



An assessment of occupational health and safety measures and performance of SMEs: An empirical investigation



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ABSTRACT

An empirical study was undertaken to identify the relationship between occupational health and safety measures (OHSMs) and performance of small- and medium-sized enterprises (SMEs). Survey data was collected from 35 SMEs located at S.I.T.E. Kotri, Sindh Pakistan, through questionnaire. Appropriate sampling of the collected data was carried out and analyzed in two stages using SPSS (statistical package for social sciences) software. Initially, reliability of the data was checked with the help of Cronbach's alpha coefficient, which was 0.80; and that reflects good and consistent. Afterward, descriptive statistics (mean and standard deviation) and then inferential statistics techniques (Pearson correlation and simple regression) were used. Results revealed a moderate positive correlation among OHSMs and performance of SMEs. This reflects that OHSMs were not properly carried out which influenced the performance of SMEs. Therefore; Pakistani SMEs need to pay a serious attention towards proper implementation of the OHSMs.

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1. Introduction

In recent years, there have been major employment challenges worldwide. According to United Nations (UN) and International labor organization (ILO), globally, during the period from 2007 to 2015, unemployment increased from 170 million to 204 million and by 2030 this number is anticipated to reach 470 million (International Labour Office, 2015; UN, 2016). In 2015, UN held a summit about global sustainable development, wherein 150 leaders participated and adopted new agenda that includes seventeen sustainable development goals (SDGs). Aim of these SDGs was to boost sustained economic growth with the innovation of technology and attaining higher levels of productivity. Key of Success to this aim lies in promoting policies which create jobs and encourage entrepreneurship. Keeping these targets in mind, goal of UN is to achieve full and productive employment for all men and women by 2030, which is known as decent work for all.

In this context, small- and medium-sized enterprises (SMEs) can play vital role for the achievement of SDGs in terms of employment generation and economic growth worldwide. Many international organizations such as UN and ILO are working to promote SMEs sector. This sector has outreached the potential to create

qualitative and quantitative employment generation. Worth of this sector can be estimated that it contributes to one third of the global employment (International Labour Office, 2015).

In Pakistan, according to an authority for development of small and medium enterprises (SMEDA), 90% establishments are SMEs (SMEDA, 2007). These contribute approximately 40% to the gross domestic product (GDP), 30% to the country's export and 80% to employment excluding agricultural workforce (Syed et al., 2012; Khan and Ghouri, 2011). These statistics indicate that SMEs are playing active role in boosting economy, prosperity and employment generation in the country (Marri et al., 2011; Nebhwani et al., 2011). Unfortunately, 90–95% of SMEs fail at their initial stages due to competitive environment (Khalique, 2011). In such competitive environments, occupational health and safety (OHS) should play a key role for the sustainable development and long term survival of the SMEs. SMEs of Pakistan have been lacking in efforts towards implementation of health and safety due to a lesser attention by industrialists to this significant factor (Farooqui, 2008; Khan, 2013). Most recently, statistical reports from ILO indicate that around 317 million occupational accidents occur globally every year out of which approximately 6300 people die (Danjuma et al., 2016; International Labor Organization, 2016). Also, Global Reporting Initiative, in its G4 development, formed an occupational health and safety working group for promoting sustainability and transparency in the organizations (GRI, 2012).

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OHS situation in establishments vary country to country, but both death toll and injuries take place at larger extent in the developing countries. In Pakistan, working deaths are reported higher than in other developing economies (Hassan, 2012). In Pakistan, approximately 7444 fatal accidents and 5,680,740 occupational accidents take place annually, which keep workers away from work at least for 3 days. However, fatality rate and accident rate per 100,000 workers are approximately 20.7 and 16,000 respectively (Hämäläinen et al., 2006). It has been observed that work related accidents are higher in SMEs as compared to larger enterprises (Arocena and Nunez, 2010).

In an economic perspective, occupational accidents, injuries and diseases are obviously unwanted by organizations due to extra expenses incurred to both employees and employers (Gopang, 2015). Costs paid by employees are in terms of loss of wages, medical treatments, pain and reduction in life quality. Whereas, costs paid by employer include monetary compensation, equipment or plant damage and loss in terms of production interruption. Another type of cost incurred to employer is replacement and training of a new employee in case an employee is expired or disabled. These costs can be reduced by improvement in health and safety conditions at the workplaces (Thomason and Pozzebbon, 2002).

Working conditions can be improved with the effective implementation of OHS management at workplace. OHS management is a part of the organizational management that is executed through safety measures by the top management. It considers the prevention of occupational accidents and injuries on top priority. As a result, workplace conditions are improved and floor accidents and injuries are reduced (Vinodkumar and Bhasi, 2010). Thus, OHSMs bring safer workplaces which can also help to improve productivity, reduce costs, increase profitability and performance (Bakri et al., 2006).

Fernández-Muñiz et al. (2009) have discovered that good occupational safety management (OSM) practices have impact on overall performance (competitive, financial and safety) of SMEs. These reduce the rate of accidents, material damage, personal injuries and absenteeism of employees, and improve the working conditions, productivity, sales and profit. These practices also have positive influence on the reputation, productivity, sales and profit. Diugwu (2011) has also reported that a good occupational safety management culture improves reputation, lowers costs and sustains the competitiveness of SMEs. Similarly, Bottani et al. (2009) have provided evidence that companies which do not adopt safety management systems have lower performance as compared to those which do.

This paper is an extended effort in the above context wherein results of a survey based empirical investigation on occupational health and safety measures (OHSMs) and their effect on the performance of SMEs in Pakistan are presented and statistically analyzed.

2. Methodology and methods

This research study was conducted through a survey at one of the industrial zones of Pakistan located in Sindh province, known as Kotri S.I.T.E. Area. Unit of analysis was SMEs, and convenience sampling technique was used to collect the data, through a modified questionnaire obtained from the study of Makori (2012), given in Appendix A. Likert scale, as stated by Likert (1932), was used in the questionnaire having range 1–5, wherein 1 = strongly disagree 2 = disagree, 3 = Not Sure, 4 = agree and 5 = strongly agree.

Analysis of data was carried out in three stages. At first stage, reliability was checked by using Cronbach's alpha, which indicates the internal consistency of items and is essential statistical technique for survey based studies (Allen et al., 2008; Gliem and Gliem, 2003). Cronbach's alpha coefficient ranges from 0 to 1.

Value of the Coefficient: ≥ 0.9 indicates excellent internal consistency of items, ≥ 0.8 indicates good consistency, ≥ 0.7 indicates acceptable, ≥ 0.6 reflects questionable, and ≤ 0.5 indicates poor and unacceptable (George and Mallery, 2003).

At second stage, descriptive statistics, i.e. frequency, percentage, mean and standard deviation were measured. At third stage, inferential statistical tools (Pearson correlation and simple Regression) were used to analyze the data with the help of SPSS. In the Pearson correlation analysis, correlation assesses the strength of relationship between dependent and independent variables (Malik et al., 2010). Further, it also answers to three basic questions about these variables. That is, (a) whether there is any relationship between variables, and if there is any, (b) what is its direction of the relationship and (c) what is magnitude of the relationship (Cohen et al., 2005). Whereas, regression analysis indicates the extent of variance in dependent variables due to independent variables, which is determined by R-square, coefficient of determination (Malik et al., 2010).

3. Results and discussion

Before further analysis, reliability of the data was computed with the help of Cronbach's alpha coefficient which yielded 0.80 which was good and consistent.

3.1. Rate of response

Total survey questionnaires were sent to 65 SMEs in the selected region, out of which 16 (24.61%) did not respond due to their policies, 14 (21.53%) of the questionnaires received back were discarded because those were partially completed and remaining 35 (53.84%) completed questionnaires were used for analysis purpose as shown in Fig. 1.

3.2. Demographics of respondent SMEs

Demographic characteristics of respondent SMEs comprises of the field of the SMEs, operational period and number of employees there in. The results are discussed below.

3.2.1. Field of responding SMEs

According to statistical analysis, out of 35 SMEs, 17 (48.57%) were Textile Manufacturing, 4 (11.43%) were Pipe Manufacturing, 5 (14.29%) were Mechanical Works, 4 (11.43%) were Tobacco, 2 (5.78%) were Civil Works and 3 (8.57%) were Floor Mills as shown in Fig. 2.

3.2.2. Operation period of the firms

According to collected data, it was observed that all of the respondent SMEs had history of more than 10 years of the opera-

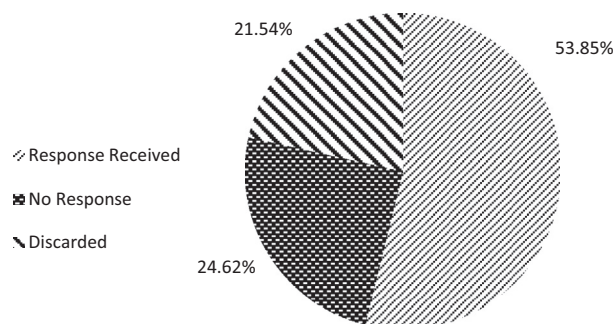


Fig. 1. Response from SMEs.

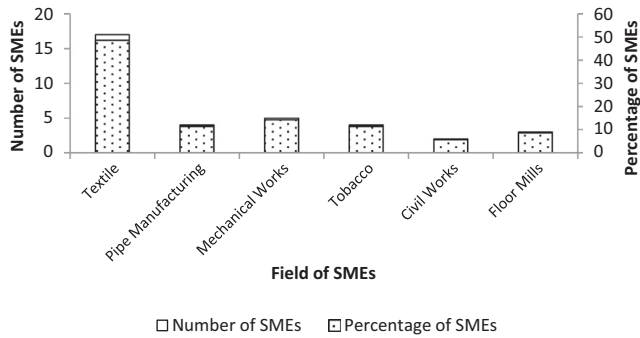


Fig. 2. Distribution of respondents by sub-sector.

tional period. Out of 35 SMEs, 1 (2.86%) had more than 40 years of operation period, 10 (28.57%) were operated for 30–40 years, whereas, 11 (31.43%) and 13 (37.14%) were operated for 21–30 and 11–20 years respectively as shown in Fig. 3.

3.2.3. Number of employees in respondent SMEs

According to the statistical analysis, out of 35 SMEs, 11 (31.43%) had 11–50 employees, 5 (14.29%) had 51–150 employees, 4 (11.42%) had employment of 151–200, whereas 15 (42.86%) had 200–250 employees as shown in Fig. 4.

3.3. Occupational health and safety measures (OHSMs) in SMEs

Respondent SMEs were provided questionnaire and asked to indicate level of agreement for the different variables. They were asked to rate the variables on 5 point scale as defined earlier in the methodology section. Collected data was analyzed and mean (\bar{x}) and standard deviation (SD) were computed, and results are given in Table 1.

Statistical values for illumination in production area were $\bar{x} = 4.54$ and $SD = 0.51$ as given in Table 1. Here \bar{x} is close to 5, therefore it is considered as 5. This means that the study participants strongly agreed that there was adequate illumination in the production area of their SMEs. Illumination is important element for the health and safety of workers which prevents accidents at workplace and improves the efficiency of workers. It also makes work easier for workers. This result is similar as reported by Khan et al. (2014). In that study, conducted in the textile industries of Lahore Pakistan, researchers witnessed that illumination level was within the range of OSHA standards. Ajala (2012) has stated that proper illumination at work place influence on the behavior, attitude, satisfaction, performance and productivity of the workers.

Statistical values for ventilation in offices were $\bar{x} = 4.37$ and $SD = 0.69$ as given in Table 1. Here \bar{x} is near to 4, therefore it is considered as 4. This reflects that study participants agreed that there was satisfactory ventilation in their offices. Poor ventilation influ-

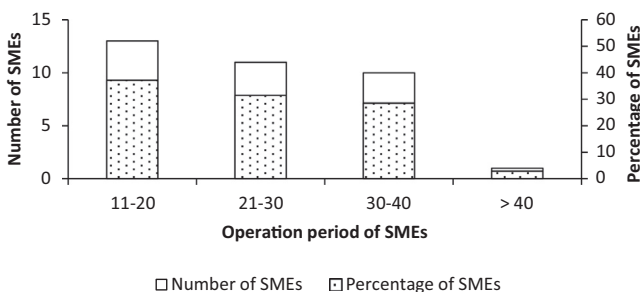


Fig. 3. Operation period of the respondent SMEs.

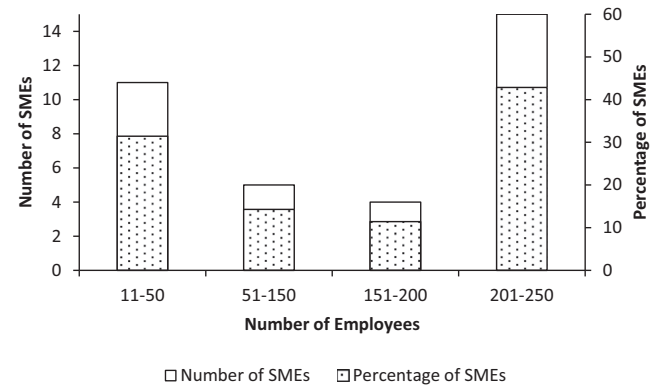


Fig. 4. Number of employees in respondent SMEs.

Table 1

Occupational health and safety measures (OHSMs).

Variable parameters	Mean	Standard deviation
Illumination at the operational area	4.54	0.51
Ventilation	4.37	0.69
Availability of safety manual	3.91	0.95
Fire exits	4.09	0.70
Firefighting equipment	3.91	0.74
Directional signs	3.91	0.95
Firefighting skills	3.63	0.88
First aid kits	3.86	0.91
Enough toilets	4.26	0.74
Clean and dry floors	4.03	0.75
Clean Drinking water	3.89	0.87
Cleanliness in washrooms	3.86	0.88
Waste disposal system	3.23	1.19
Accident prevention measures	3.20	1.21
Protective clothing	2.43	1.09
Consistent medical checkup	2.43	1.20

ences the performance inferior air quality which may lead to infectious diseases resulting in short term sick leave. Seppänen et al. (2006) have also stated that proper ventilation results in lower indoor pollutants and improves performance, whereas lower ventilation leads to adverse health effects leading to absence from work. Ventilation is one of the features of physical work environment that has positive association with productivity of employees (Ajala, 2012; Veitch and Newsham, 2000).

Statistical values for availability of health and safety manual were $\bar{x} = 3.91$ and $SD = 0.95$ as given in Table 1. Here \bar{x} is 4, which reflects that study participants agreed to have safety policy manuals available. The safety policy is a fundamental part of a company's safety practice because it presents a demonstration of the basic beliefs and commitment of an organization towards workstation safety. Fernández-Muñiz et al. (2009) have stated that safety policy comprises commitment of organization for continuous improvement and has positive impact on the productivity of the organization. Molenaar et al. (2009) have also stated that availability of written safety policy plan has potential effect on the performance of the organizations.

Statistical values for fire safety measures which include fire exits, firefighting equipment, directional signs, and firefighting skills are given in Table 1. Here \bar{x} for these measures was close to 4, which reflects that participants agreed for the existence of directional signs, fire exits, firefighting equipment and skills. Lack of firefighting measures has negative effect on whole organization, i.e. human resources, equipment and other assets. Malik et al. (2013) have stated that fire hazards demoralize the employees, their relatives and business itself and damages different resources.

Wadud et al. (2014) have stated that occurrence of fire incident leads to damage of assets which also negatively affect the reputation of the industry.

Statistical values for different welfare facilities such as toilet facility, cleanliness of floors, uncontaminated drinking water, cleanliness in washrooms and first aid kits are given in Table 1. Here \bar{x} for these facilities is close to 4, which reflects that study participants agreed that these measures were taken at their company. Generally, welfare facilities affect the workers' health and motivate them towards work, ultimately affecting their performance and productivity. Ajala (2012) has stated that workplace environment directly affect the human sense and thus productivity. Awan (2015) have stated that good working environment leads to boost up the productivity level of employees. Moreover, clean floors lead to reduce the likelihood of slips and falls, leading to possible injury to the workers. Verma et al. (2010) have also stated that slips and falls lead to the injuries and controlling these may reduce the chances of injuries and increase the performance of the workers.

Statistical values for waste disposal system and accident prevention measures are also given in Table 1. Here \bar{x} of these variables is close to 3, which reflects that study participants neither agreed nor disagreed about the practices of these measures at their organizations. Occupational accidents do not only deteriorate the human capital but also affect the productivity of the organization negatively. Accidents also damage the equipment and harm humans which lead to the loss of economic potential and working days. However, accidental prevention measures decreases the accident occurrence rate, hence improves the performance and productivity of the organization. Fernández-Muñiz et al. (2009) have stated that through the practices, policies and actions, accidents can be avoided which will be beneficial to both workers and the firm. Cagno et al. (2011) have stated that work related accidents have negative impact on the competitiveness of companies.

Proper disposal of the industrial waste improves the environmental performance of the organization which affects the reputation of the company also. Yang et al. (2011) have stated that effective environmental management practices have positive impact on the financial performance and marketing. Russo and Fouts (1997) have also witnessed that environmental and economic performances are positively linked.

Statistical values for protective clothing and regular medical checkup are also given in Table 1. Here \bar{x} of these variables is close to 2, which reflects that study participants disagreed about the practices of these measures at their organizations. Occupational accidents do not only deteriorate the human capital but also affect the productivity of the organization negatively. Accidents also damage the equipment and harm humans which lead to the loss of economic potential and working days. However, accidental prevention measures decreases the accident occurrence rate, hence improves the performance and productivity of the organization. Fernández-Muñiz et al. (2009) have stated that through the practices, policies and actions, accidents can be avoided which will be beneficial to both workers and the firm. Cagno et al. (2011) have stated that work related accidents have negative impact on the competitiveness of companies.

Protective clothing protects workers from hazardous substances, extreme environments (i.e. hotness or coldness) and physical cuts, which ultimately affect performance of the workers. Adams et al. (1994) have also stated that personal protective clothing encourages workers to work at a hazardous workplace and these have notable influence on their performance. Cavazza and Serpe (2009) have stated that violating the use of personal protective equipment is an unsafe act which leads to the injury.

Work related diseases have direct and indirect effects on the productivity of the organizations. Burton et al. (1999) have stated

that organizations have to pay direct costs for the health of workers in terms of health care costs, and indirect costs in terms of absenteeism and disability of the employees. These both ultimately affect productivity of the organizations.

3.4. Performance indicators for SMEs

Data collected through survey for the performance indicators as given in Table 2 was analyzed and mean (\bar{x}) and standard deviation (SD) were computed. Participants were provided 5 point scale as defined earlier in the methodology section.

Table 2 reflects the outcomes of analyzed data for different performance indicators of SMEs. Analysis reveals that \bar{x} for all these parameters is close to 4, which reflects that participants agreed that due to safety practices, reputation of the firm, productivity of organization, level of employees satisfaction, profit and sales were increased. Moreover, orders were delivered promptly, there was enough working capital, production operations were effective, quality of products was improved and firms realized their targets.

Furthermore, statistical values for increase in number of clients and easiness in supervision are also given in Table 2. Here \bar{x} of these variables is close to 3, which reflects that study participants neither agreed nor disagreed about these performance parameters.

However, statistical values for reduction in product cost and diversification of product were (\bar{x} = 2.34 and SD = 0.91) and (\bar{x} = 2.26 and SD = 0.98) respectively. These values reveal that \bar{x} of these parameters is close to 2 which means participants disagreed for product diversification and reduction in product cost.

3.5. The impact of OHSMs on the performance of SMEs

Table 3a shows the results of regression and correlation when mean of OHSMs (predictors) regressed against overall mean of performance of SMEs. Value of r (0.617) for the OHSMs indicates that there was direct and moderate positive relationship between OHSMs and Performance of SMEs which is significant with p -value 0.000, that is <0.05 . This shows that OHSMs contribute moderately positive towards performance of SMEs. Consequently, this study justifies the previous studies, i.e. Arocena and Nunez (2010), Bottani et al. (2009), Makori (2012), and Fernández-Muñiz et al. (2009). These studies witnessed that if a company is taking OHSMs, it ultimately affects its performance positively. Table 3b shows the value of regression in which R-square is 0.380, which shows that 38% variance in the performance of SMEs is due to these safety measures. This also reflects that there are some other possible factors such as internal and external politics, extrinsic and intrinsic rewards and training of the workers, which can also affect the performance of SMEs.

Table 2
Performance indicators for SMEs.

Variables	Mean	Standard deviation
Reputation	4.29	0.75
Productivity	4.11	0.80
Employee satisfaction	3.71	0.99
Profits	3.60	1.01
Sales	3.51	1.25
Prompt order delivery	4.09	0.78
Sufficient Working capital	3.94	1.03
Effectiveness in operations of production	3.86	0.97
Product quality	3.86	0.91
Achievement of targets	3.63	0.97
Number of clients	3.17	1.36
Easiness in supervision	3.09	1.25
Reduction in product cost	2.34	0.91
Product diversification	2.26	0.98

Table 3a

Model summary (regression and correlation of mean of OHSMs against overall mean of SMEs' performance).

Variables	Regression coefficient, B	Standard error, B	Pearson coefficient, r
Independent variables: OHSM	0.718	0.159	0.617 ^a , p < 0.000

^a p value is significant at 0.05.

Table 3b

Regression of variables (regression and correlation of mean of OHSMs against overall mean of SMEs' performance).

Variables	Values
Multiple R	0.617
R square	0.380
Adjusted R square	0.362
Standard error	0.452
Df	1
F value	20.267, p < 0.000

4. Conclusions

This study was carried out with the aim to know the relationship between occupational health and safety measures (OHSMs) and performance of SMEs. Pearson correlation analysis result ($r \leq 0.617$, $p < 0.000$) revealed that there was moderate positive

correlation between OHSMs and SMEs' performance, which is significant. Regression analysis result (R-square = 0.38) reveals that there is 38% of variation in the performance of SMEs due to OHSMs. Specifically, this study also concludes that Pakistani SMEs need severe improvements in terms of health and safety measures, i.e. firefighting skills, accident prevention measures, protective clothing, waste disposal system and consistent medical checkup; because owners of the SMEs don't pay much attention to these important and competitive parameters. It is therefore recommended that government authorities and policy makers should take efforts to implement OHSMs effectively and bound the SMEs for implementing these important parameters to compete locally and globally and to achieve sustainable development goals for the sustainable development of economic position of the country.

5. Limitations

This research study has presented the importance of OHSMs for the improvement of overall performance of SME's. However, this study is carried out in the context of Pakistan and was limited to one S.I.T.E. area. Hence, outcomes of this research study represent the perspective of Pakistani region only. Also, the study may be extended to be interview based for reducing the possible biasness or lack of interest in completing the questionnaire. However, such study would obviously require longer duration.

Appendix A. Questionnaire

Mehran University of Engineering and Technology, Jamshoro Occupational Health and Safety Measures (OHSMs) Survey

Section A: Background Information

Nature of the business:

For how long has your firm operated?

How many employees does your firm have?

Section B: Occupational Health and Safety Measures (OHSMs)

Rate the following statements indicating the extent they apply to your firm by ticking in the appropriate box.

S.no.	Statement	Strongly agree	Agree	Not SURE	Disagree	Strongly disagree
i	The firm has a safety manual.	5	4	3	2	1
ii	Protective clothing is provided to all employees.	5	4	3	2	1
iii	The floors are kept clean and dry to reduce chances of falls and slips.	5	4	3	2	1
iv	There is adequate ventilation in the office.	5	4	3	2	1
v	There is adequate illumination at the production area.	5	4	3	2	1
vi	In case of emergency there are clearly marked fire exits.	5	4	3	2	1
vii	There is adequate fire - fighting equipment in place.	5	4	3	2	1
viii	Employees have been trained firefighting skills.	5	4	3	2	1
ix	There are adequate first aid kits and medical services.	5	4	3	2	1
X	There are enough toilet facilities separate for males and females.	5	4	3	2	1
xi	Employees are satisfied with the standard of cleanliness in the washrooms.	5	4	3	2	1
xii	There is a waste disposal system.	5	4	3	2	1
xiii	There is a continuous review of accident prevention measures.	5	4	3	2	1
xiv	Our firm conducts medical check- up for employees regularly.	5	4	3	2	1
xv	There are directional signs to guide movement of people.	5	4	3	2	1
xvi	There is enough clean drinking water for all employees.	5	4	3	2	1

(continued on next page)

Section C: SMEs performance		Strongly agree	Agree	Not sure	Disagree	Strongly disagree
i	High production has been achieved	5	4	3	2	1
ii	There is increase on our sales	5	4	3	2	1
iii	The company has been able to realize its set targets	5	4	3	2	1
iv	We deliver customer orders promptly	5	4	3	2	1
v	We have diversified our products	5	4	3	2	1
vi	Our firm has enough working capital	5	4	3	2	1
vii	Cost of producing our products has decreased	5	4	3	2	1
viii	Our firm has a good reputation	5	4	3	2	1
ix	Product Quality has improved.	5	4	3	2	1
x	More Profitability	5	4	3	2	1
xi	Effectiveness of operations has improved	5	4	3	2	1
xii	No of clients is high	5	4	3	2	1
xiii	Easy Supervision	5	4	3	2	1
xiv	Level of satisfaction high	5	4	3	2	1
Thanks for your co-operation						

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