



Submitted By: Syed Adeel Hussain

Thesis Advisor: Dr. Sajid Saleem - Assistant Professor
Department of Institute of Industrial & Manufacturing
PhD (Superconducting Nanoelectronics)
Email: ssaleem@pnec.edu.pk; sajidsaleem@gmail.com
Website: <http://www.sajidsaleem.com/>

Author Note

Correspondence concerning this paper should be addressed to
Syed Adeel Hussain, IME Department, N.U.S.T. P.N.E.C. Karachi
Cell No. : +92-334-3827829 Email: adeel_hps@yahoo.com

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Impact of Supplier SMEs on partnership with LMEs in a manufacturing

SIEMENS

industry - A case study of Siemens Pakistan

In this research, the goal will be to prove that having a supplier relationship with LMEs in a long run , help the SMEs to grow and flourish rapidly and thus to prove this result I have targeted Siemens Pakistan as the buyer firm and I will thus be carrying out some research on Siemens Pakistan and will analyze some of its vendors. Having acquired the list of Vendors that are registered by Siemens Pakistan through SAP , the objective will be to collect information regarding their growth & to analyze some of those vendors and compare them with some other manufacturing industries that act as suppliers to other firms that are don't do business with Siemens Pakistan.

Abstract

The goal of this research will be to provide some facts as to how partnership with Siemens can help industries to grow and flourish in the long run. The Data collection is done through Questionnaires that were made and distributed to the vendors and the analysis is carried out using Data Envelopment Analysis – a tool used worldwide to find out the efficiency of different organizations with respect to each other through controlled parameters. The parameters that I have used to check out the efficiency are Assets , Revenue Generation per year , Manpower & Manpower skill level. A detailed comprehensive analysis has been provided to support the hypotheses made

H1: *There is a significant difference between revenues of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not*

H2: *There is a significant difference between manpower count of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not.*

H3: *There is a significant difference between manpower skill levels of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not.*

H4: *There is a significant difference between difference between total assets of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not.*

This research is motivated by the interest in looking beyond the must-have tangible performance factors of buyer–supplier mutual relationships to understand the role of tangible & intangible factors that affect buyer–supplier relationship continuity and their future collaboration.

Nowadays success in corporate markets somewhat depends on understanding relationship development between buyers and suppliers. Organizations have downsized, focused on core competencies, developed cutting edge strategies and attempted to achieve competitive advantage by leveraging their suppliers' capabilities and technologies. "Increasingly, firms are allocating more resources to their core competencies and encouraging the outsourcing of non-core activities, which increases their reliance and dependence on suppliers." (Vijay R. Kannan & Keah Choon , 2002) Tan Supplier Relationship Management is simply transforming the dynamics of supply chains to fit the needs of the organization. Supply networks are becoming stretched over geographies and involve many different stakeholders and players in the process. " Literature has begun to identify supplier development as any activities undertaken to improve the present or future relationship between purchasers and sellers; these activities can be either short- or long-term in nature " (Tan et al. 2000; Chartered Institute of Purchasing and Supply 2002; Cavinato and Payne 1995) .Gartner Consulting, "Partnerships, alliances, and buyer/supplier relationships in general have received much attention during the 1990s.Reports from industry of shorter cycle times, fewer quality defects, reduced costs, and streamlined processes resulting from closer working relationships with suppliers have suggested a clearer understanding of reciprocal needs and capabilities among buying and supplying firms "(Minahan 1998)" Supplier development has made a relatively recent appearance among American manufacturers. In the past, large supply bases and arm's-length relationships caused supplier development to be an uneconomical practice" (Hartley and Choi 1996) Hence SRM can be defined as "A set of methodologies and practices needed for interacting with suppliers of products and services of varied criticality to the profitability of the enterprise." (Gartner: 2001, p.2)

Introduction

Companies are off-shoring non-core and low value added activities to 3rd parties as well as sourcing material and or finished products from India and the Far-East. How important can this relationship enhancement be? Gartner further suggests that "By 2005, enterprises will move strongly to SRM methodologies or they will see profit reductions of close to two percent." Global supply networks often carry some typical challenges:

- Higher risk of supplier failure in terms of time, quality , quantity cost or services ;
- Quality adherence associated with pressure for ethical sourcing and a corporate social responsibility;
- Inadequate level of visibility making problem resolution slow and hard to manage;
- Frequent process disruptions compounded by longer lead times;
- Lack or absence of communication between manufacturer and suppliers – ill managed supply chain.

During the quality revolution of the mid-1980s, firms began to look at their suppliers, not so much in opportunistic terms, but as partners (Hoyt and Huq 2000). Some buyers speak to the issue of supplier performance measurement and feedback but leave development initiatives

up to the supplier, which must derive the improvement initiatives without further explanation (Flynn and Farney 2000). But the costs of supplier switching, as well as the costs of unmet expectations, are so high that proactivity has become the most frequently advocated strategy (Watts and Hahn 1993; Vlosky et al. 1998). Whether you are a buyer or a supplier, the definition and characteristics of a good partner always remains the same. While firms differ in the specific approaches used to manage suppliers, certain trends can be observed. “Quantifiable or ‘hard’ criteria” (Ellram 1990) such as price, delivery, quality, and service are routinely used for supplier selection and assessment “Soft,” difficult-to-quantify factors such as management compatibility and strategic direction of the supplier have also been shown to be important, particularly in the context of strategic buyer-supplier partnerships (Ellram 1990) (Hahn et al. 1990). A successful partnership is one in which there is mutual economic gain and which is supported by mutual respect clear understanding of each other's roles and responsibilities a sincere desire by both parties to win current and future business responsiveness to each other's needs and to those of the end-user a "win, win" attitude in which both are willing to compromise openness, honesty, integrity, fairness and professionalism mutual reliability and interdependence shared knowledge. Successful partnerships are ongoing and consistent; they are not limited to one incentive program. Supplier development involves taking those initiatives necessary to change the performance of supplier firms (Steven C. Dunn & Richard R. Young, The Journal of Supply Chain Management | Summer 2004)

Ohmae (1994) has predicted, the modern information technology is making traditional borders obsolete. Not only between nations, but especially between organizations, creating a “global village”. This phenomenon has created a new business environment in which companies compete no longer as a single legal entity, but as supply chains, and information has become the most valuable asset for companies, which has to be managed and distributed to their stakeholders. Hence, the application of information technology and the formation of electronic networks have become an important part of corporate strategy. This statement is especially true in the management of company's relationship with their suppliers.

Shedding light on the theory, it is observed that contingency variables, such as Environmental conditions and individual characteristics of organizational members, could influence the relationship between buyer search effort and the elements of communication in a buyer-supplier relationship (e.g., Lawrence and Lorsch 1967).

To put it together, Supplier relationship management (SRM) is the discipline of strategically planning for, organizing and managing, all interactions with third party organizations and subcontractors that supply goods and/or services to an organization in order to maximize the value of those interactions. In practice, SRM entails creating closer, more collaborative relationships with key suppliers in order to uncover and realize new value, obtain better result and reduce risk.

Increasingly, the global market environment is becoming more turbulent, complex and uncertain. Literature has explored the importance of supply management and its direct impact on performance. (Ying Liao, Paul Hong & S.Rubba Rao, Supply Management, Supply Flexibility and Performance Outcomes) In many distinct ways, it resembles Customer Relationship

Management. Just as companies have multiple interactions over time with their customers, so too do they interact with suppliers – negotiating contracts, purchasing, managing logistics and delivery, collaborating on product design, etc. Strategic supplier alliances refer to close and long-term relationships with suppliers (Hines 1994; Macbeth and Ferguson 1994). Strategic supplier alliances provide a framework for strategic collaboration, ensuring open communication channels and faster resolution of problematic issues and higher responsiveness (Mentzer, Foggin and Golicic 2000). A strategic alliance emphasizes direct long-term associations that encourage mutual planning and problem solving efforts between the firm and its suppliers (Gunasekaran, Patel and Tirtiroglu 2001; Li, Ragu-Nathan, Ragu-Natha and Rao 2006).

The starting point for defining Supplier Relationship Management is a recognition that these various interactions and coordinations with suppliers are not discrete and independent – rather they are accurately, acutely and usefully thought of as comprising a relationship, one which can and should be managed in an organized coordinated fashion across functional and business unit. SRM is the systematic, complete and sophisticated enterprise wide assessment of suppliers.

Literature Review

It also deals with their assets and capabilities with respect to overall corporate business strategy, determination of what activities to engage in with different suppliers, designing plans to meet those strategies and planning and execution of all interactions with suppliers, in a coordinated fashion across the relationship lifecycle, in order to maximize the value realized through those interactions. The focus of Supplier Relationship Management is to develop mutually beneficial relationships with strategic supply partners to deliver and furnish greater levels of innovation and competitive advantage than could be achieved by operating independently and in an isolated manner or through a traditional, transactional purchasing arrangement.

“In spite of the Internet environment in which all forms of information can be shared at the click of a mouse, supply chain constituents will cling to their databases and only share what they think is inconsequential as they gather all they can to enhance their performance. The new thinking says that attitude prevents you from getting to the hidden values and savings that could come from a more open, sharing relationship. Important parts of the database that help both parties should be opened and shared through an interactive extranet designed for such a purpose. That knowledge, gained by whatever means, becomes a crucial element in SRM.” (An Advanced Supply Chain Management Technique, Charles C. Poirier)

Keeping under consideration the research that has been carried out on Supplier Relationship Management, buyer and supplier relationship can be divided into two major types: “adversarial competitive” and “collaborative partnership”. Firstly, Shapiro (1986) claims “The main goal of the traditional adversarial approach is to minimize the price of purchased goods and services”. Therefore in this relationship, in order to obtain a higher bargaining position compared to other suppliers, the buyer keeps a big number of suppliers and make only short-term contracts. In this case, buyer does not use total resources of the supplier but only some and thus suppliers have less possibility to provide value-added services, technology gains and other methods of gaining competitive advantage to buyer. Therefore it is not likely lead to collaborative long-term relationship. Later Mayhew (1985) suggested that “Buyers should not only consider price-based criteria, but should consider more about Performance criteria, such as quality and delivery for the relationship between buyer and supplier.” Morgan (1987) observed “Customers shift from an

arm length relationship (a number of competing suppliers) to closer collaborative relationship. In order to move forward collaborative relationship, it is requiring trust, commitment and willingness to share risks in long-term cooperation “. Especially for effective collaboration, good communication is needed at all levers and information should be shared in an open way. Also continuous inter-and intra-improvements are needed. Ellram (1990) recommended “ Four important factors that should be considered when it comes to buyers and supplier partnerships. These factors are (1) financial issues, (2) organizational culture (3) strategy and (4) technology.” These crucial factors are relatively more qualitative and longer term than factors which are involved in classical supplier evaluation models. Also, these factors can play supplement role rather than replace, it helps to developing strategic partnerships with vendors and suppliers.

“ When relational aspects of a buyer-supplier relationship begin to appear, interdependence and bilateral communication develop and anticipation of conflict arises “(Dwyer, Schurr and Oh 1987).In the context of supply chain management , a feature that has attracted increasing attention among the industrialists have been the area of Relative Development between buying firm and suppliers which can be elaborated as ” Supplier development activities appear to differ fundamentally to the degree in which buying firm invests in the effort “ (Krause , Scannel and Calantone 2000).

Many big corporate companies have realized that it is worthwhile investing to make sure these supplier relationships are managed efficiently and effectively. In recent years, companies have invested in supply chain management (SCM) software to automate procurement processes, improve delivery times , reduce the cost of doing business and thus obtain increased customer satisfaction level. Now, market trends, such as increased shorter product lifecycles , global competition, and a move to outsource business processes, require organizations to improve collaboration with their supplier base and to examine methods of further reducing the costs associated with supplier buyer relationships.

A straightforward example of where supplier relationships are critical to the buying organization is in the product development process. If materials, parts or services cannot be supplied to meet the design requirements, production deadlines or at an acceptable cost, then the product development team must go back to the drawing board.

Another observed trend that indicates the need for effective supplier relationship management is the move by enterprises to outsource or offshore key functions, from design to product assembly to after-sales service, in order to improve competitiveness , market share and financial performance. Gartner describes this use of contract manufacturing and other unconventional supplier relationships as 'virtualization'.

One big trend of supplier management for manufacturers in these industries is to involve their suppliers in their secretive new product development processes, which is justifiably called “supplier involvement in new product development”—abbreviated as SINPD hereafter— notwithstanding the possibilities of losing bargaining power, leakage of key information, and financial burden on the manufacturer’s part. Seunghwa Chung , Gyeong Mook Kim (2003)

“Conflict resolution mechanisms include a spectrum of constructive and destructive methods. These methods include joint problem solving, which enhances partnership success; smoothing over or ignoring/avoiding issues, which does not eliminate the source of the problem and often results in renewed or larger-scale conflict; and severe methods such as coercion or confrontation, which are destructive to relationships “ (Mohr and Spekman 1994; Monczka et al. 1998). It focuses on the clustering of firms and the competitive advantage which they derive from local external economies and joint action, captured in the concept of collective efficiency. The role of suppliers has changed drastically since the advent of 20th century. The relationship between suppliers and firms have evolved in a new and impressive frame and companies now emphasize towards reducing the number of suppliers in order to have better control and to better manage the strategic relationship with suppliers aiming at their development along with their own.

“Cooperative relationships seek to establish open lines of communication, nurture and sustain longer relationships between trading partners, and develop mechanisms to resolve conflicts such that business relationships are maintained to the mutual benefit of both buyers and suppliers “ (Cannon and Homburg 2001; Manev and Stevenson 2001; Ramaseshan and Loo 1998; Spekman 1988)

Since Suppliers directly impact both ways the cost, quality, speed , customization , technology, delivery, revenue , flexibility, service , reputation and profits of the firms that incorporate the suppliers’ outputs into their final product . Dwyer, Schurr and Oh (1987) put forward a framework of relationship development that characterizes and symbolizes the process moving through four interrelated integrated stages: ‘awareness, exploration, expansion and commitment.’ “The specific development stage of a buyer-supplier relationship influences the extent of supply chain partners’ involvement in supply chain initiatives because, as time passes, involvement usually increases “ (Romano 2003).

The development of a buyer-supplier relationship is basically a sequentially oriented step by step process. The idea of a process means that the stages being experienced by buyers and suppliers are progressive and systematic , suggesting potential change in relationship variables from one stage to another. Cannon and Homburg (2001) argued that “ studying the time dimension in buyer-supplier relationships is important because the effects of supplier behavior “ (e.g., communication quality, information sharing, conflict resolution) on a buyer-supplier relationship are contingent on the relationship development stage. “ Relationship development is a progression through increases of resource commitment and interdependence “ (Rao and Perry 2002).

“Supplier development has become a viable supply chain management practice across industries as firms continue to focus on their core competencies and outsource a significant percentage of the costs of goods sold. Supplier development practices used by buying firms include formal supplier assessment and feedback, supplier incentives, competitive pressure, and direct involvement in improving performance through activities such as training and investment “. (The journal of Supply Chain Management , Daniel R. Krause and Thomas V Scannal 2002) According to social penetration theory, “ relationships develop and progress through increases in depth and breadth of information exchanged “ (Parsons 2002).

Empirical findings point out that relationship progression, success and history depends on buyer-supplier relationships (Wathne, Biong and Heide 2001).

A positive reputation can be a source of competitive advantage (Rindova, Williamson, Petkova and Sever 2005; Hansen, Samuelson and Silseth 2008) and financial performance (Carr and Pearson 1999; Roberts and Dowling 2002; Eberl and Schwaiger 2005). Additionally, uncertainty in buyer-supplier relationships can be reduced when suppliers are evaluated based on their reputation (e.g., Rindova et al. 2005). On the other hand, a negative reputation is negatively related to relationship values such as trust (e.g., Anderson and Weitz 1989). While the consequences of positive or negative reputations are generally understood from a strategic management and marketing perspective, there is limited understanding about the consequences of a buying firm's perception of a supplier's reputation in a supply chain management context.

The industrial procurement models from the works of Robinson, Faris and Wind (1967), Webster and Wind (1972), and Sheth (1973) each contain buyer firm size as an organizational influence on the industrial procurement process. The actual goal is to enhance the relationship between buyers and suppliers. "In relational exchanges, the real value of a relationship is linked not only to revenue or volume but more importantly to the mutual acknowledgment and acceptance that the success of each firm depends in part on the other firm" (Anderson and Narus 1990; Christopher and Jüttner 2000).

As far as this particular paper is concerned we are targeting SMEs and their Supplier Relationship with MNCS. The successful establishment of SMEs and their subsequent evolution and development has long been a source of interest and concern for researchers, government and policy makers because SMEs are increasingly important to the economic growth of the economy and stability of a country. "Smaller organizations depend more on personal, noncommercial information sources for purchasing than do larger organizations. Because smaller organizations have lower budgets and fewer personnel to devote to the acquisition and accumulation of internally generated information, they seek information more actively from industry colleagues and other sources outside their organizations" (Moriarty and Spekman 1984).

"Growth can also take the form of personal development of management and employees, technology innovation, and professional recognition" (Orser et al., 1996), whilst Hakim (1989) makes a distinction between businesses which are actively attempting to grow and those which are not. Westhead and Birley's findings, which are echoed in other work (e.g. Freel, 1997a), tend to support Porter's general contention, "It is a market conditions and the structure of competition that are the main determinants of SME growth."

Similarly in this context, Paul JA Robson, 2006 wrote "The main positive relationships of advice and performance are dominated by private sector sources such as lawyers, suppliers, customers and business friends/relatives. Collaborative arrangements with suppliers nationally/internationally have a strong positive relationship with employment and turnover growth; collaboration with local suppliers has a strong positive relationship with growth in profitability. There is little evidence of statistically significant relationships between government-backed providers of business advice such as Business Link and firm performance."

Elaborative and descriptive research in supplier and vendor selection has used a variety of methodologies including “mathematical programming” (e.g., Turner 1988; Pan 1989), “weighted average methods” (Timmerman 1986; Thompson 1990), “payoff matrices” (Soukup 1987), and the “analytic hierarchy process” (Narasimhan 1983; Nydick and Hill 1992; Barbarosoglu and Yazgac 1997). Additionally, a number of studies have examined the criteria used by buying firms to assess supplier performance (e.g., Monczka and Trecha 1988; Giunipero and Brewer 1993; Watts and Hahn 1993; Walton et al. 1998; Carr and Pearson 1999). This dissertation deals with Data Envelopment Analysis of the suppliers; both those doing business with Siemens Pakistan and those who don't. It aims to establish certain facts pertaining to the growth of suppliers after doing business with Large Multinational Corporations.

Data Envelopment Analysis

Data Envelopment Analysis (DEA) is a Linear Programming based technique for the analysis of efficiency of organizations or simply suppliers with multiple inputs and outputs. In about 30 years, Data Envelopment Analysis (DEA) has grown into a powerful quantitative, analytical tool for measuring and evaluating the performance. DEA has been successfully applied to a host of many different types of entities engaged in a wide variety of activities in many contexts worldwide. here are also parametric approaches which are used for the estimation of production frontiers These require that the shape of the frontier be guessed beforehand by specifying a particular function relating output to input. One can also combine the relative strengths from each of these approaches in a hybrid method (Tofallis, 2001) where the frontier units are first identified by DEA and then a smooth surface is fitted to these. This allows a best-practice relationship between multiple outputs and multiple inputs to be estimated.

"DEA has been used for both production and cost data. Utilizing the selected variables, such as unit cost and output, DEA software searches for the points with the lowest unit cost for any given output, connecting those points to form the efficiency frontier. Any company not on the frontier is considered inefficient. A numerical coefficient is given to each firm, defining its relative efficiency. Different variables that could be used to establish the efficiency frontier are: number of employees, service quality, environmental safety, and fuel consumption. An early survey of studies of electricity distribution companies identified more than thirty DEA analyses—indicating widespread application of this technique to that network industry. (Jamasp, T. J., Pollitt, M. G. 2001). A number of studies and research using this technique have been published for water utilities. The main advantage to this method is its ability to accommodate a multiplicity of inputs and outputs. It is also useful because it takes into consideration returns to scale in calculating efficiency, allowing for the concept of increasing or decreasing efficiency based on size and output levels. “ A drawback of this technique is that model specification and inclusion/exclusion of variables can affect the results.” (Berg 2010)

Questionnaires were made and distributed to Suppliers from manufacturing industries of both genre, those who deal with Siemens Pakistan and those who don't. Some of them were contacted directly with personal visits, others were approached through [LinkedIn](#) and later coordinated through telephone. The questionnaires targeted basic information of the company, their principal business, information pertaining to ISO Certification, Revenue Generation per year, Fixed

Survey Method Used assets as per the fiscal year 2012, Manpower, Manpower skill level (which was taken as number of Bachelor Engineers working in the organization) and some questions relating to Quality Management System, Training Program, Change Control, Deviation \ Investigation Reporting, Warehouse management and other parameters as well. Since we are dealing with Hypotheses related to Revenue Generation, Assets, Manpower & Manpower skill level only we will be sticking to that information into our Analysis later. Keeping into consideration the confidentiality limitations of the companies the questions were designed to be answered in the form of ranges for the convenience of the suppliers. List of companies whose data was gathered after the survey were as under

List of Companies / Suppliers

Dealing with Siemens Pakistan

Fine Gases



Jubilee Corporation



Cool point



IIL



Pakistan Cables



Imperial Engineering



Panasian Group



Standard Computers



Not Dealing with Siemens Pakistan :

SYSNET



Industrial Powertech



Zainel Automation



Baig Engineering



Allied International



R.A Engineering



S.NA Industries



Keeping under consideration the hypotheses , we begin our analysis.

Analysis

The data as mentioned earlier was collected through the questionnaires and gathered. Among these companies whose data is to be analyzed 8 of them are those that do business with Siemens Pakistan and 7 of them are those that don't do business with Siemens Pakistan. Now using Data Envelopment Analysis , I shall be analyzing the acquired data and thus will be showing some results to prove my hypothesis regarding the following parameters :

Assets

Revenue Generation

Man power

Man power skill level

Pre Analysis Assumptions & Justifications :

Here I must mention that from the data collected which was in the form of ranges for the convenience of the companies , I have scaled the numbers so that all of them meet the definite criteria as required for the software to perform. For example revenue generation between 4-5 millions is taken as 4500000 and between 2-3 millions is taken as 2500000 for our convenience . Similarly for manpower the ranges are scaled to the upper limit for better understanding and for our convenience. No.of employees < 25 are taken as 25 , between 25 and 50 are taken as 50 , between 50 and 100 are taken as 75 and greater than 100 are taken as 100. And for the manpower skill level which incorporates for the No. of bachelor Engineers in the organization , The ranges are again scaled to upper limit to meet the requirements of the software and for better understanding. For example skill level < 5 is taken as 5 , between 5-10 is taken as 10 ,between 10-15 is taken as 15 etc.

This will help us to elaborate the result more efficiently and will give us the clear picture to solve our analysis.

Data envelopment analysis (DEA), occasionally called frontier analysis, was first put forward by Charnes, Cooper and Rhodes in 1978. It is a performance measurement technique which, as we shall see, can be used for evaluating the *relative efficiency* of *decision-making units (DMU's)* in organizations. Here a DMU is a distinct unit within an organization that has flexibility with respect to some of the decisions it makes, but not necessarily complete freedom with respect to these decisions.

Data Envelopment Analysis (DEA) measures the relative efficiencies of organizations with multiple inputs and multiple outputs. The organizations are called the decision-making units, or

DMUs and the parameters on which results are judged are taken as Indices. Here in this analysis we have taken DMUs as the companies (suppliers) and indices as the factors on which our hypotheses depend, i.e. Assets, Manpower, Revenue Generation and Manpower skill level. Since this software also gives us the freedom to calculate the efficiency of DMUs we will be later working in order to calculate the efficiency but since the tables have to be defined before analysis begins I have introduced a table Ratio of Manpower given as a Ratio of Manpower to Manpower Skill level which will tell us the correct data pertaining to how many workers are skilled in the company out of the total workers.

This is how the table looks after we have set the fields accordingly with the respective indices.

Welcome Syed Adeel Hussain. ([Home](#) - [Logout](#) - [Account](#) - [You're Visible](#)) [Step by Step Guide](#)



Main

- New project
- Open project
- Change password
- User detail
- Upgrade account
- About us
- Logout

Project

- Data viewer**
- Solve
- Options
- Import/Export

Reports

- Data statistics
- Data plot

Efficiency

- Efficiency Plot
- References

Project : My Thesis Work

Add Row [Data Statistics](#)

Name	Active	Assets	Manpower	Manpower	Revenue C	Ratio Manp	
Unit		Not Acti ▾	Not Acti ▾	Not Acti ▾	Not Acti ▾	Not Acti ▾	
Cool point	<input checked="" type="checkbox"/>	5500000	100	15	2500000	6.667	Delete
Fine Gase:	<input checked="" type="checkbox"/>	5500000	100	15	5500000	6.667	Delete
Panasian C	<input checked="" type="checkbox"/>	5500000	100	25	4500000	4	Delete
Standard C	<input checked="" type="checkbox"/>	500000	25	5	4500000	5	Delete
Jubilee Co	<input checked="" type="checkbox"/>	5500000	25	15	4500000	1.667	Delete
Imperial Er	<input checked="" type="checkbox"/>	4500000	50	15	4500000	3.33	Delete
IIL	<input checked="" type="checkbox"/>	9500000	75	25	9500000	3	Delete
Pakistan C	<input checked="" type="checkbox"/>	4500000	100	25	7500000	4	Delete
R.A. Enqin	<input checked="" type="checkbox"/>	5500000	25	5	5500000	20	Delete
Allied Inter	<input checked="" type="checkbox"/>	1500000	25	5	4500000	5	Delete
S.NA Indus	<input checked="" type="checkbox"/>	3500000	25	5	500000	5	Delete
Industrial P	<input checked="" type="checkbox"/>	1500000	25	5	3500000	5	Delete
Zainel Autc	<input checked="" type="checkbox"/>	2500000	25	5	1500000	5	Delete
Sysnet	<input checked="" type="checkbox"/>	8500000	50	20	7500000	2.5	Delete
Baiq Enqin	<input checked="" type="checkbox"/>	1500000	25	5	2500000	5	Delete
		Delete	Delete	Delete	Delete	Delete	

≤ 1 ≥

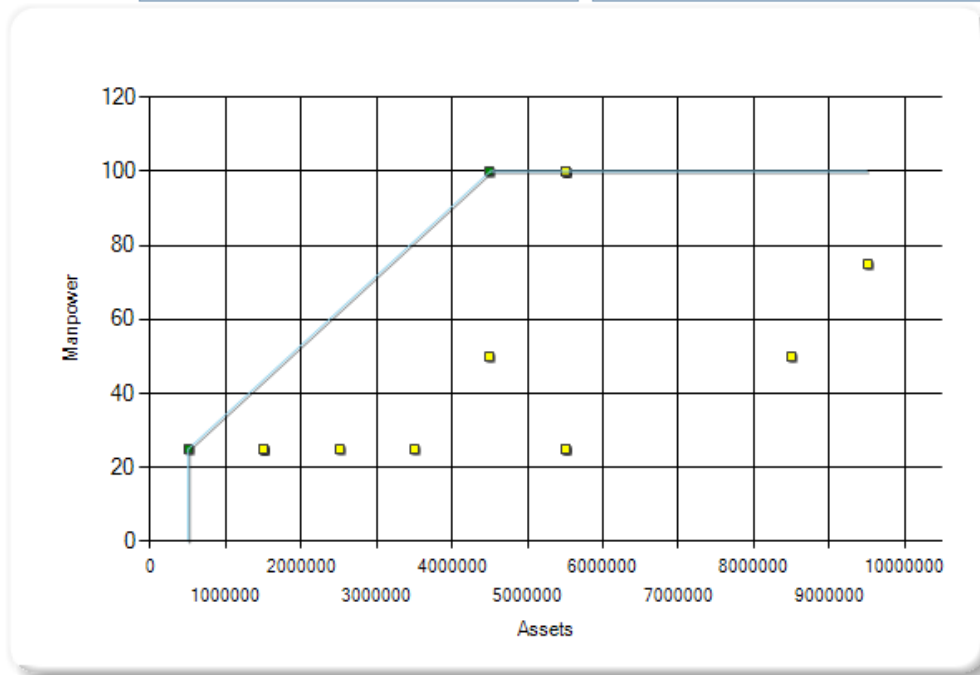
Now we can proceed with our analysis but lets us first find out the mean and standard deviation of the Values.

Name	Minimum	Maximum	Mean	Standard Derivation
Assets	500000	9500000	4366666.6667	2499777.7679
Manpower	25	100	51.6667	32.2318
Manpower Skill Level	5	25	12.6667	7.9303
Revenue Generation	500000	9500000	4566666.6667	2293953.4045
Ratio Manpower to Manpower Skill level	1.667	20	5.4554	4.1117

Now we will be proceeding with the analysis of the indices or simply the factors which we have to work on. We will be correlating each factor with another one so that we may see the impact of one factor over the other.

Correlation between Assets & Manpower :

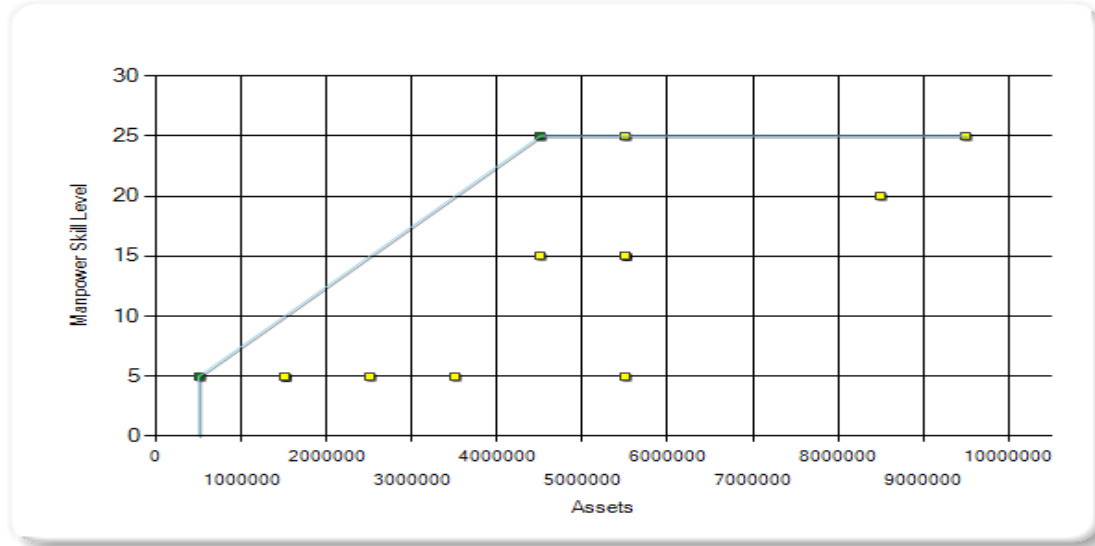
Correlation (Assets, Manpower) : 0.5199



This is the result obtained when correlating assets and manpower i.e. an increase in one value causes an increase in the other. As assets increase it gives you more leverage to have more manpower or similarly as manpower increases, productivity increases which gives the chance to acquire more assets

Correlation between Assets & Manpower Skill Level :

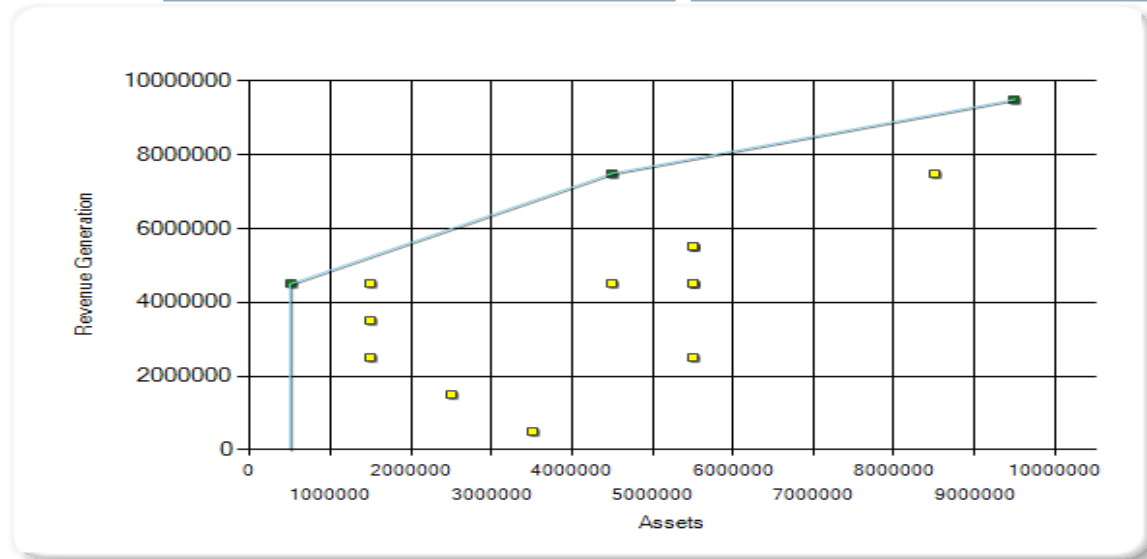
Correlation (Assets , Manpower Skill Level) : 0.7578



Again a similar trend is observed. Increase in assets incorporates for increase in skill level of workforce. The more skilled the workforce is the more efficient is the learning curve and so higher productivity can be attained in lesser amount of time.

Correlation between Assets & Revenue Generation :

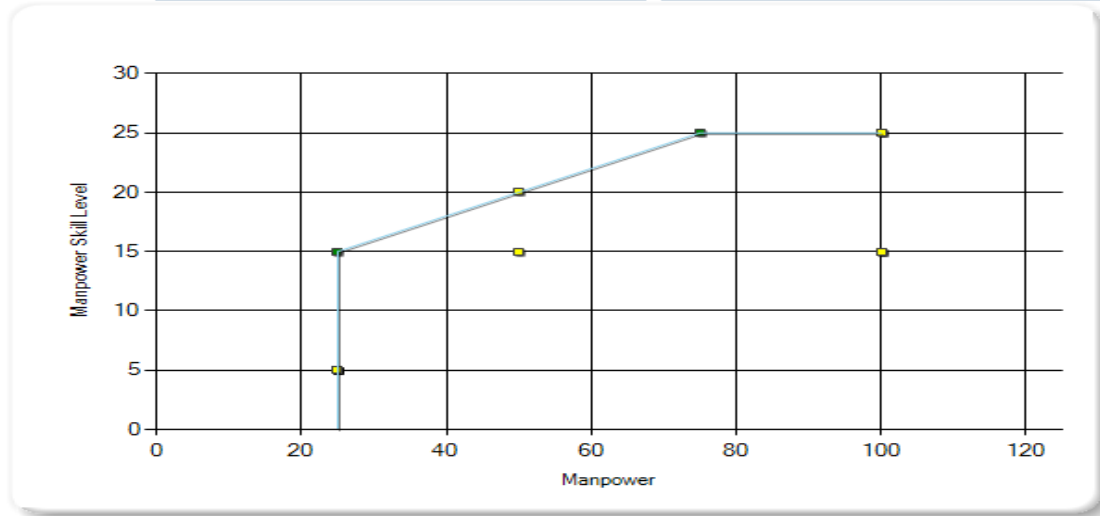
Correlation (Assets , Revenue Generation) : 0.6526



Again, as we can see as the assets tend to increase the revenue generation also increases which shows the companies having higher assets usually have higher revenue generation as compared to those having lower assets. The more the assets, the more the outcome you can generate.

Correlation between Manpower & Manpower Skill level :

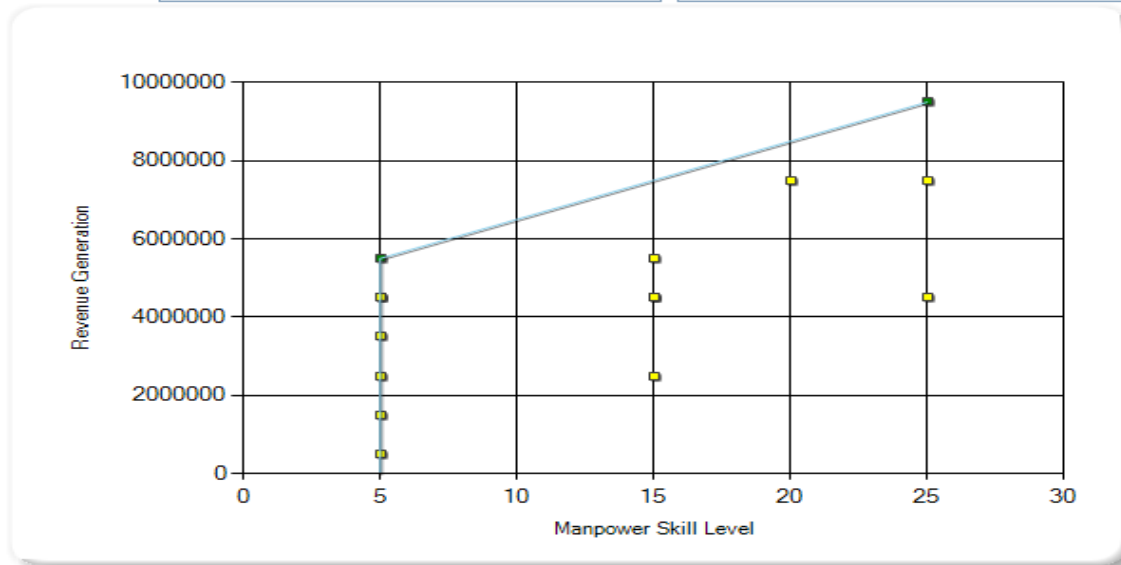
Correlation (Manpower , Manpower Skill Level) : 0.7977



Naturally an increase in manpower will make for more qualified persons and hence naturally the two show positive correlation.

Correlation between Manpower Skill level & Revenue Generation :

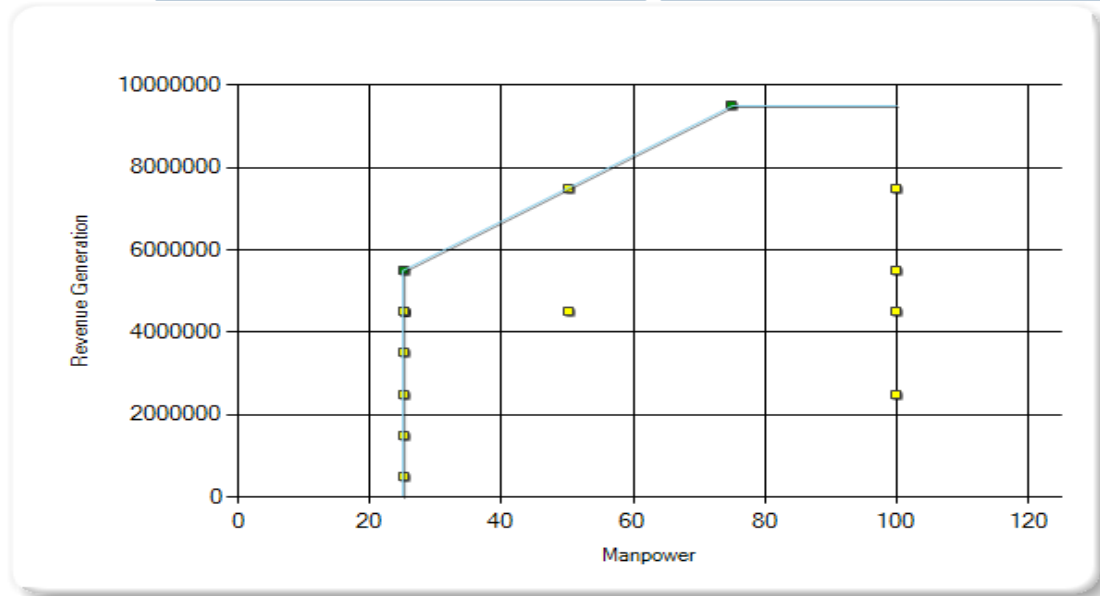
Correlation (Manpower Skill Level , Revenue Generation) : 0.6865



A very strong correlation which provides evidence to the fact that Increase in Manpower Skill level results in an increase in revenue generation.

Manpower & Revenue Generation :

Correlation (Manpower , Revenue Generation) : 0.4042



A relatively weak but still it's a positive correlation showing an increase in manpower is associated with an increase in revenue generation. An increase in manpower makes for higher revenue generation.

We have thus far analyzed the four factors with their effects on each other and have observed that these four factors Revenue Generation , Manpower , Manpower Skill Level and Assets of an organization are moderately showing positive correlation if not a strong correlation which provides us the platform to proceed.

Efficiency :

Now since Data Envelopment Analysis is a tool specially designed to find out the efficiency of suppliers , we can thus perform the analysis which will tell us how efficient these suppliers are with respect to each other.

Efficiency (Taking Revenue Generation & Assets as o/p : Man power Skill level as i/p)

Result

Report Name: Number of decimals :

Problem solved successfully.

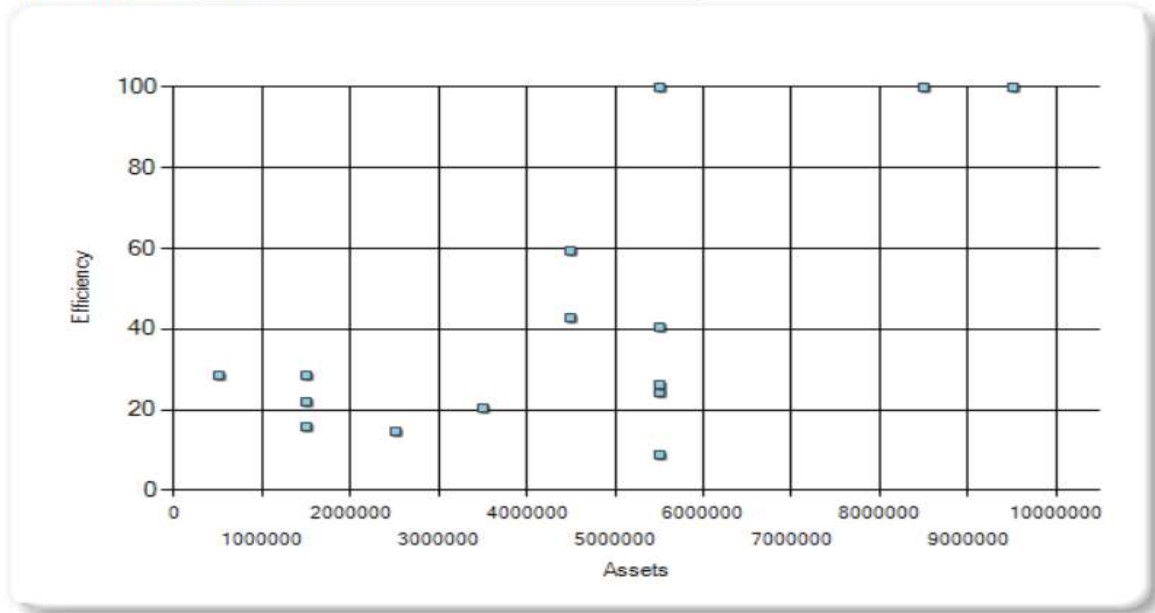
Show All [Efficients](#) [Inefficients](#)

	Efficiency	Graph	
Cool point	24.3 %	<div style="width: 24%; background-color: blue; color: white; text-align: center;">24%</div>	
Fine Gases	26.1 %	<div style="width: 26%; background-color: blue; color: white; text-align: center;">26%</div>	
Panasian Group	40.4 %	<div style="width: 40%; background-color: blue; color: white; text-align: center;">40%</div>	
Standard Computers	28.4 %	<div style="width: 28%; background-color: blue; color: white; text-align: center;">28%</div>	
Jubilee Corp.	100 %	<div style="width: 100%; background-color: blue; color: white; text-align: center;">100%</div>	✓
Imperial Engineering	42.7 %	<div style="width: 43%; background-color: blue; color: white; text-align: center;">43%</div>	
IIL	100 %	<div style="width: 100%; background-color: blue; color: white; text-align: center;">100%</div>	✓
Pakistan Cables	59.2 %	<div style="width: 59%; background-color: blue; color: white; text-align: center;">59%</div>	
R.A. Engineering	8.7 %	<div style="width: 9%; background-color: blue; color: white; text-align: center;">9%</div>	
Allied International	28.4 %	<div style="width: 28%; background-color: blue; color: white; text-align: center;">28%</div>	
S.NA Industries	20.6 %	<div style="width: 21%; background-color: blue; color: white; text-align: center;">21%</div>	
Industrial Powertech.	22.1 %	<div style="width: 22%; background-color: blue; color: white; text-align: center;">22%</div>	
Zainel Automation	14.7 %	<div style="width: 15%; background-color: blue; color: white; text-align: center;">15%</div>	
Sysnet	100 %	<div style="width: 100%; background-color: blue; color: white; text-align: center;">100%</div>	✓
Baiq Engineering	15.8 %	<div style="width: 16%; background-color: blue; color: white; text-align: center;">16%</div>	

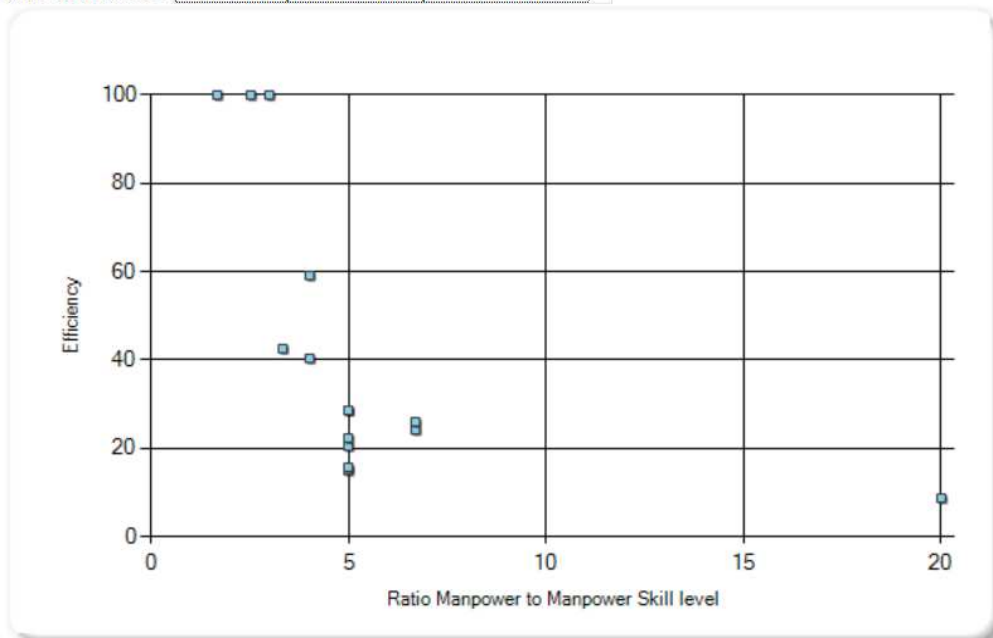
✓ : Efficients

Efficiency Plots :

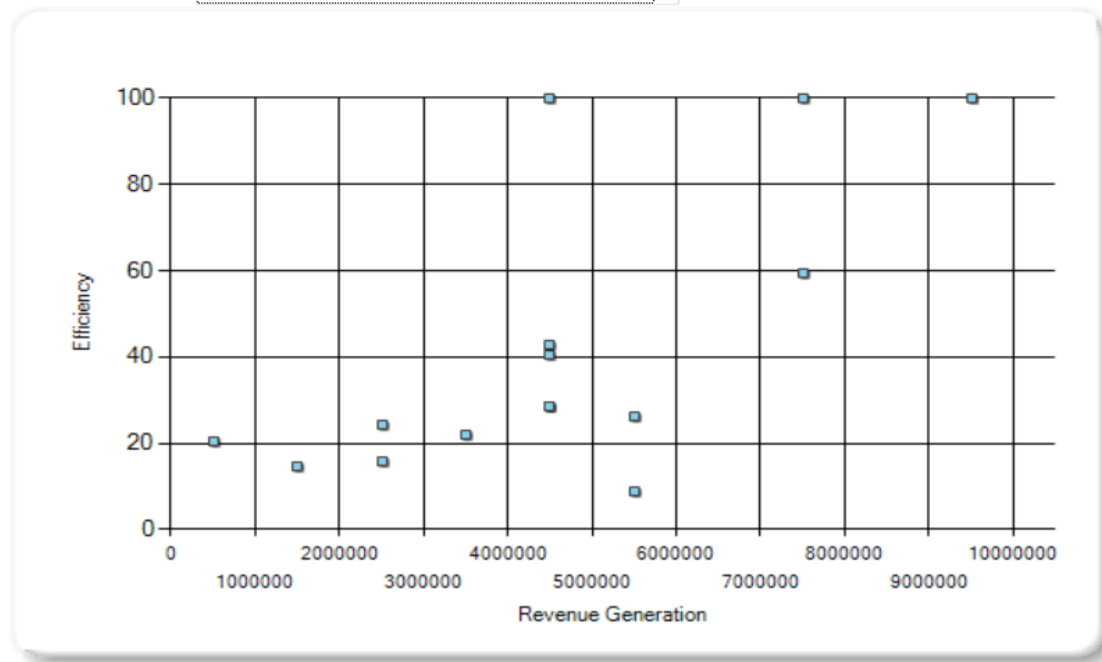
I. With respect to Assets :

Report Name: Selected index : 

II. With respect to Ratio of Manpower to Manpower Skill Level :

Report Name: Selected index : 

III. With respect to Revenue Generation :

Report Name: Selected index : 

Referencing

Report Name:

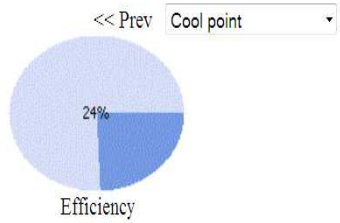
	Peer Group	Frequencies	
Cool point	Sysnet	0	✓
Fine Gases	IIL	0	
Panasian Group	Sysnet	0	
Standard Computers	IIL	0	
Jubilee Corp.	Jubilee Corp.	1	✓
Imperial Engineering	IIL	0	
IIL	IIL	9	✓
Pakistan Cables	IIL	0	
R.A. Engineering	IIL	0	
Allied International	IIL	0	
S.NA Industries	Sysnet	0	
Industrial Powertech.	IIL	0	
Zainel Automation	Sysnet	0	
Sysnet	Sysnet	5	✓
Baiq Engineering	IIL	0	

✓ : Referenced

Individual Performance Characteristics

Report Name: **Default**

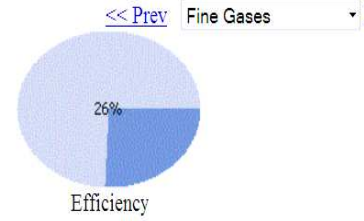
Cool point



Reference Peer Group: Sysnet
Frequency : 0

Report Name: **Default**

Fine Gases



Reference Peer Group: IIL
Frequency : 0

Report Name: **Default**

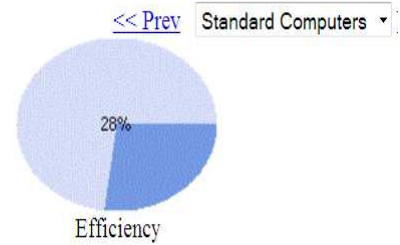
Panasian Group



Reference Peer Group: Sysnet
Frequency : 0

Report Name: **Default**

Standard Computers



Reference Peer Group: IIL
Frequency : 0

Report Name: Default

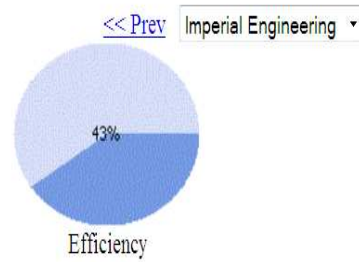
Jubilee Corp.



Reference Peer Group: Jubilee Corp.
Frequency : 1

Report Name: Default

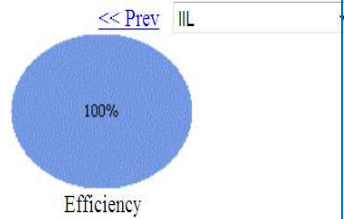
Imperial Engineering



Reference Peer Group: IIL
Frequency : 0

Report Name: Default

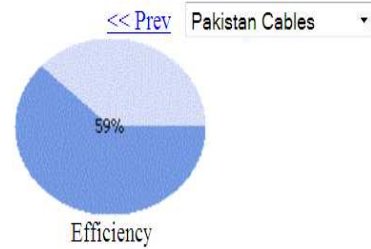
IIL



Reference Peer Group: IIL
Frequency : 9

Report Name: Default

Pakistan Cables

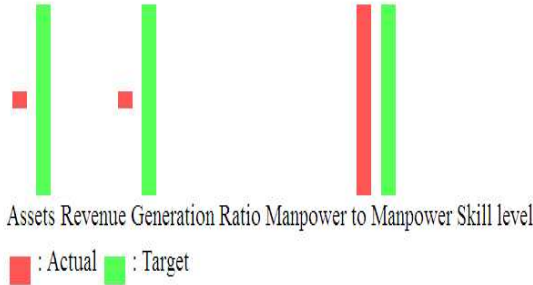
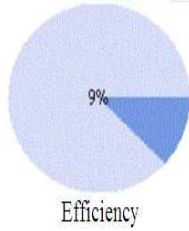


Reference Peer Group: IIL
Frequency : 0

Report Name: Default

<< Prev R.A. Engineering

R.A. Engineering

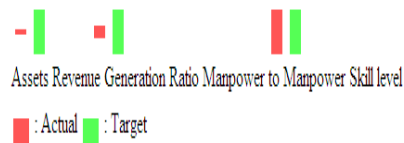
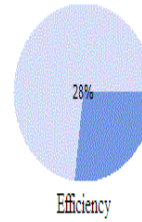


Reference Peer Group: IIL
Frequency : 0

Report Name: Default

<< Prev Allied International

Allied International

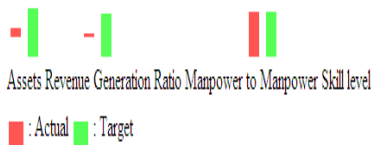
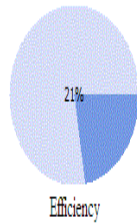


Reference Peer Group: IIL
Frequency : 0

Report Name: Default

<< Prev S.NA Industries

S.NA Industries

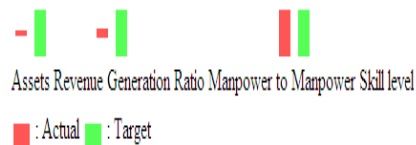
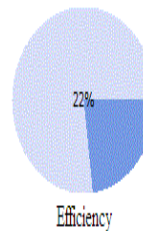


Reference Peer Group: Sysnet
Frequency : 0

Report Name: Default

<< Prev Industrial Powertech.

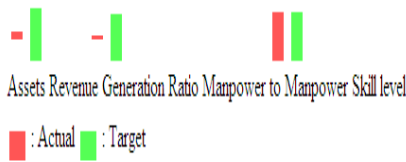
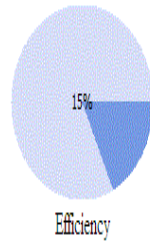
Industrial Powertech.



Reference Peer Group: IIL
Frequency : 0

Report Name: Default

Zainel Automation

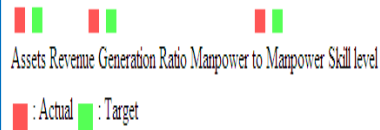


Reference Peer Group: Sysnet
Frequency : 0

<< Prev Zainel Automation

Report Name: Default

Sysnet

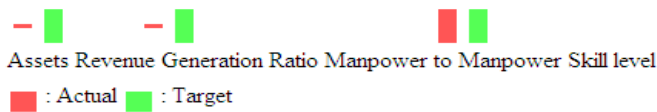
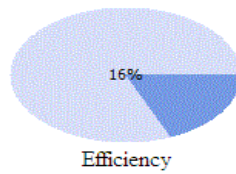


Reference Peer Group: Sysnet
Frequency : 5

<< Prev Sysnet

Report Name: Default

Baiq Engineering



Reference Peer Group: IIL
Frequency : 0

<< Prev Baiq Engineering

Now let us deal with the two groups separately using regression analysis performed through Minitab .

Companies dealing with Siemens:

Project : My Thesis Work

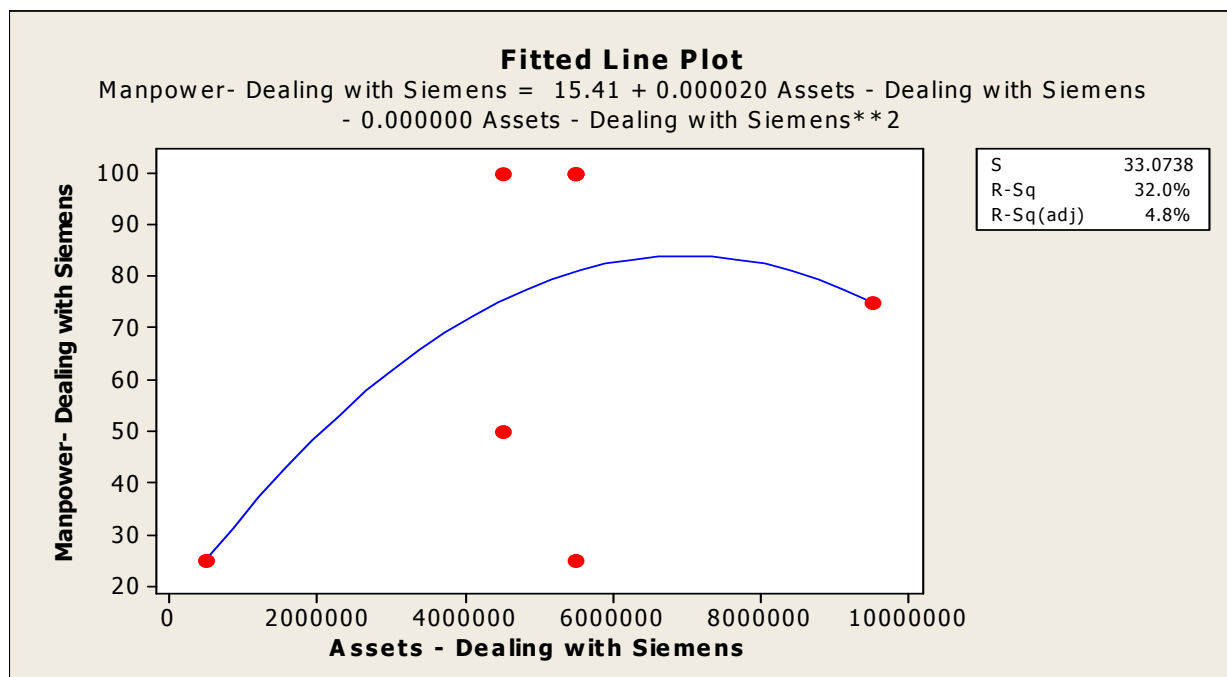
Add Row [Data Statistics](#)

Name	Active	Assets	Manpower	Manpower	Revenue C	Ratio Manp	
Unit		Not Acti	Not Acti	Not Acti	Not Acti	Not Acti	
Cool point	<input checked="" type="checkbox"/>	5500000	100	15	2500000	6.667	Delete
Fine Gase:	<input checked="" type="checkbox"/>	5500000	100	15	5500000	6.667	Delete
Penasian C	<input checked="" type="checkbox"/>	5500000	100	25	4500000	4	Delete
Standard C	<input checked="" type="checkbox"/>	500000	25	5	4500000	5	Delete
Jubilee Co	<input checked="" type="checkbox"/>	5500000	25	15	4500000	1.667	Delete
Imperial Er	<input checked="" type="checkbox"/>	4500000	50	15	4500000	3.33	Delete
ILL	<input checked="" type="checkbox"/>	9500000	75	25	9500000	3	Delete
Pakistan C	<input checked="" type="checkbox"/>	4500000	100	25	7500000	4	Delete
		Delete	Delete	Delete	Delete	Delete	

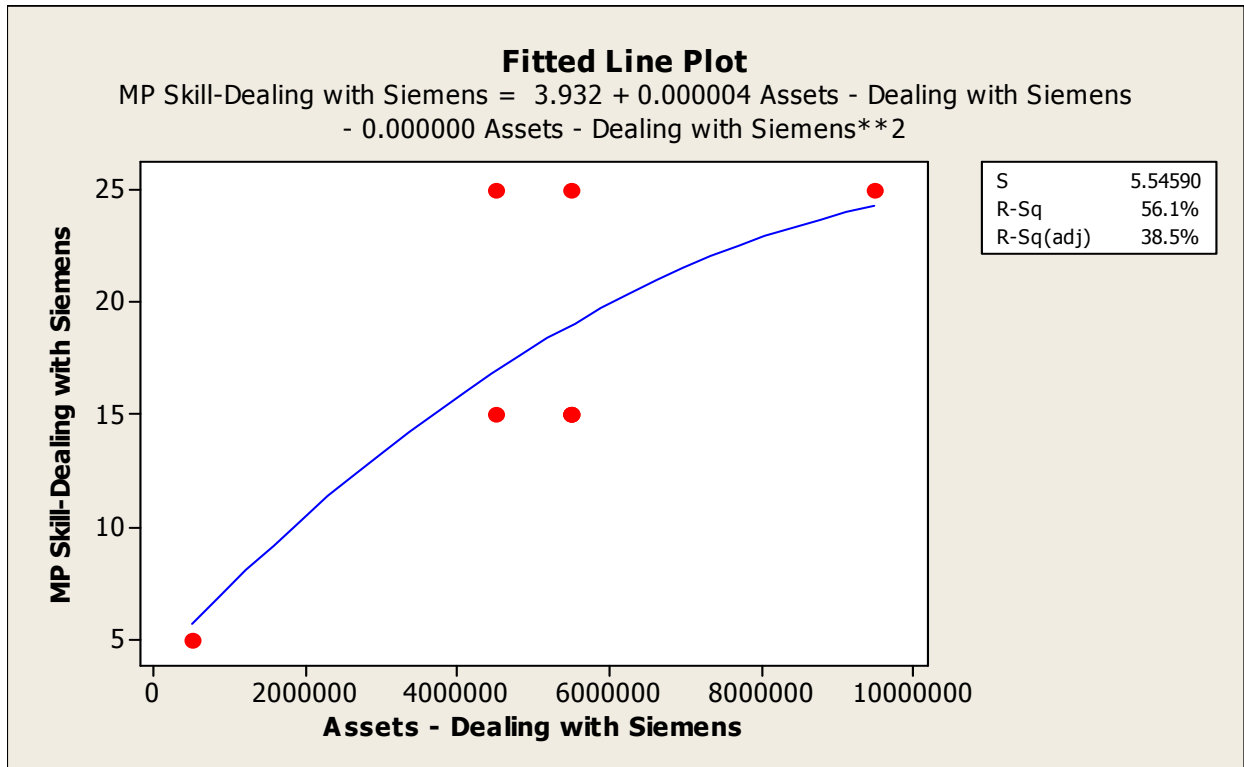
≤ 1 ≥

Save Save & Solve Cancel

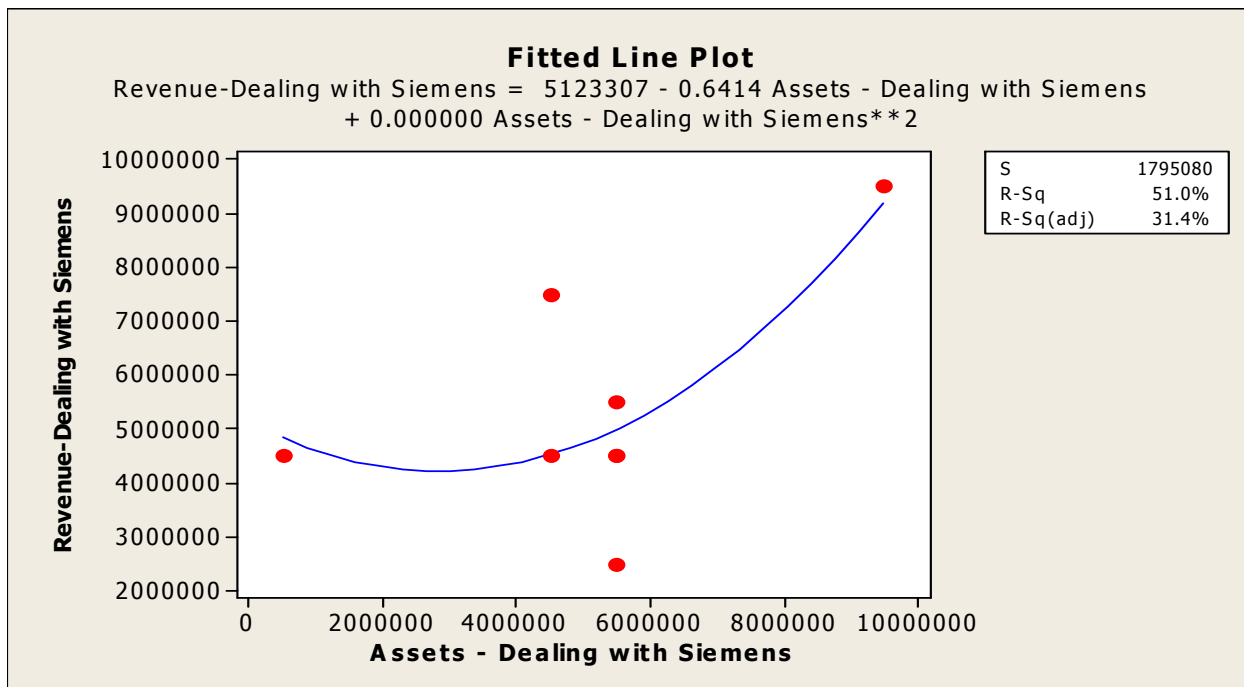
Assets & Manpower



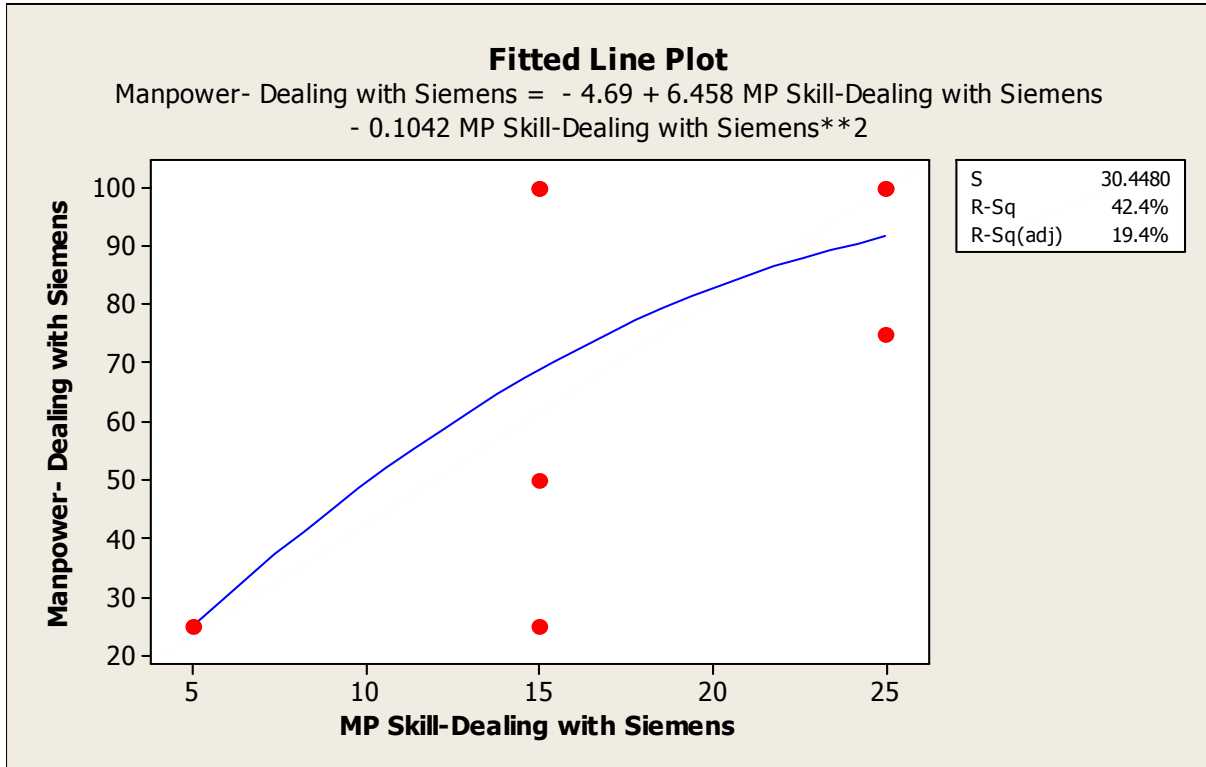
Assets & Manpower Skill Level :



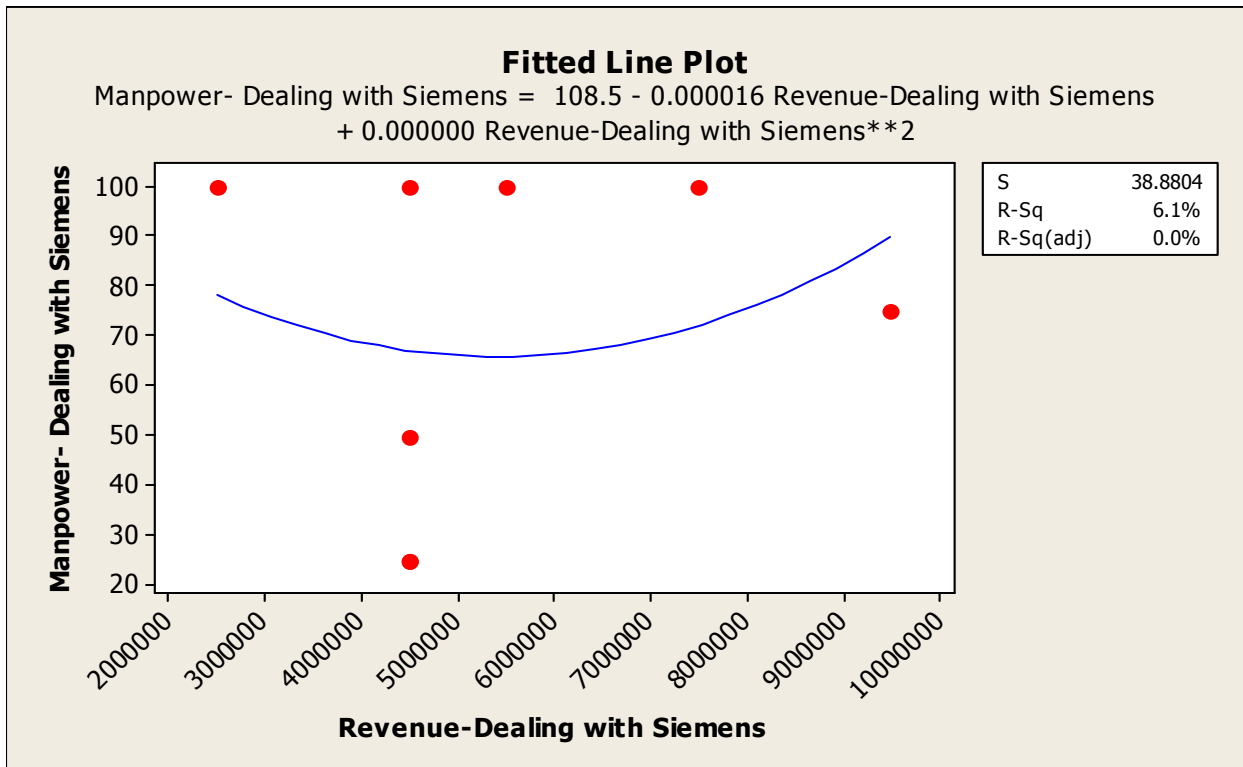
Assets & Revenue Generation:

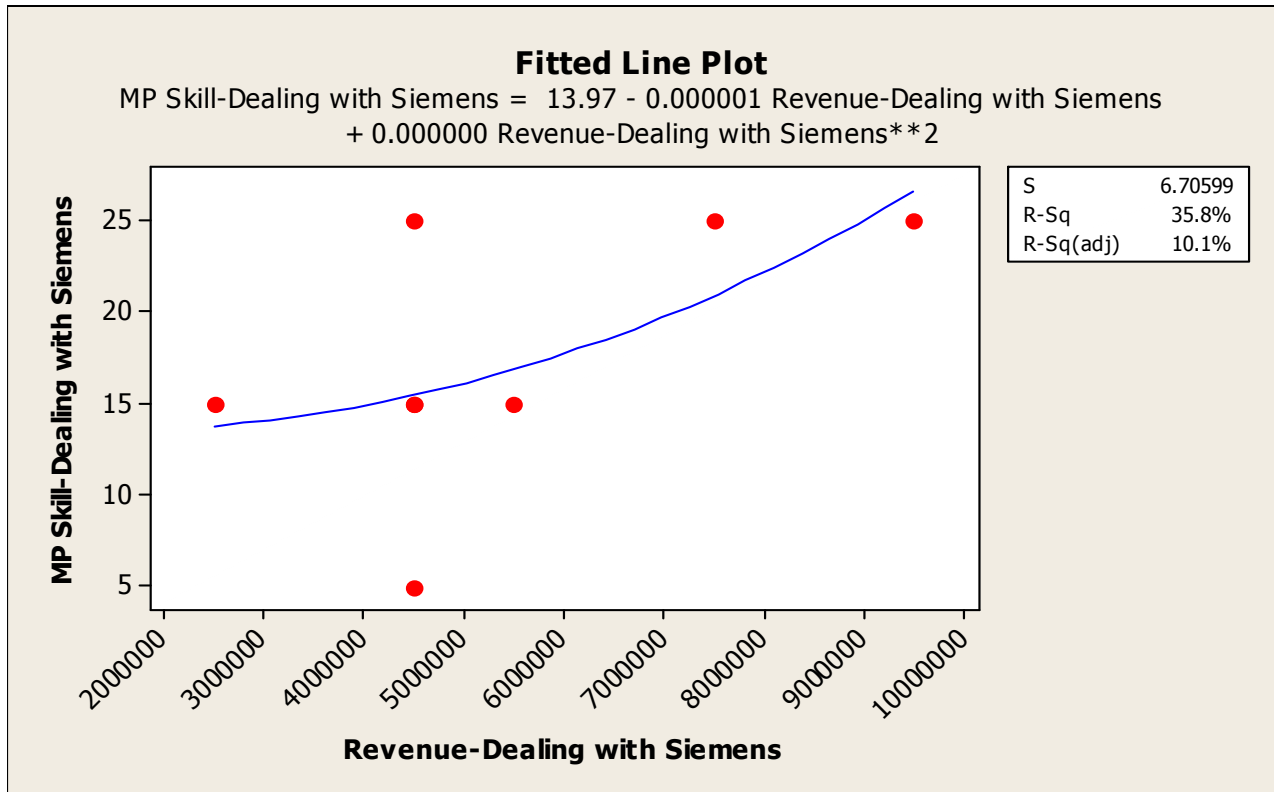


Correlation between Manpower & Manpower Skill Level :



Manpower & Revenue Generation :



Manpower Skill Level & Revenue Generation :

Now performing analysis on companies that are not doing business with Siemens Pakistan.

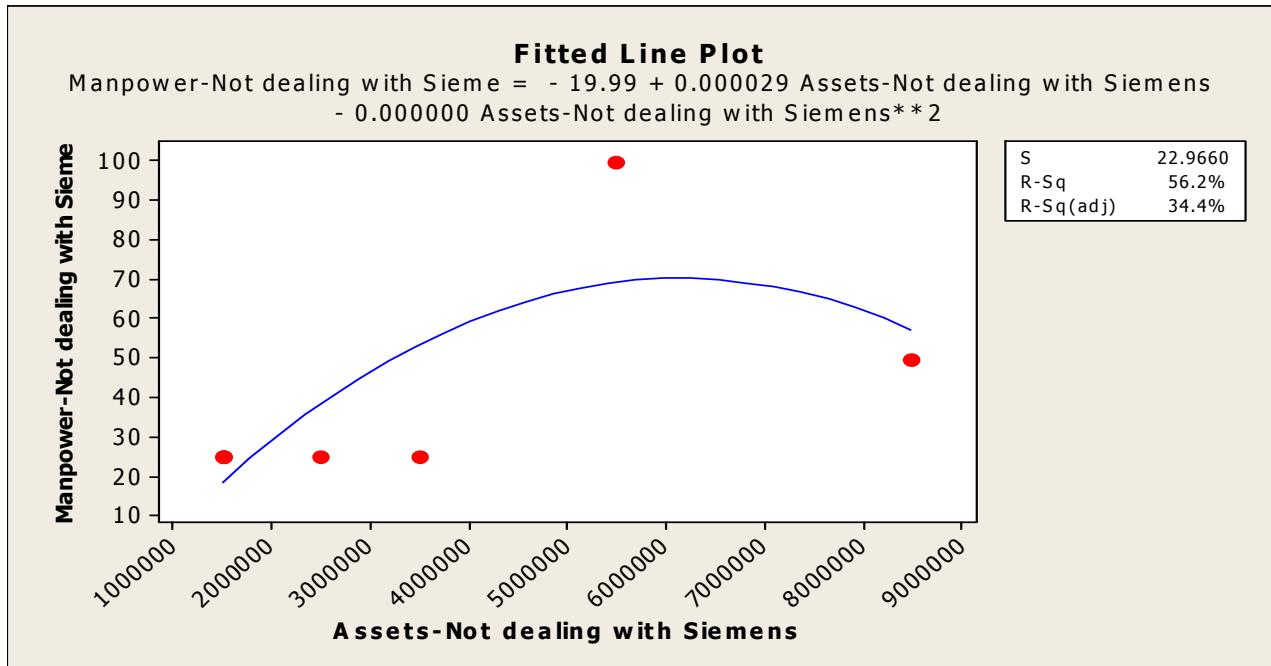
Companies that don't deal with Siemens Pakistan

Project : My Thesis Work

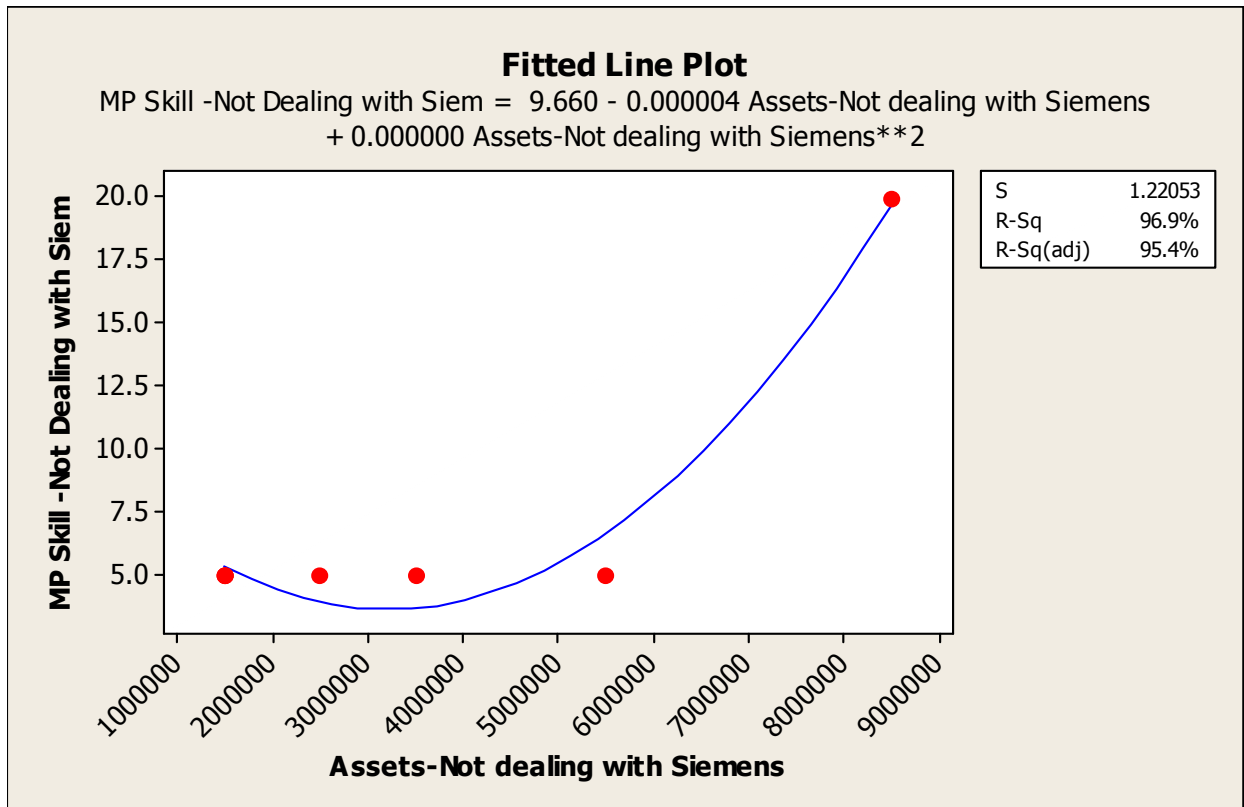
Add [Data Statistics](#)

Name	Active	Assets	Manpower	Manpower	Revenue C	Ratio Manp	
Unit		Not Acti	Not Acti	Not Acti	Not Acti	Not Acti	
R.A Engine	<input checked="" type="checkbox"/>	5500000	100	5	5500000	20	Delete
Allied Interi	<input checked="" type="checkbox"/>	1500000	25	5	4500000	5	Delete
S.NA Indus	<input checked="" type="checkbox"/>	3500000	25	5	500000	5	Delete
Industrial P	<input checked="" type="checkbox"/>	1500000	25	5	3500000	5	Delete
Zainel Autc	<input checked="" type="checkbox"/>	2500000	25	5	1500000	5	Delete
Sysnet	<input checked="" type="checkbox"/>	8500000	50	20	7500000	2.5	Delete
Baiq Enqin	<input checked="" type="checkbox"/>	1500000	25	5	2500000	5	Delete
		Delete	Delete	Delete	Delete	Delete	
≤ 1 ≥							

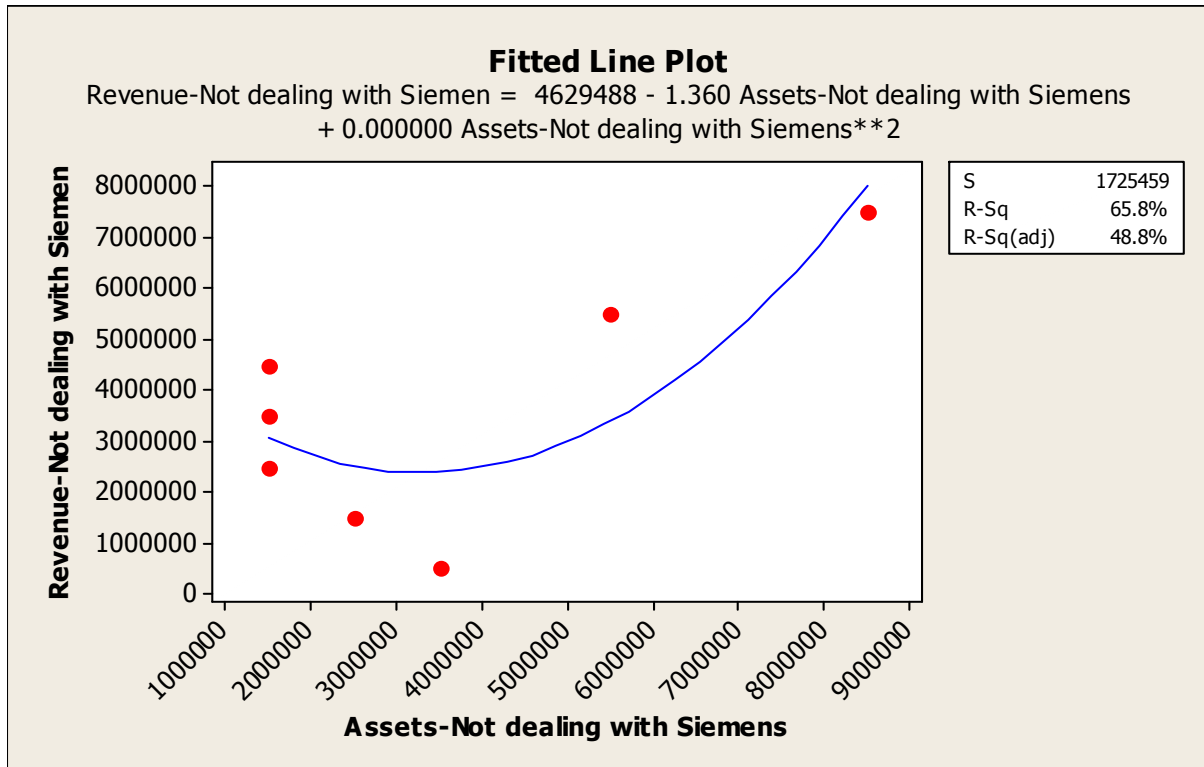
Assets & Manpower



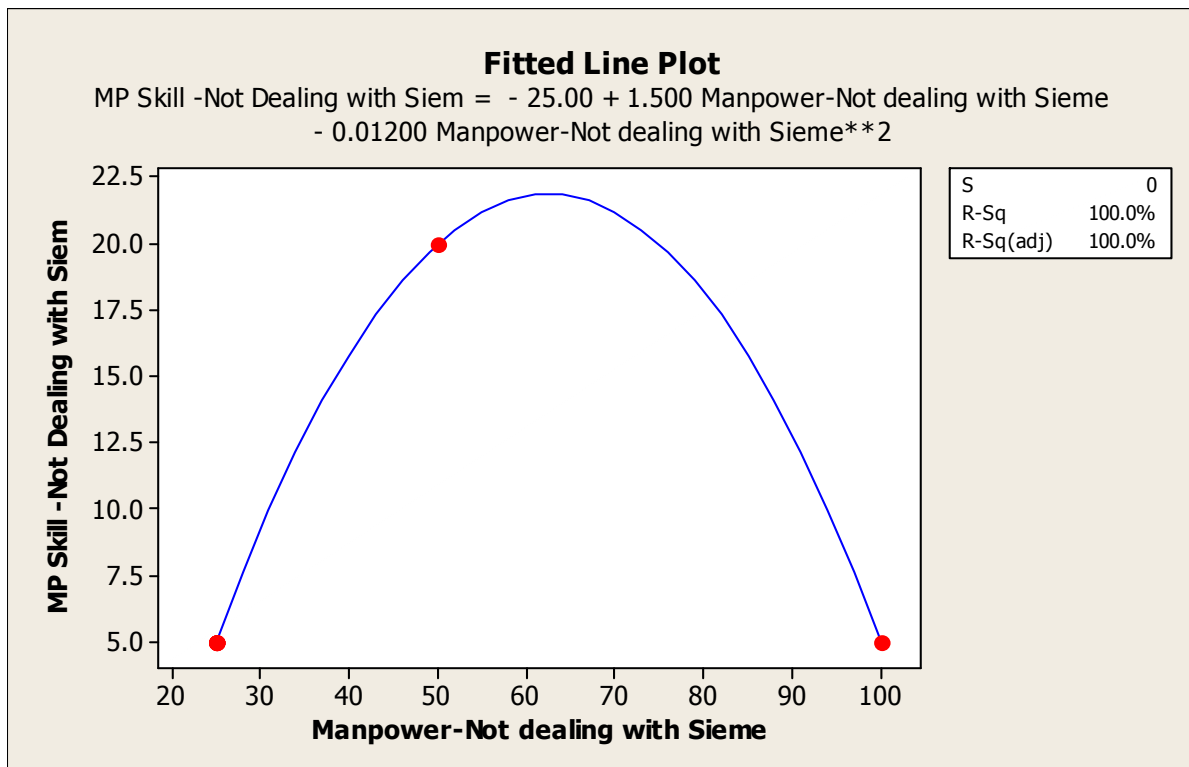
Assets & Manpower Skill Level



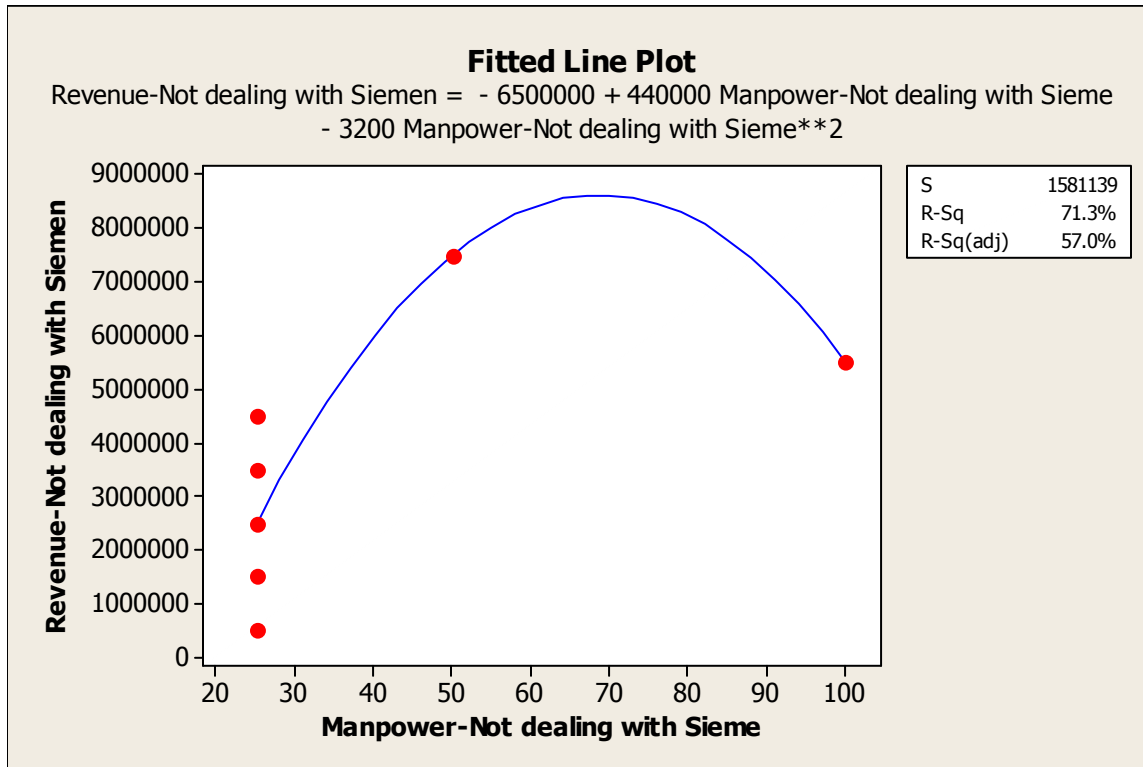
Assets & Revenue Generation :



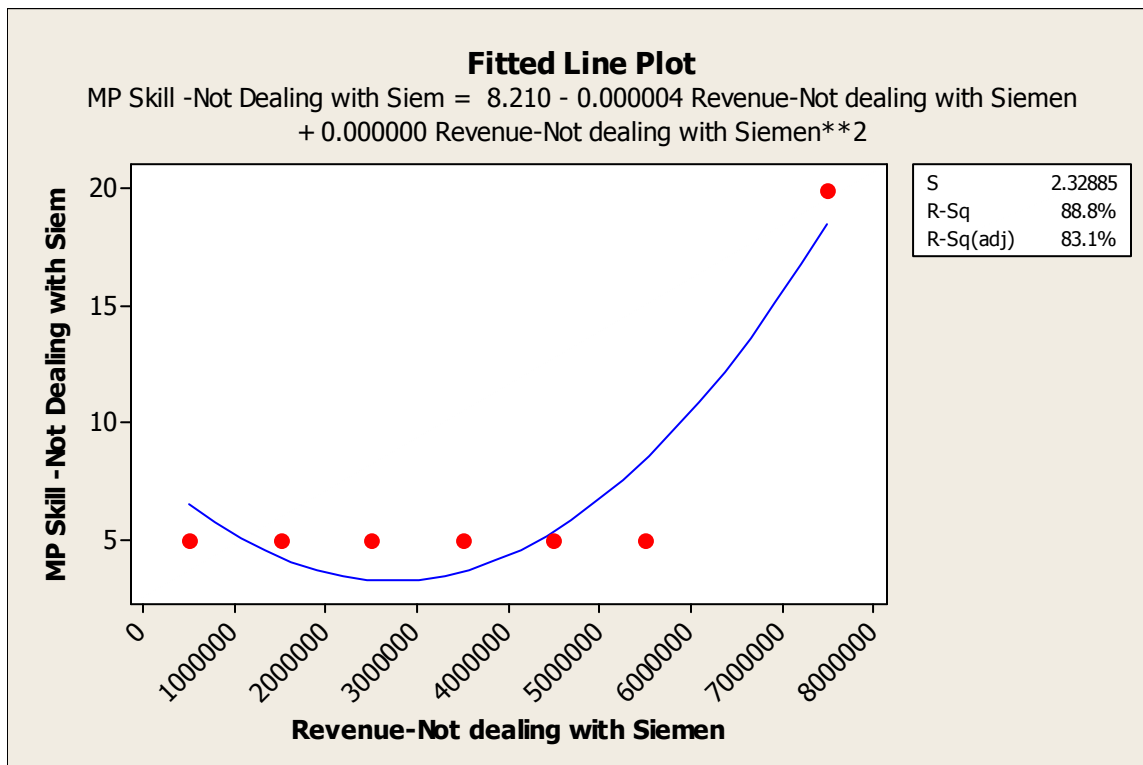
Manpower & Manpower Skill Level :



Correlation between Manpower & Revenue Generation :



Correlation between Manpower Skill Level & Revenue Generation :



With all the analysis carried out , we can thus summarize our result by directly comparing the two cases i.e. the companies dealing with Siemens Pakistan & those who aren't dealing with Siemens Pakistan. In term of the mean and standard deviation of the indices.

Head to Head Comparison

Dealing with Siemens

Name	Minimum	Maximum	Mean	Standard Derivation
Assets	500000	9500000	5125000	2287875.6522
Manpower	25	100	71.875	31.7153
Manpower Skill Level	5	25	17.5	6.6144
Revenue Generation	2500000	9500000	5375000	2027159.3425
Ratio Manpower to Manpower Skill level	1.667	6.667	4.2914	1.637

Not Dealing with Siemens

Name	Minimum	Maximum	Mean	Standard Derivation
Assets	1500000	8500000	3500000	2449489.7428
Manpower	25	100	39.2857	26.2445
Manpower Skill Level	5	20	7.1429	5.2489
Revenue Generation	500000	7500000	3642857.1429	2231499.9074
Ratio Manpower to Manpower Skill level	2.5	20	6.7857	5.4632

Now to analyze the mean values for the parameters Revenue Generation , Assets , Man power count and Man power skill level.

Results based on Mean Values :

For this purpose , Minitab is used and ‘2-sample-t ‘ test will be performed on each of the parameter to prove that mean of one group ‘ μ_1 ‘ (Companies dealing with Siemens Pakistan) is significantly different from mean of the other group ‘ μ_2 ‘ (Companies not dealing with Siemens Pakistan)

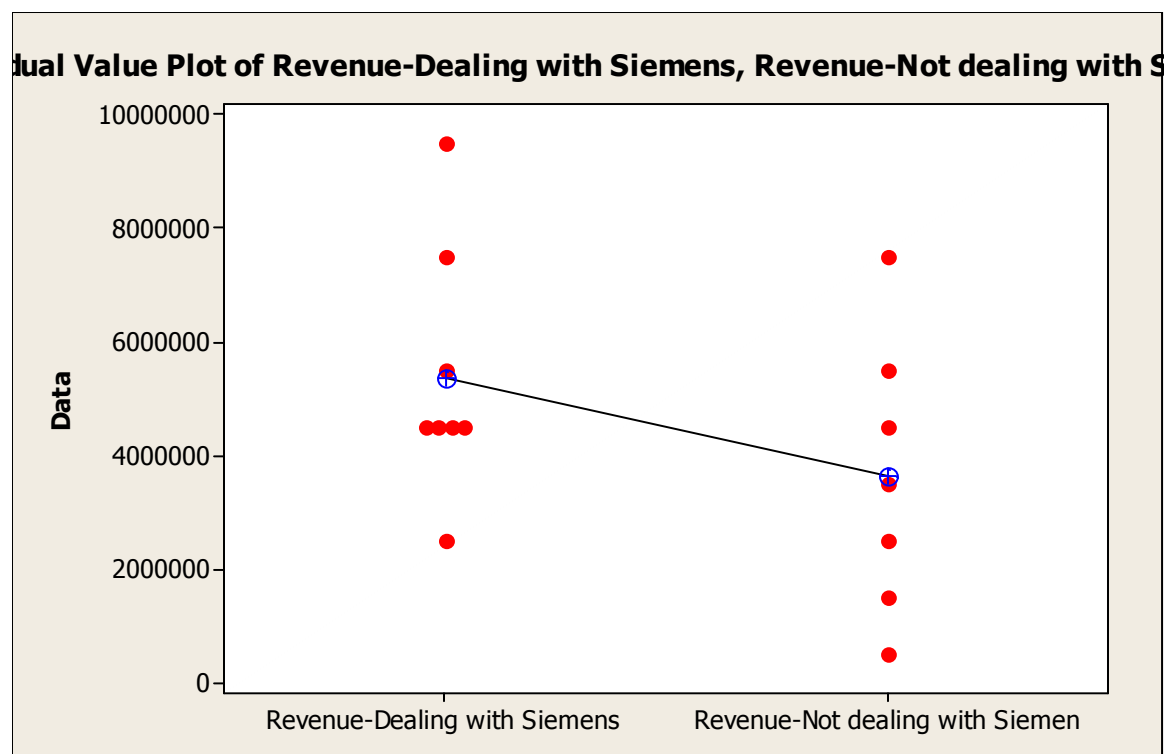
Hence our null hypothesis is $H_0 = \mu_1 - \mu_2 = 0$ (means of both groups are same)

And our alternative hypothesis is $H_1 = \mu_1 - \mu_2 > 0$ (mean of 1st group is greater than 2nd group)

Now analysis will be performed on each parameter one by one to provide evidence to support our hypotheses. Starting with our first hypothesis related to Revenue generation.

H1: There is a significant difference between revenues of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not

Using 90.0 confidence level and significance of 0.10 the following result is evaluated.



Two-Sample T-Test and CI: Revenue-Dealing with Sie, Revenue-Not dealing with

Two-sample T for Revenue-Dealing with Siemens vs Revenue-Not dealing with Siemens

	N	Mean	StDev	SE Mean
Revenue-Dealing with Sie	8	5375000	2167124	766194
Revenue-Not dealing with	7	3642857	2410295	911006

Difference = μ (Revenue-Dealing with Siemens) - μ (Revenue-Not dealing with Siemens)

Estimate for difference: 1732143

90% lower bound for difference: 137123

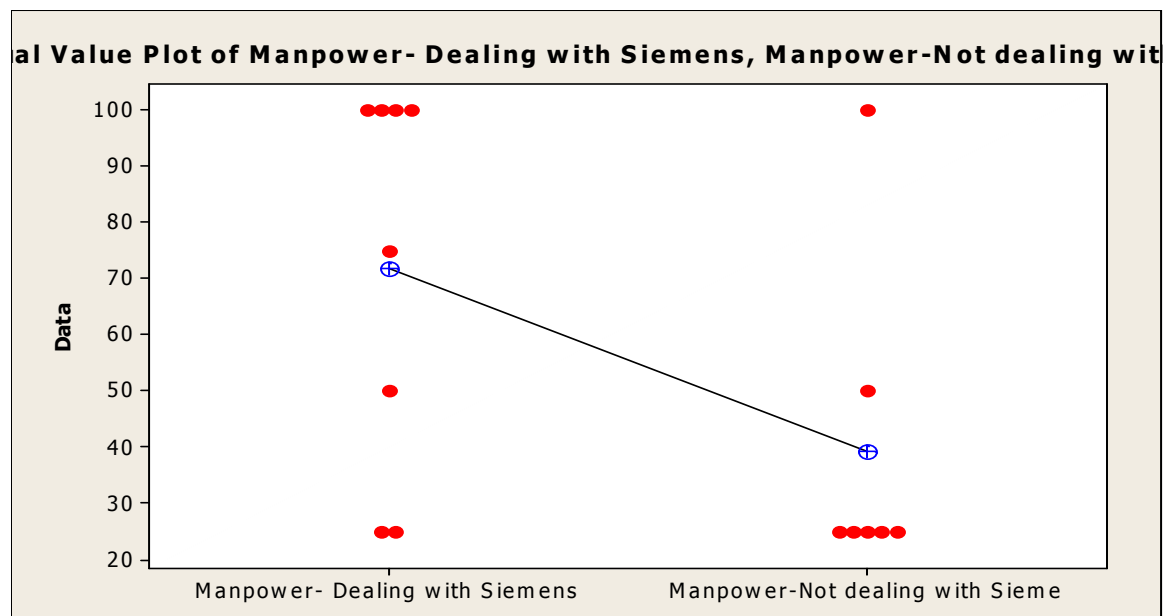
T-Test of difference = 0 (vs >): T-Value = 1.47 P-Value = 0.083 DF = 13

Both use Pooled StDev = 2282578.5496

Since , the p value 0.083 is less than our significance value 0.10 , we would reject the null hypothesis and conclude that $H_1 = \mu_1 - \mu_2 > 0$ is true for Mean of Revenue Generations for both groups and to summarize , companies dealing with Siemens have a higher mean value of Revenue Generation than those who are not dealing or in other words , **There is a significant difference between difference between Revenue Generation of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not** which proves our hypothesis.

H2: There is a significant difference between manpower count of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not.

Using 90.0 confidence level and significance of 0.10 the following result is evaluated.



Two-Sample T-Test and CI: Manpower- Dealing with S, Manpower-Not dealing wit

Two-sample T for Manpower- Dealing with Siemens vs Manpower-Not dealing with Sieme

	N	Mean	StDev	SE Mean
Manpower- Dealing with S	8	71.9	33.9	12
Manpower-Not dealing wit	7	39.3	28.3	11

Difference = mu (Manpower- Dealing with Siemens) - mu (Manpower-Not dealing with Sieme)

Estimate for difference: 32.6

90% lower bound for difference: 10.6

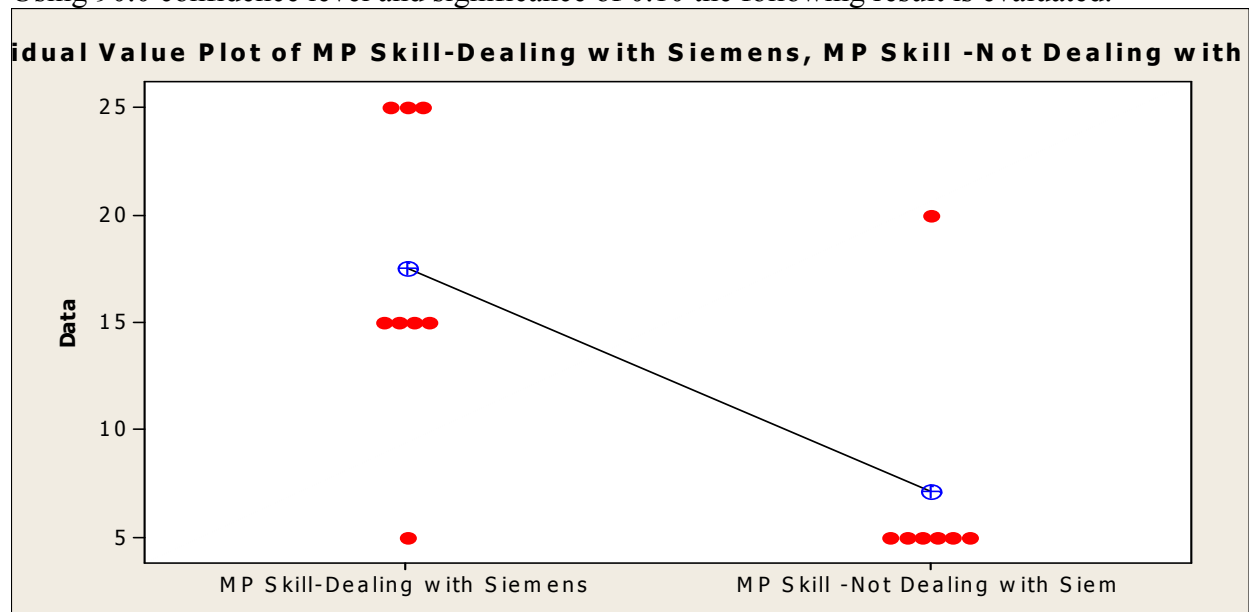
T-Test of difference = 0 (vs >): T-Value = 2.00 P-Value = 0.033 DF = 13

Both use Pooled StDev = 31.4622

Since , the p value 0.033 is less than our significance value 0.10 , we would reject the null hypothesis and conclude that $H_1 = \mu_1 - \mu_2 > 0$ is true for Mean of Manpower Count for both groups and hence companies dealing with Siemens Pakistan have a higher mean value of Manpower Count than those who are not dealing or in other words , **There is a significant difference between difference between Manpower count of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not** which proves our hypothesis.

H3: There is a significant difference between manpower skill levels of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not.

Using 90.0 confidence level and significance of 0.10 the following result is evaluated.



Two-Sample T-Test and CI: MP Skill-Dealing with Si, MP Skill -Not Dealing wi

Two-sample T for MP Skill-Dealing with Siemens vs MP Skill -Not Dealing with Siem

	N	Mean	StDev	SE Mean
MP Skill-Dealing with Si	8	17.50	7.07	2.5
MP Skill -Not Dealing wi	7	7.14	5.67	2.1

Difference = mu (MP Skill-Dealing with Siemens) - mu (MP Skill -Not Dealing with Siem)

Estimate for difference: 10.36

90% lower bound for difference: 5.84

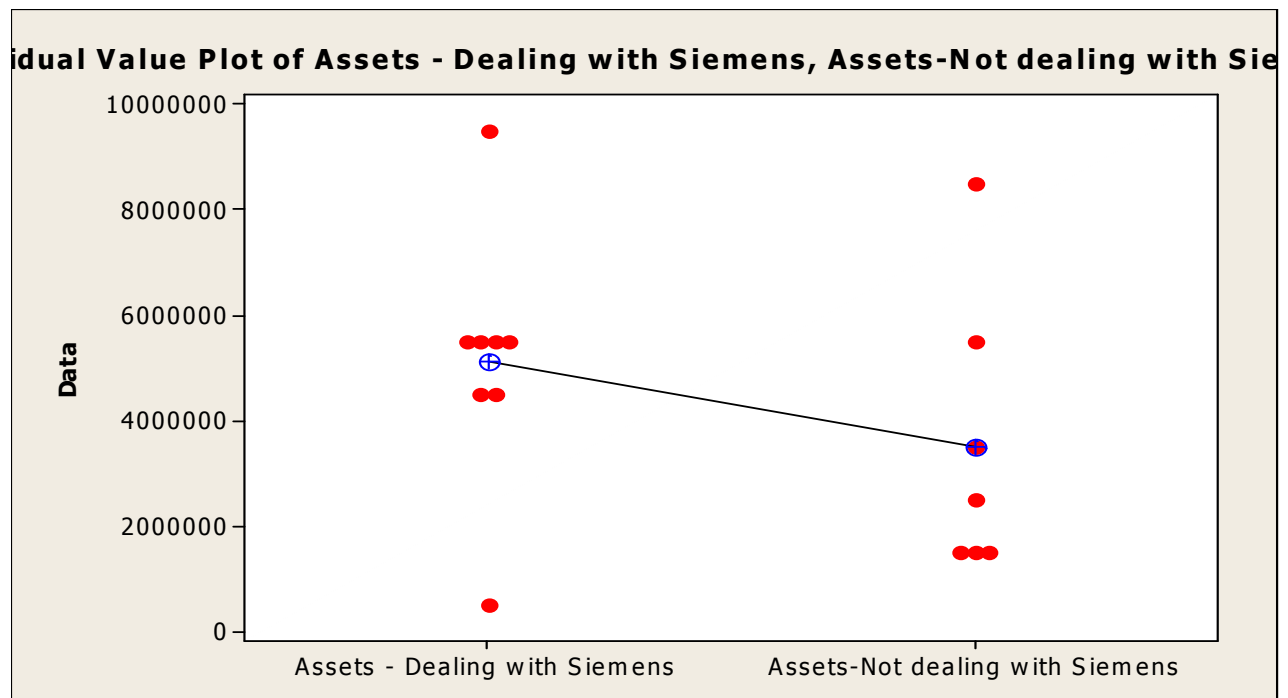
T-Test of difference = 0 (vs >): T-Value = 3.10 P-Value = 0.004 DF = 13

Both use Pooled StDev = 6.4621

Since , the p value 0.004 is less than our significance value 0.10 , we would reject the null hypothesis and conclude that $H_1 = \mu_1 - \mu_2 > 0$ is true for Mean of Manpower Skill level for both groups and hence companies dealing with Siemens Pakistan have a higher mean value of Manpower Skill Level than those who are not dealing or in other words , **There is a significant difference between difference between Manpower Skill level of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not** which proves our hypothesis.

H4: There is a significant difference between difference between total assets of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not.

Using 90.0 confidence level , significance of 0.10 the following result is evaluated.



Two-Sample T-Test and CI: Assets - Dealing with Si, Assets-Not dealing with

Two-sample T for Assets - Dealing with Siemens vs Assets-Not dealing with Siemens

	N	Mean	StDev	SE Mean
Assets - Dealing with Si	8	5125000	2445842	864736
Assets-Not dealing with	7	3500000	2645751	1000000

Difference = μ (Assets - Dealing with Siemens) - μ (Assets-Not dealing with Siemens)

Estimate for difference: 1625000

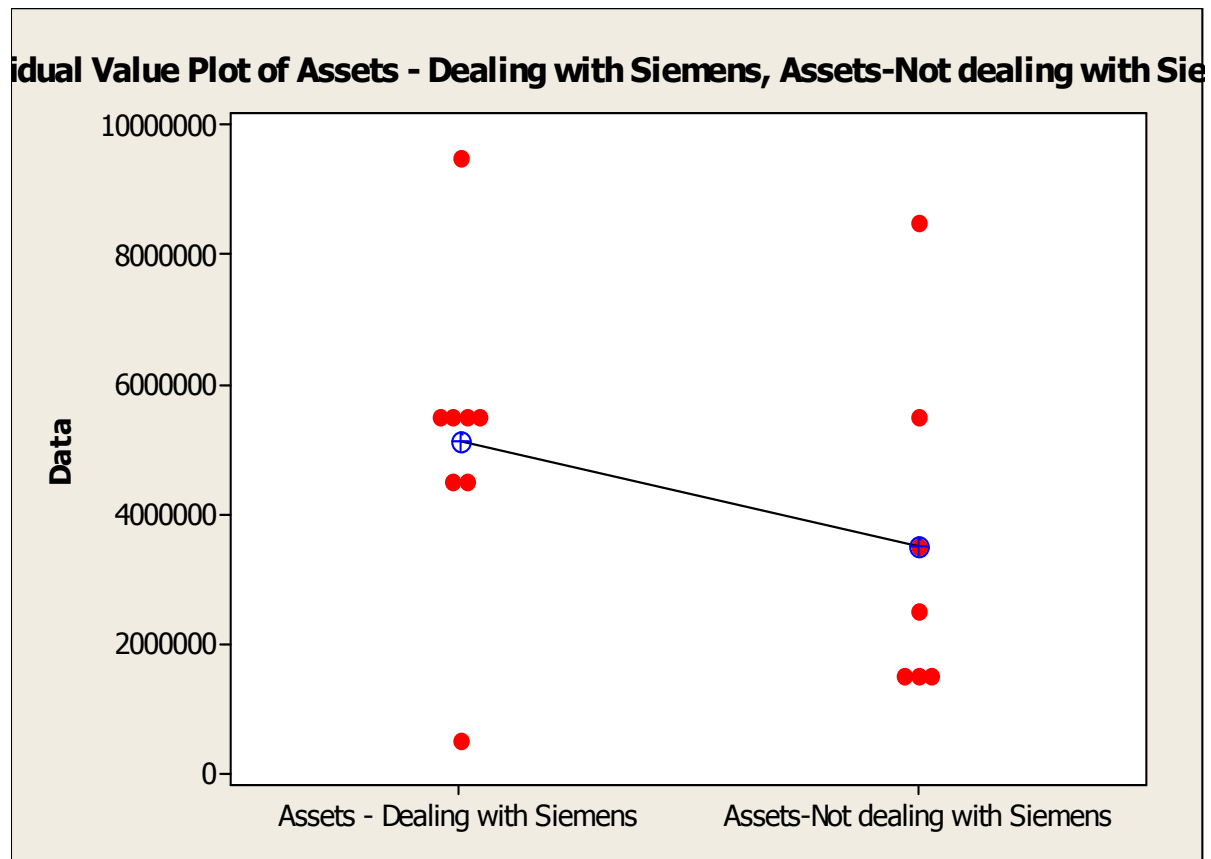
90% lower bound for difference: -149946

T-Test of difference = 0 (vs >): T-Value = 1.24 P-Value = 0.119 DF = 13

Both use Pooled StDev = 2540063.5970

Since , the p value 0.119 is greater than our significance value 0.10 , we cant reject the null hypothesis currently and so we need to check this value at a different Confidence level.

Now re-checking the analysis using Confidence level of 88.0 and significance of 0.12



Two-Sample T-Test and CI: Assets - Dealing with Si, Assets-Not dealing with

Two-sample T for Assets - Dealing with Siemens vs Assets-Not dealing with Siemens

	N	Mean	StDev	SE Mean
Assets - Dealing with Si	8	5125000	2445842	864736
Assets-Not dealing with	7	3500000	2645751	1000000

Difference = μ (Assets - Dealing with Siemens) - μ (Assets-Not dealing with Siemens)

Estimate for difference: 1625000

88% lower bound for difference: 6245

T-Test of difference = 0 (vs >): T-Value = 1.24 P-Value = 0.119 DF = 13

Both use Pooled StDev = 2540063.5970

Since , the p value 0.119 is less than our significance value 0.12 , we would reject the null hypothesis and conclude that $H_1 = \mu_1 - \mu_2 > 0$ is true for Mean of Assets for both groups and to put it straight companies dealing with Siemens have a higher mean value of Assets than those who are not dealing or in other words , **There is a significant difference between difference between total assets of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not** which proves our hypothesis.

Hence we can conclude ,

- ✓ There is a significant difference between revenues of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not – Confidence Level 90 %
- ✓ There is a significant difference between manpower count of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not – Confidence Level 90 %
- ✓ There is a significant difference between difference between Manpower Skill level of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not – Confidence Level 90 %
- ✓ There is a significant difference between difference between total assets of SMEs who do business with large multinational buyers (Siemens in this case) and those who do not – Confidence Level 88 %

Future Avenues

Since ample of data was collected from the Suppliers through the questionnaires , there are future prospects of research available in this regard. Other than Revenue Generation , Assets , Manpower Count and Manpower Skill level , useful data such as ISO Certification , Goods Received , Goods Ordered , No. of other Organizations working with and data pertaining to Quality Management System , Material management System , Facilities/ Equipment System , Packaging and Labelling System and Productions /operations System was also collected. This data can be used for further research work and can be helpful to further emphasize the already established facts that business with a MNC can actually help SMEs to grow in a long run.

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The Following Questionnaire was designed and later used for survey and information collection purpose.

Survey Questionnaire

		<h1>Supplier Questionnaire</h1>	
1. Company Details:			
Company Name:			
Address		Telephone:	
		Fax:	
Post Code:		e-mail:	

Principle Type of
Business :

2. Organization Details { Now as of Fiscal Year 2012 } :

Total Number Of Employees:	Total Man power Expertise: (kindly mention the number of Bachelor engineers in each fields)	Average Age of Employers	Revenue Generated: per year : PKR	Total Assets: PKR
{ <25 \ 25-50 \ 50-100 \ >100 }	<ul style="list-style-type: none"> • Engineering : • Manufacturing : • Quality Assurance: • Procurement : • Other : 	{ <20 \ 20-30 \ 30-40 \ 40-50 \ > 50 }	{ < 1 million \ 1 -2 million \ 2 – 3 million \ 3-4 million \ 4-5 million \ 5 - 6 million \ 6 -7 million \ 7 -8 million \ 8 – 9 million \ 9 – 10 million \ > 10 million }	{ < 1 million \ 1 -2 million \ 2 – 3 million \ 3-4 million \ 4-5 million \ 5 - 6 million \ 6 -7 million \ 7 -8 million \ 8 – 9 million \ 9–10 million \ > 10million }

How many more organizations does it work with ?
> 50 }

{ <10 \ 10 – 25 \ 25-50 \

Is this organization ISO Certified ?
No

Yes \

3. Quality Management Documentation:

Do you have procedures that document how you perform the following activities

3.1	QUALITY SYSTEM				Comment
	Quality Policy \ Manual	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Equipment & Instrument Validation \ Qualification Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Internal Audit \ Self-Inspection Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Supplier Evaluation \ Qualification Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	

	Does your company operate a supplier-auditing system?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Training Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Change Control	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Deviation \ Investigation Reporting	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Non-Conformance Reporting	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Documentation Control	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Do you have a recall system\procedure in place?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
3.2	PRODUCTION \ OPERATIONS SYSTEM				Comment
	Environmental Monitoring Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Housekeeping Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Gowning \ Entry & Exit Procedure	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Availability of Master Production Instructions and Batch production Records	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Availability of Equipment Cleaning Procedures, Cleaning Records and Cleaning Verification	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
3.3	PACKAGING \ LABELLING SYSTEM				Comment
	Labeling of Intermediate \ Final Products	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Storage of Intermediate \ Final Products	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Product \ Sample Shipping Validation Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
3.4	FACILITIES AND EQUIPMENT SYSTEM				Comment

	Preventive Maintenance Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Calibration Program	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Facility Cleaning \ Sanitization	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
3.5	MATERIALS CONTROL SYSTEM				Comment
	Inventory Management System	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Supply Chain Requirements	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	
	Warehouse System and Storage	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N\A <input type="checkbox"/>	

**The purpose of this research is only to provide evidence to the hypothesis that Registration with Siemens Pakistan as Suppliers helps SMEs to grow in the long run.*