assurance and Empathy had significant impact on

customer satisfaction. In the study, 640 retail customers of public sector banks in National Capital Region (NCR) of India were selected. The results of the study revealed that among all five dimensions of service quality, Tangibility and Assurance are recognised as most important predictors of customer satisfaction. The study suggested that to retain the customers the banks should focus on corporate brand building activities, tangible facilities and various human aspects. The previous discussion dealt with the review of existing studies and related topics was confined to explore the existing research gap which provides valuable information to frame the need, scope and objectives of the present study. The substantial work has been done on service quality, but such work has to be re-researched in the light of emerging challenges especially in the light of attaining higher customer satisfaction, but no study has been confined to assess service quality of selected telecommunication companies in Himachal Pradesh. There exists a research gap among various studies available so far. Therefore, the present study has been undertaken on service quality of selected telecommunication sector.

### NEED OF THE STUDY

In the era of globalisation-age of competition, it has become an essential task of every service organisation to provide a good service quality. Any service organization cannot survive successfully without delivering high quality service. Hence, it has become necessary to analyse the impact of service quality dimensions of customer satisfaction because if customers are satisfied with the service of a company, then it can increase the market share of the company. Moreover, rather than getting new customers, retaining old one satisfied and with the company for long time has been a much greater challenge. As pointed out in the literature survey, there seems to be dissatisfaction on the part of customers related to service quality provided by the telecom operators. The present study is the modest effort to study the level of customer perception towards the service quality dimensions of Airtel and BSNL telecommunication companies.

### OBJECTIVES OF THE STUDY

The present study is conceived with the following objectives:

1. To assess the service quality of Government owned (BSNL) and Private owned (Airtel) Telecommunication Companies.
2. To make comparison of service quality dimensions between Airtel and BSNL.

### RESEARCH METHODOLOGY AND DATA COLLECTION

The primary data was collected from the subscribers of both public and private sector telecommunication companies in the state of Himachal Pradesh. The scope of the study has been restricted to two telecommunication companies i.e. one public company (BSNL) and one private company (Airtel). The data was collected from 600 respondents, out of which 300 were Airtel subscribers and 300 were BSNL subscribers. Multi-stage and stratified sampling was applied to get the desired information from the respondents.

For analysing the customers' perception towards service quality of telecommunication companies, the questionnaire relevant to the telecommunication industry was constructed. In questionnaire, total 43 items were included under eight dimensions (Tangibility, Reliability, Responsiveness, Assurance, Empathy, Value added services, Pricing and Network quality) of service quality. In general, 22 statements were included from the original five dimensions of SERVQUAL instrument i.e. Tangibility, Reliability, Responsiveness, Assurance and Empathy and 21 additional statements were added to the SERVPERF scale only after reviewing the studies conducted in the telecommunication sector, personal interviews with teachers, customers etc. Assessment was done on the five point Likert scale from 5 (strongly agree) to 1 (strongly disagree). T-test was used to analyse the significant mean difference between the perception of customers of public and private sector telecommunication companies with regard to service quality dimensions.

### RESULTS AND DISCUSSION

#### TANGIBILITY

Tangible dimensions are those that indicate the overall outlook of the organization. How the customers perceive about the service after observing the outlook and visual appeal of the organization includes; appearance of building, cleanliness of facilities and appearance of personnel, communication material etc. is shown in table 1.

TABLE 1: STATISTICAL DESCRIPTION OF TANGIBILITY DIMENSIONS

Statements	Airtel	BSNL	t-value	p-value
Modern equipment and technology	3.8100	3.6400	2.748	.006
Employees outlook	3.2367	3.2267	.217	.828
Proper communication of information material	3.8400	3.5500	3.938	.000
Physical facilities visually appealing	3.8133	3.5833	3.203	.001
Outlets easily assessable	4.1319	3.8008	2.391	.017
Overall	3.7663	3.5601	4.112	.000

Source: Data collected through questionnaire

Analysis of table 1 reveals that overall mean score of perception of Airtel customers has been found 3.76 in comparison to 3.56 of BSNL, under tangibility dimensions. The highest mean score of responses has been found among both service providers i.e Airtel (4.13) and BSNL (3.80) as far as easy accessibility of outlets is concerned. Further, the lowest mean score has been found among both service providers with regard to employees outlook. The difference between perception of respondents on the statement of employees' outlook under tangible dimension is found insignificant. Whereas, statements relating to modern equipment and technology, proper communication of information material, visually appealing physical facilities and easy accessibility of retail outlets, the difference in the perception of customers of Airtel and BSNL is found significant at 1% level of significance. Overall, there is a significant difference in the perception of both the service providers.

#### RELIABILITY

The reliability dimensions of service quality are defined to which extent the correct, accurate and up-to-date knowledge and information is provided to customers and also perform service promised to subscribers is performed. The perception of customers on the dimensions of reliability is shown in table 2.

TABLE 2: STATISTICAL DESCRIPTION OF RELIABILITY DIMENSIONS

Statements	Airtel	BSNL	t-value	p-value
Show sincere interest in solving problems	3.8800	3.5967	3.715	.000
Provide the services at promised date and time	4.0700	3.8933	2.569	.010
Maintain records accurately	3.6067	3.4633	2.672	.008
Sound network system and easy connectivity of calls	3.9667	3.6700	3.709	.000
Activation & deactivation in agreed time	3.9067	3.6800	3.177	.002
Easy availability of information by employees	3.5067	3.2767	3.174	.002
Timely delivery of messages, voice message	4.3833	4.2167	2.995	.003
Overall	3.9028	3.6852	5.229	.000

Source: Data collected through questionnaire

As it is evident from the Table 2, overall mean score of responses in reliability dimensions in Airtel (3.90) is more as compared to BSNL (3.68). Amongst reliability dimensions, the mean score of responses on timely delivery of messages has been found maximum in both services providers i.e Airtel (4.38) and BSNL (4.21). The

lowest mean score has been found on easy availability of information by employees among the subscribers of both Airtel (3.50) and BSNL (3.27), which shows that responses of both service providers are on lower side of mean value. A significant difference in the perception of respondents at 1 percent level of significance on service quality dimensions has been observed. Hence, it can be concluded that overall service quality of Airtel is better than BSNL, as far as all reliability dimensions are concerned.

**RESPONSIVENESS**

Responsiveness dimensions indicate the timeliness of the service of the firm. It is the responsibility of the company to respond to customer’s complaints when concern quickly. Views of the customers of select service provider were solicited as shown in table 3.

**TABLE 3: STATISTICAL DESCRIPTION OF RESPONSIVENESS DIMENSIONS**

Statements	Airtel	BSNL	t-value	p-value
Employees are willing to help customers	3.6567	3.5100	2.326	.020
Employees have knowledge to answer the customers’ queries.	4.0333	3.8333	3.321	.001
Employees never busy to respond to customers’ requests	3.1367	3.1033	.433	.665
Employees tell exactly when services to be performed.	3.5933	3.4467	2.438	.015
Employees get feedback from customers.	3.8900	3.2400	7.793	.000
Overall	3.662	3.426	5.219	.000

Source: Data collected through questionnaire

The results of the Table 3 reveals that overall mean score of perception of customers for responsiveness dimension in Airtel are (3.66) more as compared to BSNL (3.42). The mean score of responses pertaining to employees answer the customer’s queries has been found highest and lowest with regard to employees never respond to customer, among both the service providers. A significant difference in the perception of subscribers of both service providers has been observed in all five dimensions of responsiveness except in case of employees promptly respond to customers’ requests, where the perception of all the subscribers is almost same irrespective of the service provider. Overall, a significant difference at 1 percent level of significance in the perception of all subscribers with regard to responsiveness dimensions has been observed.

**ASSURANCE**

Assurance consists of polite behaviour of the staff, respect and gratitude for the customers and building confidence in them about the service so that positive bonding between the customer and the service provider is established. Perception of the subscribers of the service providers on service quality on the basis of assurance is depicted in table 4.

**TABLE 4: STATISTICAL DESCRIPTION OF ASSURANCE DIMENSIONS**

Statements	Airtel	BSNL	t-value	p-value
Employees are courteous and polite with customers.	3.9433	3.8267	2.205	.028
Customers trust the employees	3.7967	3.6900	1.381	.168
Method of communication suits the needs of customers.	4.0533	3.9967	.910	.363
Employees give accurate presentation of products and services.	3.6300	3.5967	.522	.602
Customers feel that their transactions are safe	3.7100	3.7667	-.893	.372
Overall	3.826	3.776	1.260	.208

Source: Data collected through questionnaire

The analysis of Table 4 clearly demonstrates that overall mean score of responses of Airtel subscribers has been found 3.82 in comparison to 3.77 in BSNL. Mean score of responses of subscribers has been found maximum for the statement proper communication method and lowest for making presentation of products and services. Further, the difference between the perception of subscribers with regard to statement who feel that employees are courteous and polite with their customers is found significant at 5 % level of significance. Further, as far as trustworthiness of employees, proper communication system and accurate presentation of products is concerned, no significant gap between the perception of Airtel and BSNL subscribers has been observed. Overall, the perception of all subscribers is almost same irrespective of the service providers under assurance dimensions.

**EMPATHY**

Empathy means understanding and focuses on placing customers over and above everything else during the course of interaction. Service providers must be caring and should provide personal attention to customers and should be conveniently available. Perception of customers on Empathy dimensions has been presented in table 5.

**TABLE 5: STATISTICAL DESCRIPTION OF EMPATHY DIMENSIONS**

Statements	Airtel	BSNL	t-value	p-value
Employees give caring and individual attention to customers.	3.4900	3.4433	.775	.438
Understands the specific need of their customers	3.6667	3.5567	1.684	.093
Ease of taking a connection	4.1633	4.0367	2.017	.044
Welcome complaints and criticism and respond positively	3.6800	3.0300	8.777	.000
Overall	3.75	3.517	5.230	.000

Source: Data collected through questionnaire

Table 5 shows that overall mean score of responses of Airtel subscribers under empathy dimensions is more (3.75) as compared to BSNL subscribers (3.51). Amongst empathy dimensions, the highest mean score of responses on ease of taking a connection has been found high in Airtel (4.16) and lowest mean score has been found with regard to positive respond to complaints and criticism in BSNL (3.03). Further, a significant difference in the perception of subscribers pertaining to statements; ease of taking a connection and positive response to complaints and criticism, has been observed at 1 percent level of significance. Further, no significant gap in the perception of subscribers is found regarding the statements; employees pay personal attention and understand specific needs of customers. Overall, a significant difference at 1 percent level of significance has been found in the perception of both the subscribers of service providers as far as empathy dimensions are concerned.

**VALUE ADDED SERVICES**

Value added services include location based services, missed call alerts, voice mail box, mobile TV, online games, ringtones, SMS facilities etc. Value added service dimensions indicate proper and accurate information about the service and its charges. Perception of customers on the dimensions of value added services is shown in table 6.

**TABLE 6: STATISTICAL DESCRIPTION OF VALUE ADDED SERVICES DIMENSIONS**

Statements	Airtel	BSNL	t-value	p-value
Adequate variety of VAS	3.7800	3.6400	2.395	.017
No hidden charges for VAS	3.4800	3.2733	3.165	.002
Easily connectivity to customer care	3.4233	2.9933	5.167	.000
VAS started after customers’ consent	3.5133	3.4367	1.104	.270
VAS deactivated without unnecessary trouble and charges.	3.3900	3.2567	1.747	.081
Overall	3.518	3.32	4.716	.000

Source: Data collected through questionnaire

The results of the Table 6 reveals that overall mean score of perception of the respondents in all the value added dimensions for Airtel has been found more (3.51) which is more as compared to BSNL (3.32). The subscribers of both the service providers are highly satisfied with adequate variety of value added services, as the mean score of Airtel subscribers is 3.78 in comparison to 3.64 for BSNL whereas lowest mean score has been found among the subscribers of both service providers on account of deactivation of services without unnecessary trouble and charges. A significant difference at 1 percent level of significance has been observed on service quality of Airtel on adequate variety of VAS, no hidden charges for VAS and easy connectivity to customer care centres. As far as statements relating to VAS started after customers' consent and VAS deactivated without unnecessary trouble & charges no significant gap between the perception of respondents has been observed.

#### PRICING

Price is one of the most important factor for customers while selecting a particular mobile plan. Price is the amount which customer pay against the utilization of product or service. Views of the customers of select service provider were solicited as shown in table 7.

**TABLE 7: STATISTICAL DESCRIPTION OF PRICING DIMENSIONS**

Statements	Airtel	BSNL	t-value	p-value
Reasonable call charges	3.1200	3.4433	-3.878	.000
Convenient recharge in various denominations	4.1400	4.0900	-.807	.420
Accurate information of tariff plans and schemes	3.6500	3.5467	1.971	.049
Accurate balance deduction/ billing	3.7800	3.6400	2.485	.013
Overall	3.672	3.68	-.180	.857

Source: Data collected through questionnaire

The perception of sample subscribers of the selected service provider with regard to pricing dimensions has been presented in the table 7 reveals that the overall mean score of Airtel subscribers is more (3.67) in comparison to BSNL (3.68). The mean score of responses among the respondents with regard to convenient recharge in various denominations has been found more in Airtel (4.14) in comparison to BSNL (4.09) whereas the lowest mean score has been found pertaining to the statement relating to reasonable call charges. Further, a significant difference in the perception of respondents on account of reasonable call charges, accuracy of information about plans, schemes and accurate balance deduction has been observed. However, overall the perception of the subscribers of both the service providers on pricing dimensions is almost same.

#### NETWORK QUALITY

Network quality which has become a key dimension in service quality as data using customers select the services of particular service provider on the basis of network coverage and speed also include voice quality, call drop rate, network coverage, and network congestion. Perception of the subscribers of the service providers on service quality on the basis of network quality is depicted in table 8.

**TABLE 8: STATISTICAL DESCRIPTION OF NETWORK QUALITY DIMENSIONS**

Statements	Airtel	BSNL	t-value	p-value
Wide network coverage	3.9867	3.6100	4.687	.000
Rarely face call dropping problem	3.3200	3.2367	1.121	.263
Strong roaming network coverage	3.4167	3.4733	-.883	.378
Call connected at first attempt	3.3133	3.1600	1.797	.073
Good call clarity	3.9367	3.8767	.963	.336
Instant delivery of messages	3.9100	3.8533	.885	.377
Overall	3.647	3.535	2.463	.014

Source: Data collected through questionnaire

Table 8 reveals the perception of customers on the basis of network quality dimensions, overall the mean score of perception of subscribers regarding network quality dimensions in Airtel is found 3.64 in comparison to 3.53 in BSNL. Amongst various network quality dimensions, the highest mean score with regard to wide network coverage has been found in Airtel (3.98) whereas, highest mean score in BSNL (3.87) has been found for good call clarity. The lowest mean score has been found in both service providers i.e Airtel (3.31) and BSNL (3.16) with regard to connectivity of call at first attempt. Further, a significant difference in the perception of subscribers of both service providers has been observed at 1 percent level of significance for wide network coverage. However, no significant difference in the perception of Airtel and BSNL subscribers has been observed on the statements relating to strong roaming network coverage, rare call dropping, calls connected at first attempt, good call clarity and instant delivery of messages. Overall there is significant difference in the perception of both Airtel and BSNL subscribers at 5 percent level of significance as far as service quality on network quality dimensions are concerned.

#### CONCLUSION

It can be summed up that, though the sample respondents are satisfied with the service quality of both Airtel and BSNL. However, subscribers of Airtel are found more satisfied in comparison to BSNL subscribers. The findings suggest that BSNL company should spend more on modern equipment and technology, proper communication system, appealing physical facilities and easy assessability of retail outlets. The telecom company should employ certain employees specifically to listen and redress the customer problems, ensure error free records, constantly communicate with customers regarding services, policies and other information and should focus on network system. The company need to be more effective and efficient in order to do services on time, as promised and right on the first time. It is suggested that the employees should be especially in BSNL imparted proper training, knowledge and be asked for feedback due to changed competitive environment. The employees should be trained in such a way that their behaviour towards customers is courteous and polite and handle the complaints and criticism in a positive way. The company should more focus on variety and full information of charges of VAS and easily connectivity to customer care centres. However, call rates of BSNL are found cheaper as compared to Airtel but Airtel provides accurate information about tariff plans & schemes and accurate deduction of balance in comparison to BSNL. Further, Airtel customers are more satisfied with network quality with regard to wide network coverage under the dimensions of network quality. The company should work more on the network quality problems. Overall, the result shows that the service quality regarding reliability dimensions of BSNL is low, as the subscribers are not satisfied with the availability of the desired service. It is observed from the study that there is a significant positive association between service quality and customer satisfaction and is evident that all service qualities dimensions highly contribute in increasing customer satisfaction.

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## MEASURING GENDER AND INCOME IMPACT ON PERCEPTION OF ORGANIC FOOD: AN EMPIRICAL STUDY ON GERMAN YOUTH

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### ABSTRACT

*In order to know how organic food is perceived by young generation of Germany, study was conducted upon 100 GYOC<sup>1</sup> with average age of 26.81 years. Male and females are in equal numbers. 65% of respondents are student, 87% of them are single and 98% is having university level of education. This study reveals that almost 60% of GYOC purchase organic products at least once in a week. Statistical techniques naming Descriptive statistics and ANOVA are used to analyze data and test significance. Findings show that organic foods are perceived mostly as eco-friendly, healthy and expensive. Both males and females have same perception of organic food with the exception of taste, nutritious value and credibility. Organic food is perceived less nutritious, tasty and credible to male than female. GYOC with higher income perceive organic food as healthier, safer and less expensive than that of lower income group.*

### KEYWORDS

organic food, german young organic consumers, healthy, eco-friendliness.

### JEL CODES

P46, M31.

### INTRODUCTION

Because of high education and standard of living, developed country like Germany is showing more interest on organic products. People are more concerned not only for their personal health but also for generation next and environment. They expect to have foods with higher nutritious value, no additives & preservatives that come from organic farming. Germany is the second largest organic food market in the world after USA. Sales of organic foods have increased in recent years, peaking in 2012 at over €7 billion. That's nearly a third of the total organic food sales in the European Union and about 4% of the total food sales in Germany (GAIN Report, 2014). Germany is the country of more than 82.5 million people. Even though median age of German population is 45.9 years (Worldometers, 2014), young generation (20 to 39 years old) consists of 23.6% of the population (Population Pyramid, 2015). Future market of any industry in Germany depends on this group of population. In this study, author wants to analyze the perception of this group of people towards organic food. Studies conducted on organic food earlier have shown the direction of this study and help to find the necessary variables to be analyzed. For example, previous studies (Eco Mercados, 2005; Cene and Karaman, 2015; Fotopoulos and Krystallis, 2002) show education, income, age, gender, children affect organic food purchase decisions. Moreover, plenty of studies (Mohsen and Decko, 2013; Wilson, Evans, Leppard, & Syrette, 2004; Cabuk et al., 2014; Rehbar and Turhan, 2002) show health, environment, nutritious value, taste, animal welfare, food safety and knowledge play very important roles for making purchase decision of organic product.

### LITERATURE REVIEW

All customers associate organic products with health at different level of abstraction and want good tasty and nourishing products, because pleasure and wellbeing are their most important values (Zanoli and Naspetti, 2002). Concern for ecology drives consumer to buy organic. In Germany, ecological reason is the 2<sup>nd</sup> best motivating factor after health (Alvensleben, 1997). Environmental friendly production method attracts younger people towards organic food (Wier and Calverly, 2002). Likewise, high product quality also drives people to consume organic food. For Croatians, high quality is the second best factors after health for buying organic food (Radman, 2005). Most consumers perceive organic food as higher quality products, based upon which they show an acceptance of a price premium for organic food. Consumers rely on organic agriculture as a possible strategy to cope with food safety problems (Bruschi et al., 2015). Michaelidou and Hassan, 2008 say food safety is the most important predictor of attitude while health consciousness appears to be the least important motive. Nutrition (Mukul et al.,

<sup>1</sup> German Young Organic Consumer

2013), animal welfare (Mutlu, 2007) and supporting small organic farmers (Zanoli, 2004) are also significant in taking decision of buying organic. Animal welfare is one of the important factors for organic consumers when they buy dairy products. In most of the western European countries, animal welfare is considered to be the second most important concern after health (Mutlu, 2007). Buying from the region is closely related with supporting small organic farmers and standing against international big food producers (Zanoli, 2004). Finally, consumers consider availability of locally grown products, reliable information and easy comparison with non-organic products too when they take the decision to buy organic food. (Gottschalk and Leistner, 2013).

For special way of production and quality, organic food is more expensive than conventional food. So, for people with low income, organic food is not the matter of interest (Hill and Lynchehaun, 2002). The appearance of organic foods is not as attractive as conventional foods. People do not get interest in having products specially foods that have bad appearance. Poor appearance and look compared to conventional food can be one of the reasons for not buying organic food (Mutlu, 2007). Despite controversies and debates about relative characteristics and real value of organic food, both individual consumers and consumer groups are prompted to pursue and react to market opportunities for safer food with high levels of enthusiasm (Wilson, Evans, Leppard, & Syrette, 2004).

The attitude and the intention to buy are affected by health consciousness, environmental concern and food safety concern. The attitude plays a fundamental role both in terms of the direct impact on the intention to buy and the indirect effect as a mediator on how the health consciousness, environmental concern and food safety concern affect the intention to buy (Cabuk et al., 2014). The previous studies as factors such as health, environmental factors, food availability, product price, consumers' income and trust to organization are found to influence consumers effectively (Cene and Karaman, 2015). Egoistic (e.g. personal health) and altruistic (e.g. environmental) considerations simultaneously play an important role on consumer attitude and intention. Societal considerations are more important while people take decision on organic or green products (Kareklas, 2014). Consumer awareness, health and environment sensitive actions are some highlights in developed countries that create market demand (Rehbar and Turhan, 2002). Young families and older consumers, who are concentrated in urban area, are highly educated and fall in high income bracket; are the organic food consumers. Health and safety issues are keys to them. On the other hand, high switching cost to organic food is one of the main reasons for not consuming organic food (Eco Mercados, 2005).

Prior product knowledge is proposed in consumer research as one of the cognitive traits existing at the background of consumer perceptions, influencing valuation of a product's perceived benefits, costs, and value (Lai, 1995). In organic food research, perceived prior knowledge exemplifies an important factor in the acceptance of organic food and may, therefore, determine the specific benefits consumers perceive and look for in it (Hill & Lynchehaun, 2002; Zanoli & Naspetti, 2002). Consumers with higher level of involvement, more perceived prior knowledge of organic food, and a higher level of usage are likely to be prominently motivated and driven by pursuit of its future-based benefits in its purchase and consumption (Mohsen and Decko, 2013).

Organic food can be marketed globally based on a universal set of key value propositions. The same could be true for other global products sharing similar types of certifiable value propositions (Thogersen et al., 2015). A cross-cultural study by Mutlu, 2007, shows that health and supporting organic movement are similarly standing on the top three places in motivation list for Turkey and Germany, on the other hand, high price and lack of availability reported as ruling barriers but with different degree of importance.

According to the report of MARKETLINE, 2015, German organic food market grew by 4.8% in 2014 to reach a value of \$10,500.9 million. The market forecast indicates that in 2019, this market will have a value of \$14,429 million, an increase of 37.4% since 2014. Fruit & vegetables is the largest segment of the organic food market in Germany, accounting for 28.8% of the market's total value. Germany accounts for 30.2% of the European organic food market value. Rivalry in the organic foods market is heightened by the lack of product differentiation, and negligible switching costs for buyers. Strong market growth serves to counteract this somewhat.

## OBJECTIVES

1. Analyze the impact of gender on perception of young organic consumer of Germany towards organic food.
2. Analyze the impact of income on perception of young organic consumer of Germany towards organic food.

## HYPOTHESES DEVELOPMENT

There are twenty-four hypotheses to be tested in this study. They are as follows:

- H1:** There is a difference in perception by gender toward healthiness of organic food.  
**H2:** There is a difference in perception by gender toward eco-friendliness of organic food.  
**H3:** There is a difference in perception by gender toward taste of organic food.  
**H4:** There is a difference in perception by gender toward nutritious value of organic food.  
**H5:** There is a difference in perception by gender toward organic food regarding free of pesticides.  
**H6:** There is a difference in perception by gender toward organic food regarding free of chemical.  
**H7:** There is a difference in perception by gender toward organic food regarding free of preservatives.  
**H8:** There is a difference in perception by gender toward organic food regarding free of GMO.  
**H9:** There is a difference in perception by gender toward organic food regarding certification and credibility.  
**H10:** There is a difference in perception by gender toward organic food regarding animal welfare.  
**H11:** There is a difference in perception by gender toward food safety of organic food.  
**H12:** There is a difference in perception by gender toward organic food regarding expensiveness.  
**H13:** There is a difference in perception by different income group toward healthiness of organic food.  
**H14:** There is a difference in perception by different income group toward eco-friendliness of organic food.  
**H15:** There is a difference in perception by different income group toward taste of organic food.  
**H16:** There is a difference in perception by different income group toward nutritious value of organic food.  
**H17:** There is a difference in perception by different income group toward organic food regarding free of pesticides.  
**H18:** There is a difference in perception by different income group toward organic food regarding free of chemical.  
**H19:** There is a difference in perception by different income group toward organic food regarding free of preservatives.  
**H20:** There is a difference in perception by different income group toward organic food regarding free of GMO.  
**H21:** There is a difference in perception by different income group toward organic food regarding certification and credibility.  
**H22:** There is a difference in perception by different income group toward organic food regarding animal welfare.  
**H23:** There is a difference in perception by different income group toward food safety of organic food.  
**H24:** There is a difference in perception by different income group toward organic food regarding expensiveness.

## RESEARCH DESIGN AND METHODOLOGY

Author needs to know perception of German young generation towards organic food and impact of gender and income on perception. So, this study is basically a descriptive kind of study that is a part of conclusive research whose major objective is the description of something, usually market characteristics or functions (Malhotra and Birks, 2006) and also causal research as it is needed to show some relationships among different variables. A causal research is a type of conclusive research where the major objective is to obtain evidence regarding cause-and-effect (causal) relationships (Malhotra and Birks, 2006). Both secondary and primary data are necessary for research purpose. To understand German organic market and find important factors regarding perception on organic food, it is needed to explore different previous studies and reports. On the other hand, to analyze the perception of young generation of Germany regarding organic food, first hand data were needed from them. A 5-point Likert scale is used with assigning value from 1 for extreme disagreement to 5 for extreme agreement. Judgmental sampling technique is used for serving the research purpose. Judgmental sampling belonging to non-probability is the form of convenience sampling in which the population elements are purposely selected based on the judgment of the researcher (Malhotra and Birks, 2006). Total sample size is 100 whose age is between

20 years old and 39 years old. Sample must consume organic products and must be having German nationality. Basically, statistical analysis like Descriptive statistics and ANOVA (analysis of variance) are used for study purpose. ANOVA is used to show the impact of gender and income on perception on organic food where the natures of independent variables (gender, income) are categorical and natures of dependent variables (healthy, eco-friendly, expensive etc.) are metric. Results are generated with the help of SPSS software.

## FINDINGS

**Reliability analysis of scale:** Cronbach's  $\alpha$  is calculated to test the reliability of the Likert scale. The internal reliability of the scale items is satisfactory as value of  $\alpha$  is 0.7508 in our case. The reliability exceeds 0.70 is typically considered as acceptable (Nunnally, 1983).

**Demographic profile of samples:** The demographic distributions of GYOC shows that age group of 24 to 25 are dominating with 41% of young organic consumers. Minimum age of respondents is 23 years and maximum is 35 years. Average age of the samples of this study is 26.81. Gender is distributed equally (50% is male and 50% is female). 65% respondents are students, 27 are having full time job and only 8 are having part time employment. There are five different levels of income have been chosen for the study. 34% lies in the group who has income of less than €1000 per month and 39% belongs to the group that has income of €1000 to less than €2000 per month. Similarly, 22 % of respondents earn €2000 to less than €3000 per month. Likewise, 2% and 3% of samples have income of €3000 to less than €4000 and €4000 and above per month respectively. Regarding the marital status, 87% are single, 6% are married with no child, 6% are married with children and only 1% is single parent with no child. 56% of the GYOC purchases organic products at least once in a week and 29% purchases 2 to 4 times in a week. On the other hand, 12% and 3% of samples purchases once in a month and less than once in a month respectively.

**Perception towards organic food:** Mean score of any particular variable higher than 3 indicates a positive association between organic food and that particular variable whereas, mean score less than 3 shows a negative association, as point 3 is the neutral point above which is agreement and below is disagreement. Considering this fact, we can articulate that according to GYOC, organic food is strongly associated with eco-friendliness, healthiness and expensiveness. They also believe that organic food is free from pesticides, chemical, preservatives and GMO (genetically modified organisms). They moderately agree that it is safe and it cares animal welfare and it is credible. But they have doubt on its taste and nutritious value to some extent (Table 1).

**Impact of gender on perception:** To know the impact of gender on perception of organic food and compare the means of male and female, one-way ANOVA is conducted as nature of independent variable (sex) is categorical and nature of dependent variables (healthy, eco-friendly, tasty etc.) are metric. Results (Table 3) show that there is no significant difference on perception between male and female except the case of taste, nutritious value and certified or credibility. Only these three variables have calculated F value greater than the critical value which is significant at 5%. The critical value of F is somewhere between 3.92 and 4.00 at 1 and 98 degrees of freedom. But calculated values of F of all these three variables (7.467, 8.973 and 5.271) are higher than the critical value. Moreover, we can see a big difference of sample means of these variables in Table 2: for example, sample means with values of 2.84 (male) and 3.32 (female) for variable "tasty" are quite different. Interestingly, females have higher mean score than males in these three variables: taste, nutritious value and certified or credibility. So, we can conclude that we could reject the null hypothesis relating to these three variables. Organic food is perceived more nutritious, tasty and credible to female than male. To summarize,

TABLE A

Hypothesis	Test
H3. There is a difference in perception by gender toward taste of organic food.	Accepted
H4. There is a difference in perception by gender toward nutritious value of organic food.	Accepted
H9. There is a difference in perception by gender toward organic food regarding certification and credibility.	Accepted

**Impact of income on perception:** For the same reason explained in the previous section, ANOVA technique is used here again. The study reveals that people with different levels of income have different perception toward organic food regarding healthiness, expensiveness and safety. Other perceptions are same irrespective to income. The critical value of F is somewhere between 2.45 and 2.53 at 4 and 95 degrees of freedom. F values for healthiness, food safety and expensiveness are 4.280, 2.833 and 12.655 which are higher than the critical value (Table 5). So, all of the null hypothesis associated with these three variables will be rejected. Moreover, we can see the big mean differences of various levels of income associated with these three variables (Table 4). For the other cases, differences are negligible. In a nutshell, after analyzing mean scores of each level associated with these three variables: healthiness, expensiveness and food safety, we can conclude that GYOC with higher income perceive organic food as healthier than that of lower income group. Organic food as safe food is perceived mostly by the highest income level group. Mean score for food safety is lower for group with lower level of income. People with higher income do not think organic food is expensive. On the other hand, the lowest income group strongly agree with the statement - "Organic food is expensive". To summarize,

TABLE B

Hypothesis	Test
H13. There is a difference in perception by different income group toward healthiness of organic food.	Accepted
H23. There is a difference in perception by different income group toward food safety of organic food.	Accepted
H24. There is a difference in perception by different income group toward organic food regarding expensiveness.	Accepted

## CONCLUSION

This study started with twenty-four hypotheses out of which six have been accepted. The impact of gender and income on the perception of GYOC is clearly identified but it fails to show the impact of other important factors like marital status, occupation, education etc. because of age constraint set for this study. For example, due to age constraint of the samples of this study, 87% of samples are single; impact of different marital status will not be valid. Result should only be valid if there were sufficient numbers of respondent with different marital status could be found. However, result shows organic foods are perceived mostly as eco-friendly, healthy and expensive by GYOC. Perception of both males and females matches with some exceptions. Their perceptions differ in term of taste, nutritious value and credibility of organic food. Organic food is perceived more nutritious, tasty and credible to female than male. Result also reveals that GYOC with different income levels have almost same perception on organic food with the exception of healthiness, safety and expensiveness of this food. GYOC with higher income perceive organic food as healthier and safer and less expensive than that of lower income group.

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## APPENDIX

TABLE 1: PERCEPTION OF GERMAN YOUNG GENERATION TOWARDS ORGANIC FOOD

	N	Minimum	Maximum	Mean	Std. Deviation
Healthy	100	3	5	4.30	.560
Eco- friendly	100	3	5	4.37	.597
Tasty	100	1	5	3.08	.907
Nutritious	100	1	5	3.53	.937
Free of pesticides	100	3	5	4.22	.561
Free of Chemical	100	3	5	4.19	.615
Free of preservatives	100	3	5	4.06	.679
Free of GMO	100	3	5	4.00	.682
Certified	100	2	5	3.72	.712
Animal Welfare	100	2	5	3.79	.686
Food Safety	100	2	5	3.94	.664
High price	100	3	5	4.23	.664

TABLE 2: DESCRIPTIVE STATISTICS ON PERCEPTION AND GENDER

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
Healthy	male	50	4.26	.565	.080	4.10	4.42	3	5
	female	50	4.34	.557	.079	4.18	4.50	3	5
	Total	100	4.30	.560	.056	4.19	4.41	3	5
Eco- friendly	male	50	4.40	.571	.081	4.24	4.56	3	5
	female	50	4.34	.626	.089	4.16	4.52	3	5
	Total	100	4.37	.597	.060	4.25	4.49	3	5
Tasty	male	50	2.84	.842	.119	2.60	3.08	1	5
	female	50	3.32	.913	.129	3.06	3.58	1	5
	Total	100	3.08	.907	.091	2.90	3.26	1	5
Nutritious	male	50	3.26	.876	.124	3.01	3.51	1	5
	female	50	3.80	.926	.131	3.54	4.06	1	5
	Total	100	3.53	.937	.094	3.34	3.72	1	5
Free of pesticides	male	50	4.26	.527	.075	4.11	4.41	3	5
	female	50	4.18	.596	.084	4.01	4.35	3	5
	Total	100	4.22	.561	.056	4.11	4.33	3	5
Free of Chemical	male	50	4.18	.661	.093	3.99	4.37	3	5
	female	50	4.20	.571	.081	4.04	4.36	3	5
	Total	100	4.19	.615	.061	4.07	4.31	3	5
Free of preservatives	male	50	4.00	.728	.103	3.79	4.21	3	5
	female	50	4.12	.627	.089	3.94	4.30	3	5
	Total	100	4.06	.679	.068	3.93	4.19	3	5
Free of GMO	male	50	3.92	.665	.094	3.73	4.11	3	5
	female	50	4.08	.695	.098	3.88	4.28	3	5
	Total	100	4.00	.682	.068	3.86	4.14	3	5
Certified	male	50	3.56	.705	.100	3.36	3.76	2	5
	female	50	3.88	.689	.097	3.68	4.08	3	5
	Total	100	3.72	.712	.071	3.58	3.86	2	5
Animal Welfare	male	50	3.82	.661	.093	3.63	4.01	2	5
	female	50	3.76	.716	.101	3.56	3.96	3	5
	Total	100	3.79	.686	.069	3.65	3.93	2	5
Food Safety	male	50	3.92	.665	.094	3.73	4.11	2	5
	female	50	3.96	.669	.095	3.77	4.15	3	5
	Total	100	3.94	.664	.066	3.81	4.07	2	5
High price	male	50	4.28	.671	.095	4.09	4.47	3	5
	female	50	4.18	.661	.093	3.99	4.37	3	5
	Total	100	4.23	.664	.066	4.10	4.36	3	5

TABLE 3: ANOVA TABLE ON PERCEPTION AND GENDER

		Sum of Squares	df	Mean Square	F	Sig.
Healthy	Between Groups	.160	1	.160	.508	.478
	Within Groups	30.840	98	.315		
	Total	31.000	99			
Eco- friendly	Between Groups	.090	1	.090	.250	.618
	Within Groups	35.220	98	.359		
	Total	35.310	99			
Tasty	Between Groups	5.760	1	5.760	7.467	.007
	Within Groups	75.600	98	.771		
	Total	81.360	99			
Nutritious	Between Groups	7.290	1	7.290	8.973	.003
	Within Groups	79.620	98	.812		
	Total	86.910	99			
Free of pesticides	Between Groups	.160	1	.160	.506	.479
	Within Groups	31.000	98	.316		
	Total	31.160	99			
Free of Chemical	Between Groups	.010	1	.010	.026	.872
	Within Groups	37.380	98	.381		
	Total	37.390	99			
Free of Preservatives	Between Groups	.360	1	.360	.779	.380
	Within Groups	45.280	98	.462		
	Total	45.640	99			
Free of GMO	Between Groups	.640	1	.640	1.383	.242
	Within Groups	45.360	98	.463		
	Total	46.000	99			
Certified	Between Groups	2.560	1	2.560	5.271	.024
	Within Groups	47.600	98	.486		
	Total	50.160	99			
Animal Welfare	Between Groups	.090	1	.090	.190	.664
	Within Groups	46.500	98	.474		
	Total	46.590	99			
Food Safety	Between Groups	.040	1	.040	.090	.765
	Within Groups	43.600	98	.445		
	Total	43.640	99			
High price	Between Groups	.250	1	.250	.564	.455
	Within Groups	43.460	98	.443		
	Total	43.710	99			

TABLE 4: DESCRIPTIVE STATISTICS ON PERCEPTION AND INCOME

		N	Mean	Std. Dev.	Std. Error
Healthy	less than 1000	34	3.94	.649	.111
	1000- less than 2000	39	4.28	.510	.082
	2000- less than 3000	22	4.55	.596	.127
	3000- less than 4000	2	4.50	.707	.500
	4000 and above	3	4.67	.577	.333
	Total	100	4.24	.622	.062
Eco- friendly	less than 1000	34	4.53	.563	.097
	1000- less than 2000	39	4.21	.615	.098
	2000- less than 3000	22	4.41	.503	.107
	3000- less than 4000	2	4.50	.707	.500
	4000 and above	3	4.33	1.155	.667
	Total	100	4.37	.597	.060
Tasty	less than 1000	34	3.15	.892	.153
	1000- less than 2000	39	3.15	.875	.140
	2000- less than 3000	22	2.82	1.006	.215
	3000- less than 4000	2	2.50	.707	.500
	4000 and above	3	3.67	.577	.333
	Total	100	3.08	.907	.091
Nutritious	less than 1000	34	3.41	.925	.159
	1000- less than 2000	39	3.56	.821	.131
	2000- less than 3000	22	3.59	1.141	.243
	3000- less than 4000	2	3.00	.000	.000
	4000 and above	3	4.33	1.155	.667
	Total	100	3.53	.937	.094
Free of pesticides	less than 1000	34	4.32	.589	.101
	1000- less than 2000	39	4.08	.580	.093
	2000- less than 3000	22	4.36	.492	.105
	3000- less than 4000	2	4.00	.000	.000
	4000 and above	3	4.00	.000	.000
	Total	100	4.22	.561	.056
Free of Chemical	less than 1000	34	4.24	.654	.112
	1000- less than 2000	39	4.13	.615	.098
	2000- less than 3000	22	4.27	.631	.135
	3000- less than 4000	2	4.00	.000	.000
	4000 and above	3	4.00	.000	.000
	Total	100	4.19	.615	.061
Free of preservative	less than 1000	34	4.09	.712	.122
	1000- less than 2000	39	4.05	.647	.104
	2000- less than 3000	22	4.05	.785	.167
	3000- less than 4000	2	4.00	.000	.000
	4000 and above	3	4.00	.000	.000
	Total	100	4.06	.679	.068
Free of GMO	less than 1000	34	4.00	.739	.127
	1000- less than 2000	39	4.08	.623	.100
	2000- less than 3000	22	3.86	.774	.165
	3000- less than 4000	2	4.00	.000	.000
	4000 and above	3	4.00	.000	.000
	Total	100	4.00	.682	.068
Certified	less than 1000	34	3.68	.684	.117
	1000- less than 2000	39	3.82	.721	.115
	2000- less than 3000	22	3.59	.796	.170
	3000- less than 4000	2	3.50	.707	.500
	4000 and above	3	4.00	.000	.000
	Total	100	3.72	.712	.071
Animal Welfare	less than 1000	34	3.76	.741	.127
	1000- less than 2000	39	3.69	.694	.111
	2000- less than 3000	22	3.95	.653	.139
	3000- less than 4000	2	4.00	.000	.000
	4000 and above	3	4.00	.000	.000
	Total	100	3.79	.686	.069
Food Safety	less than 1000	34	3.91	.712	.122
	1000- less than 2000	39	3.79	.695	.111
	2000- less than 3000	22	4.27	.456	.097
	3000- less than 4000	2	4.00	.000	.000
	4000 and above	3	4.67	.577	.333
	Total	100	3.97	.674	.067
High price	less than 1000	34	4.44	.561	.096
	1000- less than 2000	39	4.13	.570	.091
	2000- less than 3000	22	4.09	.811	.173
	3000- less than 4000	2	3.00	.000	.000
	4000 and above	3	2.00	.000	.000
	Total	100	4.14	.752	.075

TABLE 5: ANOVA TABLE ON PERCEPTION AND INCOME

		Sum of Squares	df	Mean Square	F	Sig.
Healthy	Between Groups	5.839	4	1.460	4.280	.003
	Within Groups	32.401	95	.341		
	Total	38.240	99			
Eco- friendly	Between Groups	1.996	4	.499	1.423	.232
	Within Groups	33.314	95	.351		
	Total	35.310	99			
Tasty	Between Groups	3.579	4	.895	1.093	.365
	Within Groups	77.781	95	.819		
	Total	81.360	99			
Nutritious	Between Groups	3.100	4	.775	.879	.480
	Within Groups	83.810	95	.882		
	Total	86.910	99			
Free of pesticides	Between Groups	1.859	4	.465	1.507	.206
	Within Groups	29.301	95	.308		
	Total	31.160	99			
Free of Chemical	Between Groups	.550	4	.137	.354	.840
	Within Groups	36.840	95	.388		
	Total	37.390	99			
Free of preservatives	Between Groups	.053	4	.013	.027	.999
	Within Groups	45.587	95	.480		
	Total	45.640	99			
Free of GMO	Between Groups	.640	4	.160	.335	.854
	Within Groups	45.360	95	.477		
	Total	46.000	99			
Certified	Between Groups	1.157	4	.289	.561	.692
	Within Groups	49.003	95	.516		
	Total	50.160	99			
Animal Welfare	Between Groups	1.210	4	.303	.633	.640
	Within Groups	45.380	95	.478		
	Total	46.590	99			
Food Safety	Between Groups	4.785	4	1.196	2.833	.029
	Within Groups	40.125	95	.422		
	Total	44.910	99			
High price	Between Groups	19.480	4	4.870	12.655	.000
	Within Groups	36.560	95	.385		
	Total	56.040	99			

## APPLICATION OF GOAL PROGRAMMING TO COMPARE PERFORMANCE IN GOVERNMENT AND PRIVATE SECTOR: A CASE STUDY FOR SPECIAL ECONOMIC ZONES

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### ABSTRACT

*Special Economic Zones (SEZs) in our country have been mooted to act as engine of economic growth. Initially, these SEZs were operating only in government sector, but after initiation of open economy, doors were opened for private sector players too. It is generally believed that government sectors fail to compete with private sector. So as a test case a study was taken up for units operating in Vishakhapatnam SEZ. The units were divided between government and private sector and data on relevant parameters like, employment generated, export figures, investment attracted etc were collected. This was followed by application of Zero-One Goal Programming technique for evaluating the performance of operational Special Economic Zones (SEZs) in Government and Private sectors in order to determine the better performing sector.*

### KEYWORDS

excel solver, goal programming, special economic zones.

### JEL CODE

C61

### INTRODUCTION

In the present day circumstances, Operations Research techniques have greater role to play because of competitive coal market demands, a low operating cost, a high productivity performance and multi-criteria decision making with conflicting objectives. Numerous unseen variables are being observed during mining activities in both Underground and Opencast methods. Sometimes it becomes cumbersome and irritating to find which goal has to be given priority in our mining management and thus it calls for application of various optimization techniques and computers. These problems have slowly attracted the attention of many academicians and practitioners in India too. Over the years a few publications on optimization techniques and computers use have come out for the use of operations research practitioners.

### REVIEW OF LITERATURE

The effectiveness of Operations Research methods as an industrial tool for decision analysis has been documented by Gaither (1959) and Douglas (1981). Goal Programming is one of the most widely used techniques for solving many real world managerial Multi Criteria Decision Making problems, particularly in case where the criteria are defined as linear analytic functions of decision variables belonging to a compact feasible set. The technique can be utilized as a powerful tool for solving many complex managerial decision problems. Charnes and Cooper (1961) and Ignizio (1956) have described Goal Programming as a workhorse which is strong and rugged and easy to use rather than as a thorough bred one requiring devoted attention by skilled attendant and used only by specially trained riders. In simple algebraic equations, the system of equations has equalities only on the basis of which variables are evaluated. However, in Linear Programming examples, there will be a set of compound inequalities, meaning inequalities will have both **maximum** and **minimum** values. Linear Programming models are solved to find *optimum* values of variables to simultaneously satisfy minimum and maximum inequalities involved in the equations. In the next step, the variables can be restricted to acquire Integer values only, and further, conditions can be imposed to restrict these integer values to take a value of either 0 or 1 only. In real world situation, the mathematical modeling very often produces a set of equations where the Linear Programming models fail to yield an optimum solution. In that case Linear Goal Programming technique is used by which the inequalities are turned into equalities by adding either a *negative* or *positive* quantity called *deviational variables*. Then the technique proceeds to minimize these *deviational variables*, thereby, yielding an optimum solution. The principle of Goal Programming is to minimize the deviation in attainment of an aspired Goal value. The goal of minimization or maximization of objective(s), in constraining goal situation(s), is obtained by minimizing the over- or under- achievement of all these goals, taken together, in decreasing priority order.

### NEED/IMPORTANCE OF THE STUDY

In India, both Public Sectors (Government owned) and Private sectors are performing in different field of economic activities. Special Economic Zones (SEZs) have been mooted to operate in different zones of this country. The Special Economic Zone (SEZ) policy in India first came into inception on April 1, 2000. The prime objective was to enhance foreign investment and provide an internationally competitive and hassle free environment for exports. The idea was to promote exports from the country and realising the need that level playing field must be made available to the domestic enterprises and manufacturers to be competitive globally. At present there are eight functional SEZs located at Santa Cruz (Maharashtra), Cochin (Kerala), Kandla and Surat (Gujarat), Chennai (Tamil Nadu), Visakhapatnam (Andhra Pradesh), Falta (West Bengal) and Noida (Uttar Pradesh) in India. Further an SEZ in Indore (Madhya Pradesh) is now ready for operation. In addition, 18 approvals have been given for setting up of SEZs at Positra (Gujarat), Navi Mumbai and Kopata (Maharashtra), Nanguneri (Tamil Nadu), Kulpi and Salt Lake (West Bengal), Paradeep and Gopalpur (Orissa), Bhadohi, Kanpur, Moradabad and Greater Noida (UP), Vishakhapatnam and Kakinada (Andhra Pradesh), Vallarpadam/Puthuvypeen (Kerala), Hassan (Karnataka), Jaipur and Jodhpur (Rajasthan) on the basis of proposals received from the state governments. Any private/public/joint sector or state government or its agencies can set up an SEZ. There has always been an ongoing debate as to which, whether government should promote private sector or should open up its door more towards establishing public sector undertakings (PSUs). Given the fact that so many PSUs are ailing causing a drain of nation's exchequer, this debate has its own merit. Further it was thought that ailing of PSUs can't be generalized and a particular sector be chosen for analysis. Accordingly, SEZs operating in Vizag were chosen and divided among themselves in Public and Private sectors. Vizag zone was chosen because it offered plenty of SEZ units which are operational in both these sectors.

**DATA COLLECTION**

Over a time period of 7 years, data collected for Private and Public sector SEZs in Vizag Zone is as produced below:

**TABLE 1 (a): VIZAG SEZ PUBLIC SECTOR DATA**

YEAR	EXPORTS (RS.'CRORES)	INVESTMENT (RS.'CRORES)	EMPLOYMENT (NO.)	IMPORT (RS.'CRORES)	FDI (RS.'CRORES)	INDIRECT EMPLOYMENT (NO.)
2009-10	917.85	862.67	3057	782.84	116.48	
2010-11	1582.76	883.97	4150	1431.6	116.48	
2011-12	2404.15	903.97	4647	2101.73	116.48	
2012-13	3123.26	1239.96	4647	2292.4	116.48	
2013-14	2155.41	1239.96	4647	2034.3	116.48	
2014-15	1707.998	1239.96	4647	1766.34	116.48	
2015-16	717.57	1239.96	4647	1679.03	116.48	
<b>SUM TOTAL</b>	12609.00	7610.45		12088.24	815.36	0.00

**TABLE 1 (b): VIZAG SEZ PRIVATE SECTOR DATA**

YEAR	EXPORTS (RS.'CRORES)	INVESTMENT (RS.'CRORES)	EMPLOYMENT (NO.)	IMPORT (RS.'CRORES)	FDI (RS.'CRORES)	INDIRECT EMPLOYMENT (NO.)
2009-10	4636.21	10442.22	47142	1803.077	1708.38	20716
2010-11	11752.94	14413.41	78591	5338.944	2203.48	31434
2011-12	16668.78	16962.68	112585	4233.221	2263.04	32461
2012-13	23024.15	23518.11	138151	5087.642	3197.05	45768
2013-14	29647.4	30252.79	152743	5303.614	3527.921	47239
2014-15	43290.78	32230.97	197587	11489.45	3882.236	48583
2015-16	39847.68	42358.87	231964	13355.34	4857.809	51198
<b>SUM TOTAL</b>	168867.94	170179.05	Data not available	46611.29	21639.92	277399.00

Source 1: Government of India, Ministry of Commerce, Export Promotion Council for EOUs and SEZs, [http://www.epces.in/view\\_section.php?lang=0&id=0,1,20](http://www.epces.in/view_section.php?lang=0&id=0,1,20) accessed on 22nd June, 2016.

Source 2: Development Commissioner Office of VSEZ

**OBJECTIVES**

It is required to select the Sector (viz. Public or Private), which has exhibited maximum cumulative export at a minimum cumulative investment, having generated maximum employment in the terminal year (7-th year) simultaneously requiring minimum import requirement while attracting maximum foreign direct investment (FDI) along with generation of maximum of indirect employment.

**RESEARCH METHODOLOGY****REWRITING THE OBJECTIVES AS GOALS**

A careful examination of the two tables above (Table-1a and Table-1b) the objectives can be broken in the following way.

- (i) The main objective is selection of a sector between 2 types of SEZ sectors operating in Vizag Zone, is proposed to be undertaken. This selection of a sector is called Goal-1.  
The secondary associated objectives are as described subsequently.
- (ii) To achieve maximum cumulative Export value over the last 7-year span (Rs. in crores) This export goal is called Goal-2.
- (iii) To have incurred minimum Investment expenditure over the last 7-year span (Rs. in crores) This investment goal is called Goal-3.
- (iv) To have generated maximum employment in the last 7-th year (no.). This employment goal is called Goal-4.
- (v) To have minimum of cumulative import requirement over the last 7-year span (Rs in crores). This import is called Goal-5.
- (vi) To have attracted maximum cumulative foreign direct investment (FDI) over the last 7-year span (Rs in crores) This FDI goal is called Goal-6.
- (vii) To have generated maximum indirect employment in last 7-th year (no.). This indirect employment is called Goal-7.

**PROBLEM DATA PREPARATION IN TABULAR FORM****TABLE 2: SUMMARISED DATA**

COLLECTED DATA	PUBLIC SECTOR (X1)	PVT. SECTOR (X2)
Available SEZ sectors	1	1
Export Sum Total of last 7 years, Rs Crore	12609.00	168867.94
Investment Sum Total of last 7 years, Rs Crore	7610.45	170179.05
Employment in 7th year, No.	4647	231964
Import Sum Total of last 7 years, Rs Crore	12088.24	46611.29
FDI Sum Total of last 7 years, Rs Crore	815.36	21639.92
Indirect Employment in 7th year, No.	0 (Data not available)	51198

**GOAL FIXATION****TABLE 3: SECTOR SELECTION CRITERIA AND GOAL FIXATION**

Goal	Parameter	Govt. Sector (X1)	Private Sector (X2)	Selection Criteria (How to select between X1 and X2)	Goal Value as per Selection Criteria
Goal-1	SEZ sectors are mutually exclusive ie. Both sectors can't be selected at a time (No.)	1	1	Select any 1 (either X1 or X2)	1
Goal-2	Export Sum Total of last 7 years, (Rs Crore)	12609.00	168867.94	Maximum of X1, X2	168867.94
Goal-3	Investment Sum Total of last 7 years, (Rs Crore)	7610.45	170179.05	Minimum of X1, X2	7610.45
Goal-4	Employment in 7th year, (No.)	4647	231964	Minimum of X1, X2	231964
Goal-5	Import Sum Total of last 7 years, (Rs Crore)	12088.24	46611.29	Minimum of X1, X2	12088.24
Goal-6	FDI Sum Total of last 7 years, (Rs Crore)	815.36	21639.92	Maximum of X1, X2	21639.92
Goal-7	Indirect Employment in 7th year (No.)	0	51198	Maximum of X1, X2	51198

**GOAL PROGRAMMING FORMULATION OF THE PROBLEM**

Let there be  $i$  no. of goals (objectives) and  $j$  no. of sectors.

Then,

$i=1,2,3,\dots,7$  denote the 7 no. of goals (objectives) and,

$j=1,2$  denotes 2 no. of sectors viz. Public sector, X1 and Private sector X2.

The decision variable is  $X_j$  which is associated with the selection or non-selection of a  $j$ -th sector, i.e.,

$$X_{i,j} = \begin{cases} 0, & \text{if for an } i\text{-th objective, } j\text{-th sector is rejected.} \\ 1, & \text{if for an } i\text{-th objective, } j\text{-th sector is selected.} \end{cases}$$

It is evident that selection of a sector for any single objective is quite a simple task. However, it becomes difficult to find a selection in a multiple objective environment, and that too, in a scenario having conflicting objectives. It is quite likely that, for all the goal equations taken together, an infeasible solution will be arrived at. This infeasibility is countered by introduction of a pair of negative & positive *deviational variables* in every goal equation. That means the amount by which every individual goal may deviate either side from the targeted goal value. For a negative deviation (under-achievement) a positive quantity  $p$  is added and a positive quantity  $q$  is subtracted for positive deviation (over-achievement). Taken together, this is written as  $(n_i - p_i)$  where  $i$  stand for no. of objectives.

That means, in every goal equation a negative deviation variable will be added and a positive deviation variable will be subtracted.

That means the amount by which every individual goal will deviate from the targeted goal value. This *deviational variable* may be either positive (over-achievement,  $p$ ) or negative (under-achievement,  $n$ ), but, both negative and positive deviation can't occur simultaneously.

Mathematically, equations for various objectives (goals) can be written as.

(i) For,  $i=1$ , SEZ sectors are mutually exclusive goal,  $1(X1) + 1(X2) + (n_1 + p_1) = 1$

(ii) For,  $i=2$ , SEZ export goal,  $12609.00 (X1) + 168867.94 (X2) + (n_2 + p_2) = 1$

(iii) For,  $i=3$ , SEZ investment goal,  $7610.45 (X1) + 170179.05 (X2) + (n_3 + p_3) = 1$

(iv) For,  $i=4$ , SEZ employment goal,  $4647(X1) + 231964 (X2) + (n_4 + p_4) = 1$

(v) For,  $i=5$ , SEZ import goal,  $12088.24(X1) + 46611.29 (X2) + (n_5 + p_5) = 1$

(vi) For,  $i=6$ , SEZ FDI goal,  $815.36(X1) + 21639.92 (X2) + (n_6 + p_6) = 1$

(vii) For,  $i=7$ , SEZ indirect employment goal,  $0(X1) + 51198(X2) + (n_7 + p_7) = 1$

(viii) Finally, for  $i=8$ , an additional absolute objective is added to make X1 and X2 binary, meaning they are constrained to assume a value of either "0" or "1" only.

The generalized form of above equations, taken together, can be stated as,

$$\sum_{j=1}^j C_{i,j} X_j + (n_i - p_i) = b_i, \text{ such that } X_j \text{ is non - negative binary only for all } i.$$

where,

$C_{i,j}$  is the  $i$ -th constant associated with LHS of equation,

$n_i$  is the  $i$ -th negative deviation variables with LHS of equation,

$p_i$  is the  $i$ -th positive deviation variables with LHS of equation, and

$b_i$  is the  $i$ -th goal value associated with RHS of equation.

Optimal Solution is obtained by trying to minimize,  $\sum_{i=1}^i (n_i - p_i) = 0$  for every  $i$ .

**GOAL PROGRAMMING SOLUTION OF THE PROBLEM USING EXCEL SOLVER 2007**

First of all (i) data is entered in the Excel worksheet, (ii) next initial values and formulae are entered (iii) finally, Solver is run.

The Initial table, as shown below, is created as per explanations provided subsequently.



TABLE 4: INITIAL TABLE FOR ENTERING DATA IN MS EXCEL-2007 WORKSHEET

	A	B	C	D	E	F	G	H		
1	<b>TABLE FOR SOLVER OPERATION</b>									
2	 GOAL	J DECISION VARIABLE	J=1 (GOVT. SECTOR)	J=2 (PVT. SECTOR)	DEVIATION VARIABLE		GOAL EQUATION (CONSTRAINTS)			
3		CONSTANT	C <sub>1</sub>	C <sub>2</sub>	N <sub>i</sub> (-VE DEVN)	P <sub>i</sub> (+VE DEVN)	LHS OF EQUATION	RELATIONSHIP	RHS OF EQN	
4							C <sub>ij</sub> X <sub>j</sub>		B <sub>i</sub>	
4	I=1 (SELECT ANY 1)	AVAILABLE MUTUALLY EXCLUSIVE SEZS	1	1	0	0	SUMPRODUCT(C4:D4,\$C\$17:\$D\$17) (E4-F4)	+	=	1
5	I=2 (MAXIMUM EXPORT)	EXPORT SUM TOTAL OF LAST 7 YEARS, RS CRORE	12609.00	168867.94	0	0	SUMPRODUCT(C5:D5,\$C\$17:\$D\$17) (E5-F5)	+	=	MAX(C5:D5)
6	I=3 (MINIMUM INVESTMENT)	INVESTMENT SUM TOTAL OF LAST 7 YEARS, RS CRORE	7610.45	170179.05	0	0	SUMPRODUCT(C6:D6,\$C\$17:\$D\$17) +(E6-F6)	=	=	MIN(C6:D6)
7	I=4 (MAXIMUM EMPLOYMENT)	EMPLOYMENT IN 7 <sup>TH</sup> YEAR, NO.	4647	231964	0	0	SUMPRODUCT(C7:D7,\$C\$17:\$D\$17) +(E7-F7)	=	=	MAX(C7:D7)
8	I=5 (MINIMUM IMPORT)	IMPORT SUM TOTAL OF LAST 7 YEARS, RS CRORE	12088.24	46611.29	0	0	SUMPRODUCT(C8:D8,\$C\$17:\$D\$17) +(E8-F8)	=	=	MIN(C8:D8)
9	I=6 (MAXIMUM FDI)	FDI SUM TOTAL OF LAST 7 YEARS, RS CRORE	815.36	21639.92	0	0	SUMPRODUCT(C9:D9,\$C\$17:\$D\$17) +(E9-F9)	=	=	MAX(C9:D9)
10	I=7 (MAXIMUM INDIRECT EMPLOYMENT)	INDIRECT EMPLOYMENT IN 7 <sup>TH</sup> YEAR, NO.	0	51198	0	0	SUMPRODUCT(C10:D10,\$C\$17:\$D\$17)+(E10-F10)	=	=	MAX(C10:D10)
11	I=8 (ADDITIONAL OBJECTIVE OF BINARY REQUIREMENT)	RESTRICT DECISION VARIABLES TO ASSUME 0-1 VALUES ONLY	1	1			\$C\$17, \$D\$17	=	=	BINARY
12										
13	<b>OBJECTIVE FUNCTION</b>						SUM(E4:F10)	=	=	0
14										
15										
16	<b>VALUES OF XJ</b>		X1	X2						
17			1	1						
18										
19	COLOR CODE	OBJECTIVE DESCRIPTION	OBJECTIVE FUNCTION		CHANGING CELLS		TARGET CELL			

(i) DATA ENTRY

First of all, an Excel worksheet is created and the collected data for SEZs in 2 sectors are entered from cell nos. A2:A11 to cell nos. D2:D11 as per headings shown.

(ii) ENTERING INITIALLY ASSUMED VALUES AND FORMULAE IN EXCEL WORKSHEET

The next step is to put initial values of variables and formulas for the constraints and objective function are entered. Appropriate explanations are provided at suitable places in the worksheet assumed.

The goal programming method is based up on iteration process, whereby, the decision variables and deviation variables are assigned certain values which are subsequently pushed to optimized values in subsequent iterations. Initially, values of both decision variables X1 and X2 are assumed to be 1. All positive and negative deviation variables are assumed to be 0 and put accordingly in the worksheet.

Proceeding further, it is required to calculate the multiplied value of C<sub>ij</sub>X<sub>j</sub>. This requires computing the sum of the product of two sets of cells. Let, C1 and C2 be two constants which are to respectively multiplied by two decision variables represented by \$X\$1 & \$X\$2, subsequently their multiplication is to be added. The first way is to write the formula as C1\*\$X\$1 + C2\*\$X\$2.


Alternately, the convenient way is to replace simply by writing an easier formula SUMPRODUCT (C1:C2,\$X\$1:\$X\$2).

Thus, whereas the above two paragraphs denote the essentials of left-hand side (LHS) of constraining equations, the right-hand side (RHS) of these equations relate to b<sub>i</sub> values called the goal (target values). Depending on the selection criteria of selecting maximum (MAX) or minimum (MIN) values, the formula of MAX or MIN is entered for all the i objectives.

Once the formulae for constraining equations are well entered in all the cells, formula for objective function is entered. As stated earlier, simple summation of all positive and negative deviation variables will yield the desired optimized value. Accordingly, formula for “addition of negative deviation variable and subtraction of positive deviation variable” is entered in Target Cell of the worksheet.

(iii) **LOADING EXCEL SOLVER IN MS EXCEL-2007**

The above Goal Programming model is solved using EXCEL SOLVER 2007 in the MS-Excel suit of MS-Office 2007. The steps are briefly described as below (<https://support.office.com/en-us/article/load-the-solver-add-in-in-excel-612926fc-d53b-46b4-872c-e24772f078ca>):

1. In Excel 2007, click the **Microsoft Office Button** , and then click **Excel Options**.
  2. Click **Add-Ins**, and then in the **Manage** box, select **Excel Add-ins**.
  3. Click **Go**.
  4. In the **Add-Ins available** box, select the **Solver Add-in** check box, and then click **OK**.
- (Notes: (a) If the **Solver Add-in** is not listed in the **Add-Ins available** box, click **Browse** to locate the add-in. (b) If you get prompted that the Solver Add-in is not currently installed on your computer, click **Yes** to install it.)
5. After you load the Solver Add-in, the **Solver** command is available in the **Analysis** group on the **Data** tab.

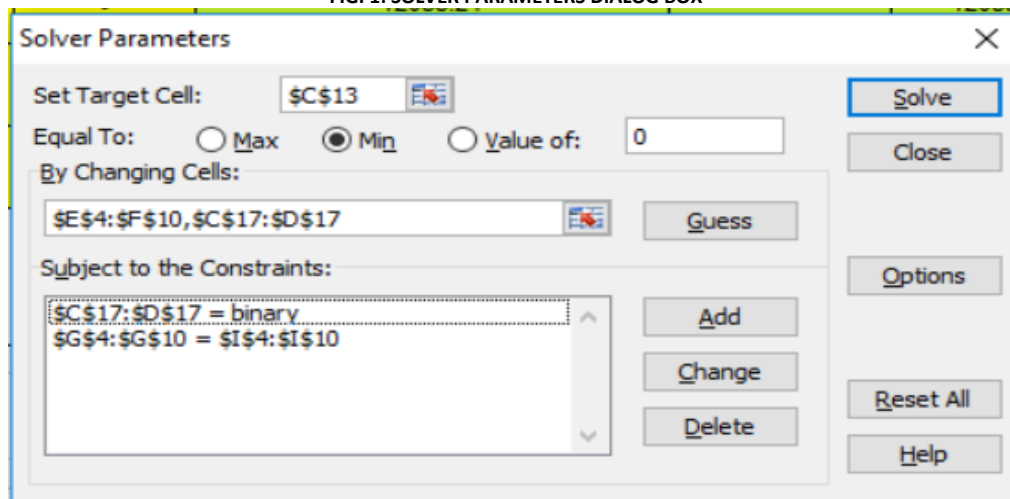
**USING THE SOLVER DIALOGS**

To let the Solver know which cells on the worksheet represent the decision variables, constraints and objective function, we click Solver button on the Data tab, which displays the Solver Parameters dialog.

In the **Set Target Cell** edit box, we type or click on cell D13, the objective function cell containing the formula SUM (E4:F10). Set Target Cell Equal to 0Min for minimization.

In the **By Changing Cells** edit box, we type \$E\$4:\$F\$10,\$C\$17:\$D\$17 or select these cells with the mouse.

FIG. 1: SOLVER PARAMETERS DIALOG BOX



To add the constraints, we click on the **Add** button, select cells \$G\$4:\$G\$10 in the Cell Reference edit box (the *left hand side*), and select cells \$I\$4:\$I\$10 in the Constraint edit box (the *right hand side*); the default relation <= is changed to =.

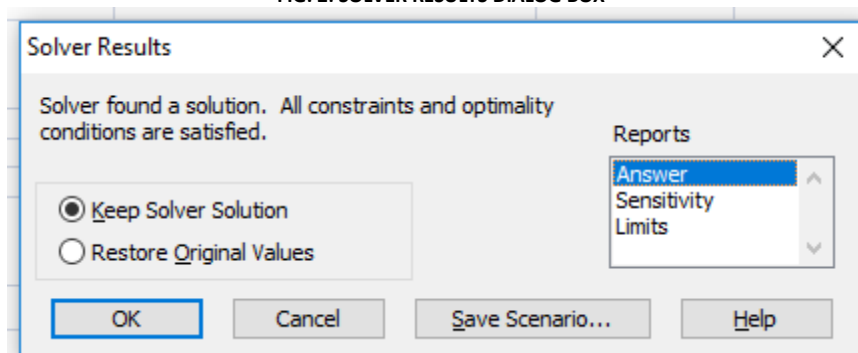
We choose the Add button again (either from the dialog above, or from the main Solver Parameters dialog) to define the non-negative binary constraint on the decision variables. Select cells \$C\$17:\$D\$17 in the Cell Reference edit box (the *left hand side*), and change default relation <= and select it as "bin". cells \$I\$4:\$I\$10. The word "=binary" is automatically entered in the Constraint edit box (the *right hand side*);

In this way the Problem is completely entered in the Excel worksheet.

**FINDING AND USING THE SOLUTION**

To find the optimal solution, we simply click on the **Solve** button. The message "Solver found a solution" appears in the Solver Results dialog, as shown below.

FIG. 2: SOLVER RESULTS DIALOG BOX



This is the "traditional" Solver dialog style from Excel 2007 and earlier. We now click on "Answer" in the Reports list box to produce an Answer Report, and click OK to keep the optimal solution values in cells C17:D17.

After a moment, the Solver returns the optimal solution: "0" in cell C17 and "1" in cell D17. This means that X1 representing the Public sector is rejected and, X2 representing the Private sector is selected. The final table obtained after running the solver is as shown below:

TABLE 5: FINAL TABLE AFTER SOLVER RUN IN MS EXCEL-2007 WORKSHEET

1 TABLE FOR SOLVER OPERATION									
2	i ↓ GOAL	j → DECISION VARIABLE → CONSTANT	j=1	j=2	DEVIATION VARIABLE		GOAL EQUATION (CONSTRAINTS)		
			(GOVT. SECTOR)	(PVT. SECTOR)	n <sub>i</sub> (-ve devn)	p <sub>i</sub> (+ve devn)	LHS of Equation	Relationship	RHS of Eqn
3			C <sub>1</sub>	C <sub>2</sub>			C <sub>ij</sub> X <sub>j</sub>		b <sub>i</sub>
4	i=1 (SELECT ANY 1)	Available Mutually Exclusive SEZs	1	1	2.56546E-12	0	1	=	1
5	i=2 (MAXIMUM EXPORT)	Export Sum Total of last 7 years, Rs Crore	12609.00	168867.94	0	0	168868	=	168867.94
6	i=3 (MINIMUM INVESTMENT)	Investment Sum Total of last 7 years, Rs Crore	7610.45	170179.05	0	162568.6	7610	=	7610.45
7	i=4 (MAXIMUM EMPLOYMENT)	Employment in 7th year, No.	4647	231964	2.18985E-07	0	231964	=	231964.00
8	i=5 (MINIMUM IMPORT)	Import Sum Total of last 7 years, Rs Crore	12088.24	46611.29	0	34523.048	12088	=	12088.24
9	i=6 (MAXIMUM FDI)	FDI Sum Total of last 7 years, Rs Crore	815.36	21639.92	0	1.1489E-08	21640	=	21639.92
10	i=7 (MAXIMUM INDIRECT EMPLOYMENT)	Indirect Employment in 7th year, No.	0	51198	2.32513E-08	0	51198	=	51198.00
11	i=8 (ADDITIONAL OBJECTIVE OF BINARY REQUIREMENT)	Restrict Decision variables to assume 0-1 values only	1	1			1	=	1
12									
13	<b>OBJECTIVE FUNCTION</b>						SUM(E4:F10)	=	0
14									
15									
16	<b>VALUES OF X<sub>j</sub></b>		<b>X1</b>	<b>X2</b>					
17			0.0000	1.0000					
18									
19	<b>COLOR CODE</b> →	<b>OBJECTIVE DESCRIPTION</b>	<b>OBJECTIVE FUNCTION</b>	<b>CHANGING CELLS</b>			<b>TARGET CELL</b>		

After a moment, the Solver creates another worksheet containing an **Answer Report**, like the one below, and inserts it to the left of the problem worksheet in the Excel workbook.

TABLE 6: MICROSOFT EXCEL 12.0 ANSWER REPORT

## Microsoft Excel 12.0 Answer Report

Worksheet: [VIZAG PERFORMANCE GOVT-PVT STUDIES.xlsx]Vizag\_GovtVrsPvt\_ByGP Final Tab

Report Created: 02-11-2018 00:58:54

## Target Cell (Min)

Cell	Name	Original Value	Final Value
\$C\$13	MINIMIZE ALL DEVIATION VARIABLES GOVT. SECTOR (X1)	0	455598.498

## Adjustable Cells

Cell	Name	Original Value	Final Value
\$E\$4	Available Mutually Exclusive SEZs NEGATIVE	0	0
\$F\$4	Available Mutually Exclusive SEZs POSITIVE	0	1.59909E-11
\$E\$5	Export Sum Total of last 7 years, Rs Crore NEGATIVE	0	0
\$F\$5	Export Sum Total of last 7 years, Rs Crore POSITIVE	0	156258.942
\$E\$6	Investment Sum Total of last 7 years, Rs Crore NEGATIVE	0	0
\$F\$6	Investment Sum Total of last 7 years, Rs Crore POSITIVE	0	0
\$E\$7	Employment in 7th year, No. NEGATIVE	0	0
\$F\$7	Employment in 7th year, No. POSITIVE	0	227317
\$E\$8	Import Sum Total of last 7 years, Rs Crore NEGATIVE	0	0
\$F\$8	Import Sum Total of last 7 years, Rs Crore POSITIVE	0	2.06979E-07
\$E\$9	FDI Sum Total of last 7 years, Rs Crore NEGATIVE	0	0
\$F\$9	FDI Sum Total of last 7 years, Rs Crore POSITIVE	0	20824.556
\$E\$10	Indirect Employment in 7th year, No. NEGATIVE	0	0
\$F\$10	Indirect Employment in 7th year, No. POSITIVE	0	51198
\$C\$17	FINAL OPTIMAL OUTPUT VALUE X1	1.0000	1.0000
\$D\$17	FINAL OPTIMAL OUTPUT VALUE X2	1.0000	0.0000

## Constraints

Cell	Name	Cell Value	Formula	Status	Slack
\$G\$4	Available Mutually Exclusive SEZs LHS	1	\$G\$4=\$I\$4	Not Binding	0
\$G\$5	Export Sum Total of last 7 years, Rs Crore LHS	168867.94	\$G\$5=\$I\$5	Not Binding	0
\$G\$6	Investment Sum Total of last 7 years, Rs Crore LHS	7610.45	\$G\$6=\$I\$6	Not Binding	0
\$G\$7	Employment in 7th year, No. LHS	231964.00	\$G\$7=\$I\$7	Not Binding	0
\$G\$8	Import Sum Total of last 7 years, Rs Crore LHS	12088.24	\$G\$8=\$I\$8	Not Binding	0
\$G\$9	FDI Sum Total of last 7 years, Rs Crore LHS	21639.92	\$G\$9=\$I\$9	Not Binding	0
\$G\$10	Indirect Employment in 7th year, No. LHS	51198.00	\$G\$10=\$I\$10	Not Binding	0
\$C\$17	FINAL OPTIMAL OUTPUT VALUE X1	1.0000	\$C\$17=binary	Binding	0.0000
\$D\$17	FINAL OPTIMAL OUTPUT VALUE X2	0.0000	\$D\$17=binary	Binding	0.0000

## RESULTS AND DISCUSSION

Thus, the above solution presents a rosy picture for the SEZs performing in the Privatesector. All the goals have been given equal priorities (importance). Other goals can also be incorporated in this model. During data collection, it is observed that a lot of un-utilized land is surplus in various units. The model can be extended to find out most efficient land use sector. Various other types of objectives can also be formulated to suit requirement of the user/policy maker.

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## A STUDY ON THE LENDING PATTERNS OF THE PAWN BROKERS WITH RESPECT TO GOLD LOANS – BANGALORE CITY

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### ABSTRACT

*Gold has been an integral part of the Indian culture and considered as an extremely desirable product. Since gold has the characteristics of readily acceptable collateral for the lenders, many Indian households end up taking loans from the value of the gold prevailing in the market for any kind of emergency or events occurred. A lender provides loans by securing the gold assets as collateral. India approximately holds for around thirty per cent of the demand for gold stock in the last years. The Indian economy has been rapidly growing for the past few years especially the gold market. The research study is of both descriptive and analytical in nature. This study has used both primary and secondary data. A study has been conducted on the lending patterns of pawn brokers with respect to gold loans. With the rapid growth in the market, regulatory scrutiny has also been increased on the gold loan lending practices. The only drawback of the unorganized sector is that even though they are supposed to be under the regulatory framework many of them fail to adhere to do so. Even after the non-adherence to the regulatory framework the unorganized sector still holds most of the gold loan market share. However, with the increasing change in the perspective of the mind set of people to the organized sector they are more likely to go for collateral for gold from the banks or NBFC's.*

### KEYWORDS

gold loan, lending patterns, pawn brokers, unorganized sector.

### JEL CODE

H80.

### INTRODUCTION

Gold has been an integral part of the Indian culture since time immemorial. It has been a store of value and a part of the medieval monetary systems as medium of exchange for thousands of years. The endurance of gold in its physical form even through war, political turbulence, and natural calamities has made it popular in India and the only means of savings in rural India. Gold purchases in India are entwined with cultural and religious beliefs. Indian celebrations demand the purchase of gold on important occasions. Traditionally and as a religious practice an Indian woman wears ornament throughout her life. The trend in recent times is going towards platinum and white gold among the urban elite, but for the middle class people it still remains gold. In India gold has both sentimental and financial value. It is considered as the best investment and that explains why India is the world's highest consumer of gold. The gold market in India looks positioned to achieve greater heights owing to the fascination for gold in the country. The India's gold demand was 842.7 tonnes in 2014. India holds the top position globally as gold consumer followed by China. Combined demand volumes in India and China have grown by 71 percent over the last ten years. The two markets accounted for 54 percent of consumer gold demand in 2014. India's gold jewellery demand rose by 8 percent to an all-time high of 662 tonnes in 2014 on purchase for weddings and festivals. More than 50% is used for making jewellery. The domestic Indian gold market has been rising significantly. However, it is fragmented and unorganized even though India is the leading consumer in gold. Due to non-availability of a benchmark, the gold prices in India vary from region to region. Despite the global economic recession, the gold consumption in the country during this period has not been affected adversely. The Indian gold market is characterized by factors such as gold demand, value of US dollar, interest rate, comparative returns on stock markets, official gold loans, jewellery and industry demand, gold jewellery recycling, speculation and taxes.

### GOLD LOANS

A loan is a debt provided by an entity i.e. an organization or an individual to another at an interest rate and evidenced by a note which specifies among other things such as the principal amount, interest rate and date of repayment. Gold loans which are also called as gold deposits are undertaken to obtain an income return on gold. The gold that is placed on loan or deposit can be either of financial asset i.e. monetary gold or a non-financial asset i.e. non-monetary gold. The gold remains on the books of the lender and the lender retains the exposure to the market risk arising from movements in the market price of gold.

Pawn is derived from the Latin word "pignus" which means pledge. In another term it is referred as collateral. Pawn refers to pledging of a personal item as a security to borrow money from the pawn brokers. A pawn broker is an individual or a business who offers secured loans to the people who pledge their personal property as collateral. Pawnbrokers lend money on items which ranges from items such as gold and diamond jewellery, musical instruments, televisions, electronics, tools, household items. The loan amount given to the customers are based on the value of the collateral. When the customer pays back the loan amount their item is returned back to them. The pawnbroker gives a pawn ticket or receipt which the customer needs to keep it so that the customer can prove that he/she owns that particular item. A customer can choose either to pawn or sell their item in pawnshops. If the loan is not paid within the time period, the pawned item will be auctioned by the pawn broker. Unlike other lenders, the pawn broker does not report the defaulted loan on the customer's credit report, since the pawn broker has physical possession of the item and may recover the loan value through the entire sale of the item.

### LITERATURE REVIEW

- **Mishasharma (2013)** "Study of gold-loan market as an alternative source of credit for low-income households." In this paper the author examines the different characteristics of the various stakeholders in the gold loan market. The review highlighted the various characteristics of the customers who acquire gold loans and for what purpose they acquire.
- **Why do Indians buy gold? (2013)** article mention that India is one of the biggest markets for gold and gold loans and the various reasons for which spread across are related to the social, economic and cultural dimensions. Indians have proved to be smart investors and consider gold as a medium to save, invest, hedge against inflation and most importantly to safeguard their future.
- **Dr. PriyankaVerma and SomeshSinha (2012)** "Study On Gold Loan Scenario Of Specific Financial Companies In India-A Success Story".The basic objective underlying in this paper is to identify the reasons for the increase in the imports of the gold loans. The author feels that Loan taken by NBFCs from banks to fulfill the financial requirement may be a risk factor for economy so the RBI should come out with regulatory framework to ensure safety of loan. International gold prices and exchange rate significantly and positively affect the gold prices in India.
- **Reserve Bank of India (January 2013)** in its study observed that gold loans have a causal impact on gold imports substantiating the emergence of a liquidity motive for holding gold. Furthermore, increase in gold prices appears to be one factor that increases the gold loans outstanding.
- **Cognizant (January 2012)** pointed out that gold loan market in India is still under-penetrated and the government should frame suitable policies favoring its growth.

➤ **Claudia Ruiz (2011) From Pawn Shops to Banks: The Impact of Formal Credit on Informal Households.** The author identified the impact of expanding access to credit on the decisions and welfare of households.

**STATEMENT OF PROBLEM**

The value of gold has been on the verge of rising in the past few years which was uninterrupted by economic factors. Thus people have turned their attention to utilize the power of gold lying in the lockers to avail loans instead of paying higher interest rates for other loans such as personal loans. Lately it is seen that pawnbrokers in India are not registered under the Act even though they are supposed to register themselves. Due to this the pawnbrokers charge interest rates, loan to value according to their rules. From the above observation the present study intends to study the lending patterns of the pawn brokers.

**OBJECTIVES OF THE STUDY**

1. To identify the conditions with respect to lending of loans in Pawn Brokers.
2. To study the lending patterns of Pawn Brokers.

**SCOPE OF THE STUDY**

The study will help to understand the lending patterns of pawn brokers. The study was conducted in Bangalore city and helps to analyze the performance of providing loans by pawn brokers. Since limited number of study has been conducted about the pawn brokers, this study will serve as a guide for further research relating to this topic.

**RESEARCH DESIGN**

The research design of present study is the descriptive and analytical research design. An attempt has been made through the research to find out in detail the lending patterns of the pawn brokers with reference to Bangalore.

**SOURCE AND TYPE OF DATA**

The data was collected from various primary data sources such as questionnaires, interviews and observations. The data was also collected from various secondary data sources such as journals and various published electronic sources.

**Sample size:** – 50 pawn brokers

**Sample technique:** - convenient sampling technique.

**Sample area:** - Bangalore.

**TOOLS FOR THE DATA COLLECTION**

For the data collection a structured questionnaire was framed and distributed to the pawn brokers.

**STATISTICAL ANALYSIS**

For the analysis of data, the Pearson’s correlation test was used.

**LIMITATIONS OF THE STUDY**

- Sampling unit was small and it was restricted to fifty pawn brokers.
- The data obtained can be biased or not accurate in nature.
- The information obtained from the respondents based on the questionnaires was assumed to be factual.

**ANALYSIS AND INTERPRETATION**

The conditions with respect to lending of loans by Pawn brokers are-

- Eligibility criteria
  - ✓ The minimum age of applicant should not be less than 18 years.
  - ✓ The maximum age of applicant should not be more than 65 years.
- Documentations
  - ✓ Identity proof: Passport copy/ voters ID card/ driving license.
  - ✓ Address proof: Ration card/ Tel, electricity bill/ rental bill/ Passport copy/Trade license /Shop & Est. License/Sales Tax certificate.
- Gold valuation

The gold given for availing loan is valued basically on the usage of gold and the number of carats in the gold and the rate of gold in the market date.

- The loan is usually disbursed within 30 minutes.
- The gold given for pledging is kept safe in the lockers available in the office.

**Hypothesis**

The following hypotheses are framed and tested in the study.

**HYPOTHESIS 1**

**Null hypothesis (Ho):-** There is no significant relationship between the loan repayment period and the maximum loan amount.

**Alternate hypothesis (H1):-** There is a significant relationship between the loan repayment period and the maximum loan amount.

**TABLE 1: CORRELATION BETWEEN THE LOAN REPAYMENT PERIOD AND MAXIMUM LOAN AMOUNT**

Descriptive Statistics			
	Mean	Std. Deviation	N
loan repayment period	2.0400	.72731	50
maximum loan amount	1.7400	.59966	50

Correlations			
		loan repayment period	maximum loan amount
loan repayment period	Pearson Correlation	1	.024
	Sig. (2-tailed)		.867
	N	50	50
maximum loan amount	Pearson Correlation	.024	1
	Sig. (2-tailed)	.867	
	N	50	50

**Interpretation**

Pearson’s correlation test is used to find out if any significant relationship exists between the loan repayment period and the maximum loan given to the customers. It is observed that the significance value for Pearson’s correlation is 0.024 which is positively low correlated. The significant value at 5 per cent level of significance

is 0.867 which is higher than the alpha value of 0.05. Therefore, the null hypothesis is accepted and it can be concluded that there is no significant relationship between the loan repayment period and the maximum loan amount.

**HYPOTHESIS 2**

**Null hypothesis (Ho):-** There is no significant relationship between the customer visits and the service charges imposed on them.

**Alternate hypothesis (H1):-** There is a significant relationship between the customer visits and the service charges imposed on them.

**TABLE 2: CORRELATION BETWEEN THE CUSTOMER VISITS AND THE SERVICE CHARGES IMPOSED ON THEM**

Descriptive Statistics			
	Mean	Std. Deviation	N
Service charges	2.0400	.94675	50
Customer visits	1.4800	.70682	50

Correlations			
		Service charges	Customer visits
Service charges	Pearson Correlation	1	-.151
	Sig. (2-tailed)		.294
	N	50	50
Customer visits	Pearson Correlation	-.151	1
	Sig. (2-tailed)	.294	
	N	50	50

\*A negative correlation means that there is an inverse relationship between two variables - when one variable decreases, the other increases.

**Interpretation**

Pearson’s correlation test is used to find out if any significant relationship exists between the customer visits and the service charges imposed on them. It is observed that the significance value for Pearson’s correlation is -0.151 which is negatively correlated. The significant value at 5 per cent level of significance is 0.294 which is higher than the alpha value of 0.05. Therefore, the null hypothesis is accepted and it can be concluded that there is no significant relationship between the customer visits and the service charges imposed on them. The negative correlation has come because when the service charges increases the customer visiting the pawnshops gradually decreases.

**HYPOTHESIS 3**

**Null hypothesis (Ho):-** There is no significant relationship between the penalty charges and the customer visits.

**Alternate hypothesis (H1):-** There is a significant relationship between the penalty charges and the customer visits.

**TABLE 3: CORRELATION BETWEEN THE PENALTY CHARGES AND THE CUSTOMER VISITS**

Descriptive Statistics			
	Mean	Std. Deviation	N
Penalty charges	2.3800	.83029	50
Customer visits	1.4800	.70682	50

Correlations			
		Penalty charges	Customer visits
Penalty charges	Pearson Correlation	1	-.317*
	Sig. (2-tailed)		.025
	N	50	50
Customer visits	Pearson Correlation	-.317*	1
	Sig. (2-tailed)	.025	
	N	50	50

\*. Correlation is significant at the 0.05 level (2-tailed).

**Interpretation**

Pearson’s correlation test is used to find out if any significant relationship exists between the customer visits and the penalty charges levied on the customers. It is observed that the significance value for Pearson’s correlation is -0.317 which is highly negatively correlated. The significant value at 5 per cent level of significance is 0.025 which is lesser than the alpha value of 0.05. Therefore, the null hypothesis is rejected and it can be concluded that there is a significant relationship between the customer visits and the service charges imposed on them. When the penalty charges increase the customers tends to gradually decrease the visits to the pawnshops for availing the loan.

**HYPOTHESIS 4**

**Null hypothesis (Ho):-** There is no significant relationship between the documents provided by customers and the maximum loan amount.

**Alternate hypothesis (H1):-** There is a significant relationship between the documents provided by customers and the maximum loan amount.

**TABLE 4: CORRELATION BETWEEN THE DOCUMENTS AND THE MAXIMUM LOAN AMOUNT**

Descriptive Statistics			
	Mean	Std. Deviation	N
Documents	1.6800	.93547	50
maximum loan amount	1.7400	.59966	50

Correlations			
		Documents	maximum loan amount
Documents	Pearson Correlation	1	.249
	Sig. (2-tailed)		.081
	N	50	50
maximum loan amount	Pearson Correlation	.249	1
	Sig. (2-tailed)	.081	
	N	50	50

**Interpretation**

Pearson's correlation test is used to find out if any significant relationship exists between the documents provided by customers and the maximum loan amount. It is observed that the significance value for Pearson's correlation is 0.249 which is highly positively correlated. The significant value at 5 per cent level of significance is 0.081 which is higher than the alpha value of 0.05. Therefore, the null hypothesis is accepted and it can be concluded that there is no significant relationship between the documents provided by customers and the maximum loan amount.

**FINDINGS**

- The maximum amount of loan given by pawn brokers to the customer falls in the range of 11 to 50 lakhs with 60 per cent opted for it. Some of the other pawn brokers having 34 per cent have given a maximum amount of loan in less than 10 lakhs.
- The most acceptable document that customers need to provide for availing the gold loan is identity proof with a majority of 58 per cent of pawn brokers opting for it. Around 26 per cent of pawn brokers have also said address proof is also the acceptable document which customer needs to provide while availing the loan.
- A majority of 48 per cent of pawn brokers have given a repayment period of loan in the range of one to five years and around 24 per cent of pawn brokers have given the loan repayment period of less than 12 months.
- The late payment penalty charges levied by pawn brokers fall in the range of six to ten per cent having a majority of 48 per cent. 30 per cent of pawn brokers have also charged around 11-15 per cent for penalty charges.
- 64 per cent of pawn brokers have mentioned that the customer visits the office lesser than three times. Around 24 per cent of pawn brokers mentioned that the customer visits the pawn shops in the range of four to seven times.
- There is no significant relationship between the loan repayment period and the maximum loan amount given by the pawn brokers to the customers at a significant value of 0.867 at five per cent level of significance. When the loan amount increases even the repayment period also increase invariably.
- There is no significant relationship between the customer visits and the service charges imposed by pawn brokers to the customers at a significant value of 0.294 at five per cent level of significance. When the service charges increased the visiting to the pawn shops by customers for availing the loan decreased.
- There is a significant relationship between the penalty charges imposed on the customers and their visits to the pawn shops. When the penalty charges were increased the visit to the pawn shops by customers for availing the loan was decreased.
- There is no significant relationship between the documents provided by the customers and the maximum loan amount. The documents provided and the loan amounts provided to the customers are increasing on a parallel basis.

**SUGGESTIONS**

- It is suitable for the pawn brokers to determine the value of gold on the basis of the purity of gold and the rate of gold on that particular market date.
- The most acceptable documents which are accepted by the pawn brokers are identity proof and address proof. In order to assure more safety for the pawn brokers by their customers they can improve on the documents to be provided by them by having a signature proof also.
- The pawn brokers can increase the amount reduced from the market price of one gram of gold. This will help the customers to get more loan value for the value of gold they have provided.
- There should be an age limit set up for pawn broker customers. The age limit will help to ensure that those people will be able to provide the correct documents and will be able to repay the loan amount in proper period given to them.
- The pawn brokers can increase the loan repayment tenure so that the customers get a proper time for repaying the loan amount and without any extra interest charged on the loan amount. The extension of loan repayment period will be a relief for the customers from the burden of paying the full amount.
- The majority of pawn brokers do not provide renewal facilities for their customers. The pawn brokers can have renewal facilities for their customers so that they can have loyal customers in their shops.
- If the service charges and penalty charges are reduced to some extent by the pawn brokers they can have more number of customers visiting the pawn shops for availing the gold loan.

**CONCLUSION**

Gold loans are among the newest class of assets which have seen rapid growth in securitization. The gold market in India looks positioned to achieve greater heights owing to the fascination for gold in the country. Lenders provided loans by securing gold assets as the collateral. Gold is considered as a highly liquid asset. From past few years the gold value has been appreciated which have led to explosion of the gold loan market. The dominance of unorganized sector in the gold loan market can be broken by the organized sector by leading the organizations to have flexible schemes and products, simpler approval and disbursement processes and better accessibility for the customers. The lending patterns of pawn brokers shows that the maximum loan value and repayment period is very less compared to that of the organized sector. Most of the pawn brokers and money lenders are not regulated under the law even though they are supposed to do it. Due to this reason they charge and fix the amount according to their shops norms and regulations.

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## CHALLENGES RELATED TO KNOWLEDGE MANAGEMENT IN THE INFORMATION TECHNOLOGY SECTOR (A STUDY WITH REFERENCE TO SELECT (IT) INDUSTRY IN DELHI/NCR)

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### ABSTRACT

*The technology in present era has reached a new height of advancement and innovation. With this has increased the complication of managing and transforming the knowledge in the right direction and at the right time. The innovation by one should be used by others, for this a systematic management of the knowledge is required, which will also help in achieving organizational goal. The success of any organization lies in how well the organization is able to manage the knowledge in the organization, proper and systematic record of its data is very important, for present and future use. Managing knowledge and encouraging employees to systematically manage and transfer the knowledge in the organization is a complicated but must process. For every organization need to focus on developing organizational learning. The subject matter of this paper is to focus on the challenges of knowledge management. Here the importance of knowledge management and its challenges will be discussed. The paper introduces the concept of knowledge management and its importance for the organization to become globally competent. Knowledge management is the future of every organization. The paper introduces a framework for expanding the knowledge management research towards conceptual and empirical direction by focussing how knowledge management is being associated with the success of the organisation and how an organization effectively leverage the knowledge management for to be globally competitive.*

### KEYWORDS

knowledge management, information system, organisational learning, challenges of knowledge management.

### JEL CODES

M10, M14, M15, M19.

### INTRODUCTION

The knowledge management plays a vital role in IT sector. In the past centuries, organisations have been concerned about creating, acquiring, and communicating knowledge and improving the re-utilization of knowledge. However, it is only in the last 20 years that a distinct field called “knowledge management” (KM) has come into highlights. Just like the employees are the asset in IT industry, Knowledge in the organisation is also the asset to the organisation. The organisation needs to store this knowledge for future uses and reference for more innovation to achieve organisational goal. Information technology sector is the fastest growing sector all around the world. In India particularly IT sector is the fastest growing sector. IT sector always thrive for innovation and innovation comes from knowledge.

### KNOWLEDGE

Knowledge can be defined as “justified personal belief”. There are many nomenclatures that specify various kinds of knowledge. Fundamental distinction is between “tacit” and “explicit” knowledge is that, tacit knowledge inhabits the minds of people and is nearly impossible, or very difficult, to articulate (Polanyi 1966). Most knowledge is initially tacit in nature; it is developed over a long period of time through trial, errors and success stories, and it is underutilized because the organization does not know how to explore knowledge (O’ Dell and Grayson, 1998, p. 154). Some knowledge is embedded in business processes, activities and relationships that have been created over time through the implementation of continues improvement.

Explicit knowledge can be understood as tangible entity, which exists in the form of words, sentences, documents, organized data, and computer programs and in other explicit forms. Knowledge is the intellectual capital of the organisation. If one accepts the useful “difficult-to-articulate” concept of tacit knowledge, a fundamental problem of Knowledge Management (KM) is to explicate tacit knowledge and then to make it available for use by others. There are the following levels of knowledge- know what, knowhow and know why. Every employee in the organization should understand that what knowledge they have to manage and how, which means what process to be used to store it and why knowledge is being managed, that is the future use of the knowledge.

### KNOWLEDGE MANAGEMENT

Knowledge management is defined as the planning, organizing, motivating, and controlling of people, processes and systems in the organization which ensure that the knowledge-related assets of the organisation are improved and employed effectively. The knowledge management plays a vital role in IT sector. The organisations have been concerned about creating, acquiring, and communicating knowledge and improving the re-utilization of knowledge. As the knowledge management is gaining importance in all spheres, organisations are finding it difficult to manage and maintain the knowledge. Knowledge management provides the competitive edge to the organisation. The processes of KM involve knowledge acquisition, creation, refinement, storage, transfer, sharing, and utilization. The function of KM in the organization to operate these processes, develops methodologies and systems to support them, and motivates people to participate in them. KM process. Knowledge management system refers to the applications of the organisation’s computer based communication and information systems (CIS) to support KM processes. KM process technically not distinct from CIS, but it involves databases, repositories, and directories. Knowledge management is not the responsibility of an individual or an organization, it needs a holistic approach which require complete involvement of an employee, management, stakeholders, customers and so on.

### ORGANIZATIONAL LEARNING

Organisational learning is the process of improving actions through better knowledge acquisition, clearer understanding, and improved performance of the organisation. It is an active philosophy, gives competitive advantage to the organisation, encourage people to learn, nurture creativeness and innovation and develops organisational capabilities. To conceptualize the relationship between KM and organizational learning is to view organizational learning as the goal of KM. The initiatives to motivate the application of KM pays off by helping the organization to implant knowledge into organizational process so that organization can continuously improve its practices and behaviours and achieve its business goals. Thus through organizational learning, an organization can sustainably improve the utilization of knowledge in the organization for achieving business goals and achieving competitive edge in the present era of globalisation.

### CHALLENGES OF KM

The following aspects as per this study should be worked upon for managing knowledge more appropriately and systematically to achieve organizational goals. Through this study the following challenges are found, which are being faced by the information technology sector are-

- Problem related to unstructured knowledge base.

- Lack of innovation and creation of knowledge by the employees
- Difficulties in transforming tacit knowledge into explicit knowledge
- Willingness to be a subject matter expert (SME's)
- Lack of knowledge sharing due to working in silos

This has been observed during this study that, though the knowledge management plays a critical role in IT sector and to a great extent the management system of knowledge is very structured but still organizations need to maintain a good knowledge base. It has been observed that there are efforts being made by the employees to do improvements on the knowledge base but it is not structured, which will lead to inefficient knowledge management system.

Another challenge in knowledge management is related to transforming a tacit knowledge into explicit knowledge as people do not easily share the knowledge they have. There has also been found the lack of interest among employees to be a subject matter expert, which could be the result of internal or external forces. Internal, is related to the self-interest of the employee and external, refers to the organizational need related to resource crunch. It has also been observed in product based organizations that unit/department/team are working independently and could lead to work in silos rather than working as a team collaboratively for product betterment or improvements.

The brains in IT industry plays a vital role for companies to achieve competitive edge. Knowledge management is very important in IT industry, if the organisation is unable to manage this knowledge, the organisation for sure will lose profit and competitive edge in the global market.

## REVIEW OF LITERATURE

Snowden (1999), defines that knowledge management is not that simple, he writes that it is the "identification, optimization, and active management of intellectual assets, either in the form of explicit knowledge held in artefacts or as tacit knowledge possessed by individuals or communities". Snowden (1999) claims that it is not necessary to define knowledge, but points out that it is important to distinguish it from information.

Swan et al. (1999), explain that knowledge management is about harnessing the "intellectual and social capital of individuals in order to improve organizational learning capabilities, recognizing that knowledge, and not simply information, is the primary source of an organization's innovative potential".

Davenport, De Long, and Beers (1999), claim that knowledge "is information combined with experience, context, interpretation, and reflection". Prusak (1999) describes knowledge as a human trait or attribute. Nurmi (1999), defines that knowledge is the notion of know-how, it is not passive. A knowledge business is created when the know-how inside the firm and the needs of customers outside the firm meet.

Nonaka and Konno (1999) categorize knowledge as either explicit or tacit. Explicit knowledge can be thought of as knowledge that can be expressed in terms of words and numbers. It can be shared in the form of data. Tacit knowledge, on the other hand, is highly personal, hard to formalize, and difficult to communicate. Much of Nonaka's work is based upon the knowledge theories of Polanyi (1966), who first came up with the idea of tacit knowledge. He declared that "we have examples of knowing, both of a more intellectual and more practical knowing".

## NEED FOR THE STUDY

The present study would help in studying the challenges of KM and also find the ways to improve the process of KM. The goals of the knowledge management is to make effective use and continuous improvement of the intellectual assets of the organisation. KM is an organisational activity which focuses on what managers can do to achieve KM's goal, how to motivate individuals to participate and how to create social processes to facilitate

## STATEMENT OF THE PROBLEM

A well-defined statement of problem is very important to clearly understand the nature and scope of the study. This will also help in achieving the goals and objectives of the study. The problem selected for the study is- Challenges of knowledge management in IT sector.

## OBJECTIVES OF THE STUDY

The following are the objectives of the study-

- To use KM for strategic advantages.
- To obtain the support of management and employees for implementing KM.
- To motivate employees to contribute in improvement of KM.
- To ensure knowledge security.
- To know the impact of KM on technical, behavioural and managerial aspects of the IT employees.
- To observe benefits and outcomes of KM in the field of IT sector in Delhi/NCR.
- To find out problems and challenges related to KM in the IT sector.

## HYPOTHESIS

There is a significant impact of knowledge management on the success of the organisation.

## RESEARCH DESIGN

It is a blue print to conduct research by the researcher. It typically includes how data is to be collected, what instruments (tools) will be used and employed during the survey and intended means by analysing and interpreting the data collected by the researcher. To find the challenges of KM in IT sector, it was necessary to get an insight into the organisation's and employee's view on the knowledge management, its importance, and its contribution towards achieving organisational goals. For the purpose of the study an interview with structured questions and a structured questionnaire based survey was conducted in selected IT companies in Delhi/NCR. The researcher has adopted convenience sampling.

Type of research- This research is explorative in nature.

Sample size- For this research our sample size is 70 respondents.

Sample unit- Keeping in view for the objective of research study, we take managers, executives and other employees of IT sector industry in Delhi/NCR.

## SOURCES OF DATA COLLECTION

The research consists of both primary and secondary data. Primary data was collected by administering the interview and a survey, and secondary data was collected through websites, from various journals and magazines.

## FINDINGS

Through this study it has been found that KM is important for every organisation, every organisation tries to maintain the KM processes. As this process involves technical and behavioural aspect, few challenges regarding to these aspects have been found, which are mentioned in this study.

Though it has been observed organisation are continuously working on it. As the problem is related to unstructured KM, people lose interest in up gradation of KM further. This also leads to lack of ease of excess to KM.

It is observed that there is lack of knowledge sharing among employees due to working in silo. Within the organisation independent departments works, this leads to work in silo. But the essence of KM lies in collaborative efforts of every individual.

Due to the demand of the organisation sometimes employees have to work on different product/unit/department, which leads to lack of subject matter expertise. This also leads to lack of interest among employees to be the subject matter expert.

**HYPOTHESIS**

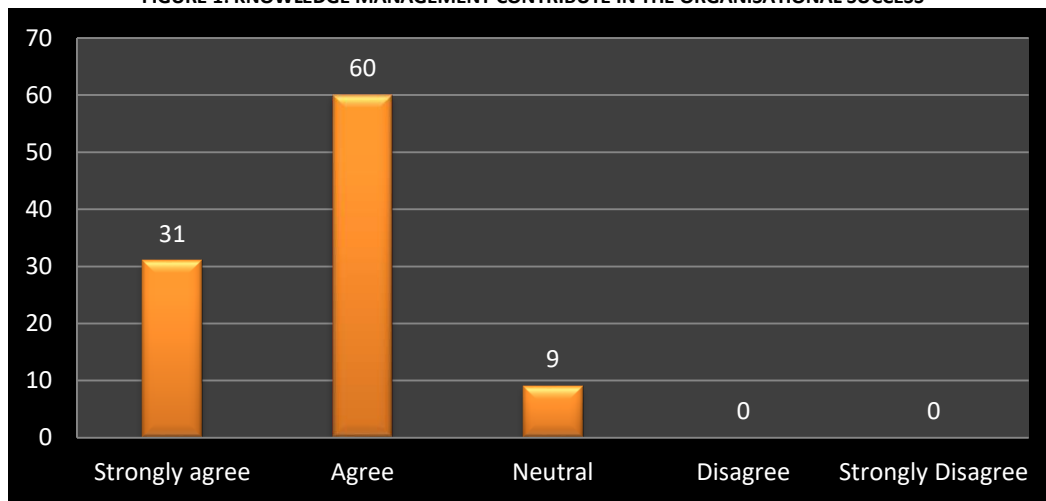
There is significant impact of knowledge management on the success of the organisation.

**TABLE 1: OBSERVED FREQUENCY TABLE**

In your opinion does knowledge management leads the organization to achieve competitive edge in the era of globalization		
	Frequency	Percent
Strongly agree	22	31
Agree	42	60
Neutral	6	9
Disagree	0	0
Strongly Disagree	0	0
Total	70	100

Source- Primary Data

**FIGURE 1: KNOWLEDGE MANAGEMENT CONTRIBUTE IN THE ORGANISATIONAL SUCCESS**



Source- Primary data

**TABLE 2: CHI SQUARE TABLE**

Scale	f%	O	E	O <sub>ij</sub> -E <sub>ij</sub>	(O <sub>ij</sub> -E <sub>ij</sub> ) <sup>2</sup>	(O <sub>ij</sub> -E <sub>ij</sub> ) <sup>2</sup> /E <sub>ij</sub>
Strongly agree	31	22	14	8	64	4.57
Agree	60	42	14	28	784	56.00
Neutral	9	6	14	-8	64	4.57
Disagree	0	0	14	-14	196	14.00
Strongly Disagree	0	0	14	-14	196	14.00
				<b>Chi value</b>		93.14

Source- Primary data

As per the calculated part, it is found that the calculated value of  $X^2$  (93.14) is greater than the tabular value of 9.49 at 5% of significance. Thus it states that there is a significant impact of knowledge management on the success of the organisation, hence the hypothesis is accepted.

**SUGGESTIONS**

To compete in the global scenario, the organizations could survive only if they create core competencies related to knowledge management. KM in organisation need to be developed in planned and systematic manner, for effective and efficient use of knowledge in the organisation.

Organisations needs to work on a standardised structure for maintaining KM, so that it becomes convenient for everyone to manage the knowledge in the organisation. This knowledge can be retrieved by others for present and future use.

The organizational processes like involving innovation, individual learning, collective learning and collaborative decision-making helps in developing effective KM. The organisations must leverage the knowledge management to develop the competitive edge.

Managers who want to grow intellectual capital must try to expand intelligence, encourage innovation and exercise innovation. Indeed, KM is one aspect through which organisation can develop core competencies of the organisation, which is needed for sustainable development.

**LIMITATIONS**

- The sample size being very small, hence may not represent the whole population.
- The study was restricted to limited area.
- The respondents were reluctant to respond.
- Time and cost involved is the major constraint of this research.

**SCOPE FOR FURTHER RESEARCH**

The present research has been done with reference to Information Technology sector alone, and there is importance of knowledge management in other sectors too, hence-

- Research can be done with reference to manufacturing sector, or any other sectors too.
- Research can be done on impact of technology on knowledge management.
- Research can be conducted on the impact of KM on the performance and productivity of the employees.
- Research can be done on the impact of KM on the organisation's performance.

**CONCLUSION**

From this study it can be concluded that knowledge management gives a competitive edge to the organization in the present scenario of challenging work environment. For this the organizations need to improve their technical, behaviour and managerial aspects for preparing sound knowledge management system, which could provide support to the organization for effective and efficient utilization of knowledge in the organization. The intermediate outcomes of KM are -improved organizational behaviours, processes, decisions, products, services and relationships that enable the organization to improve its overall performance.

Thus it can be said that Knowledge management is a set of organizational activities that are aimed at improving knowledge, knowledge related practices, organizational behaviours, decisions and organizational performance. The main focus of KM is on- knowledge processes, knowledge creation, acquisition, refinement, storage, transfer, sharing and utilization.

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