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The key performance indicators (KPIs) and their impact on overall organizational performance

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Abstract The concept of performance management is used by most of the organizations to ensure that either they are going on the right path or not. For managing the performance the organizations are required to know about the performance indicators. This paper explores the key performance indicators (KPIs) and impact of these KPIs on the overall organizational performance in manufacturing sector in Pakistan. The data for present study collected from the top level management of the 84 best manufacturing organizations in Pakistan by using a structured questionnaire and the impact of KPIs on the overall performance of the manufacturing organizations were evaluated. The results show that the manufacturing organizations put more focus on the customer satisfaction and Delivery reliability in terms of performance measurement. And measuring the performance in terms of cost, financial, quality, time, flexibility, delivery reliability, safety, customer satisfaction, employees' satisfaction and social performance indicators have positive significant impact on the overall organization's performance. This paper puts together all important performance indicators used by organizations in a single list and check their impact on the overall performance indicator index of the Organizations. As Pakistan is among the developing countries, this study will serve as a valuable

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guideline for several manufacturing organizations operating in other developing countries of the world.

Keywords Performance management · Production management · Process · Performance indicators · Manufacturing

1 Introduction

In order to get and keep competitive advantage over other market players in the same industry the manufacturing organizations must produce the quality products at lower cost with rapidly increasing variety. These are the few among many valuable objectives of the organizations. In order to get confirmations regarding the fulfilling of their objectives and goals organizations have to keep check over their performance (Ghalayini and Noble 1997). In order to achieve these purpose organizations must have to use the performance management systems. Simply the performance management is done by the organizations in order to confirm that either they are going in right direction or not. For measuring, managing and comparing the performance the organizations are required to know about the performance indicators.

The performance indicators can be defined as the physical values which are used to measure, compare and manage the overall organizational performance (Gosselin 2005). The performance indicators may include the quality (De Toni and Tonchia 2001; Gosselin 2005; Heckl and Moormann 2010; Badri et al. 1994; Neely and Platts 2005), cost (De Toni and Tonchia 2001; Neely and Platts 2005; White 1996), financial (Parmenter 2009; White 1996), flexibility (De Toni and Tonchia 2001; and White 1996), delivery reliability (Heckl and Moormann 2010; White 1996), employees' satisfaction (Leong et al. 1990; Mapes and Szwejczewski 1997; Parmenter 2009), customer satisfaction (Ittner 1998 and Neely and Platts 2005; Parmenter 2009), safety (Flin and O'connor 2000; Mearns et al. 2003; Parmenter 2009), environment/community (Neely and Platts 2005; Parmenter 2009; White 1996), and learning and growth (Parmenter 2009; Sadler-Smith and Chaston 2001; Utterback 1975). These are the performance indicators which are given in the literature and most of the organizations use these performance indicators for measuring and managing their performance. The measures are the factors which are used to determine the organization performance in terms of performance indicators (Browne et al. 1997; Gosselin 2005; Heckl and Moormann 2010). There could be tradeoffs between the performance indicators, which means that if one indicator's value increases the other's value decreases (i.e) the major tradeoff could be between the quality, cost, time, delivery reliability and flexibility (Mapes and Szwejczewski 1997). This paper revolves around three questions. First, which are the important indicators and sub-indicators of performance? Second, do these performance indicators have any relationship with each other and with overall performance index of the organizations? Third is there any impact of these performance indicators upon the overall performance of the organizations? This study is descriptive in nature which has used the survey research method and some statistical techniques in order to find the answers of questions discussed above. The results of the study reveal that the manufacturing organizations put more focus on the customer satisfaction and delivery reliability in terms of performance indicators. Measuring the performance in terms of cost, financial, quality, time, flexibility, delivery reliability, safety, customer satisfaction, employees' satisfaction and social performance indicators have significant positive impact on the overall performance of organizations.

2 Literature review

The phenomenon performance measurement is used by the organizations in order to ensure that they are going in right direction, achieving targets in terms of organizational goals and objectives. The performance measures are used to evaluate and control the overall business operations. They are also used to measure and compare the performance of different organizations in the industry, plants, departments, teams and individuals (Ghalayini and Noble 1996; Mapes and Szwejczewski 1997; Parmenter 2009). Thus the beginning of the performance measurement starts from the identification of performance indicators that allow for a detailed specification of process performance. Many authors have suggested many categories of indicators for different approaches of performance measurement. There are two main groups of indicators which are used to determine the organizational performance. One is called the financial or cost based measures of performance and the other is called non-financial or non-cost based measures of performance. The costs / financial, quality, time, delivery reliability, flexibility are largely accepted indicators of organizational performance (White 1996). But several authors have defined other indicators as well on the basis of their case study researches. Sinclair and Zairi (1995) have found the customer satisfaction, quality, delivery reliability, employee factors, productivity, financial performance, safety and environment / social performance as the indicators of business performance used by many organizations. Parmenter (2009) has identified the customer's satisfaction, employees' satisfaction, environment/community, financial, internal process performance and learning and growth as performance measurement perspectives. Browne et al. (1997) has identified that the different organization uses different measures for their performance, like generally they measure performance of the organization by breaking up the overall business into processes. And the most organizations measure their performance by allocating the indicators to individual processes. Rolstadås (1998) has identified that the performance measurement of an organization is a complex interrelation criteria between the effectiveness, efficiency, quality, productivity, quality of work life, innovation, and profitability. In order to be successful, each organization has to determine performance indicators and, subsequently, performance measures and performance figures that are strategically relevant to its respective situation (Leong et al. 1990; Mapes and Szwejczewski 1997). Following are the eleven perspectives or dimensions of overall business performance which are found in literature.

2.1 Quality

Quality is the key to success of every organization. Now a days the customers are demanding quality products and the organizations that are able to produce quality products at lower cost win the game. The quality is checked mainly at three levels input, output and throughput or process quality. Most of the organizations focus on quality because they have made promises to their customers about quality of their services and products (Heckl and Moormann 2010; Badri et al. 1994). White (1996) has discussed eight dimensions of quality which are: features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. In between these dimensions, conformance has the empirical evidence with quality. Gosselin (2005) has discussed customer satisfaction, input quality, output quality, cost quality and number of customer complaints as the measures of quality. De Toni and Tonchia (2001) have discussed machine reliability, reworks, quality system costs, customer satisfaction, returned goods, input and output quality, product reliability, and machine reliability as the quality measures. According to Neely and Platts (2005) performance, features, reliability, confor-

mance, technical durability, serviceability, aesthetics, perceived quality, humanity, and value are the measures of quality.

2.2 Flexibility

Flexibility is defined as the ability of the organizations to perform multiple tasks at given level of resources like, labour, machine etc (Zhang et al. 2003). Neely and Platts (2005) has discussed material quality, output quality, new product, modified products, deliverability, volume mix and resource mix are the most valid measures of flexibility. De Toni and Tonchia (2001) have identified volume flexibility, mix flexibility, product modification flexibility, process modification flexibility and expansion flexibility as the measures of flexibility performance. White (1996) has identified perceived flexibility, flexibility relative to competitors, process flexibility relative to competitors, perceived relative product flexibility, plant response time to product mix changes, product cycle time, set-up time, time to replace tools, change tool, assemble or move fixture, percentage increase in average number of set-ups per day, perceived relative volume flexibility, ability to perform multiple tasks efficiently, percentage programmable equipment, percentage of slack time for equipment, labour, percentage products using pull system, disruption caused by breakdowns and vendor lead time as the strategy related measures of flexibility performance of the manufacturing organizations.

2.3 Time

Time is a very important determinant of the manufacturing performance of the organizations. The time based manufacturing is an important concern for the manufacturing organizations in the world; in order to achieve competitive advantage over their competitors (Koufteros et al. 1998). De Toni and Tonchia (2001) have identified the manufacturing lead time, delivery lead time, due date performance, frequency of delivery and rate of production introductions as the measures of time performance in their article. Neely and Platts (2005) have identified time to market, distribution lead times, delivery reliability (to clients), supply lead times, supplier delivery reliability, manufacturing lead time, standard run time, actual run time, wait time, set-up time, move time, inventory turnover, order carrying out time and mean(flexibility) as the measures of time indicator. White (1996) has used lead time, cycle time, time from customer's recognition of need to delivery, order processing time, response time, percentage on-time for rush jobs, paperwork throughput time, material throughput time, distance travelled, decision cycle time, time lost waiting for decisions, percentage first competitors to market, breakeven time, time from idea to market, average time between innovation, number of changes in projects and engineering time as the strategy related measures of time. White (1996) has named time indicator as the speed in his research.

2.4 Safety

In recent years there has been a realization that the reliability of complex work systems in achieving organizational goals safely depends on work structures as well as technical arrangements (Mearns et al. 2003). Parmenter (2009) has identified in his book that the level of risk and safety perceived, accident rate, level of employees' cooperation, safety attitude of managers and employees, level of employees' physical risk on work place and the level of safety information as the key measures of safety. In UK the leading measures of the safety performance are lost time on accident, and accident rate (Flin and O'connor 2000; Mearns et al. 2003).

2.5 Financial performance

Historically financial measures are the best measures to evaluate the company's performance, such as the physical values of sales and profits or percentage return on equity and assets. Because external groups of stockholders are strongly concerned with these sort of performance measures and they put pressure on companies to use financial measures for their internal performance measurement (White 1996). Many researchers and organizations use different measures for evaluating and measuring their financial performance. Here, we have adopted the financial measures suggested by Parmenter (2009) in his book "the key performance indicators (KPIs)". He suggested cost of goods sold / sales, scrap cost as %age of total sales, A/c Receivable turnover, cash flows, days in inventory, days sales in receivables, net income, sales, number of profitable customers, return on equity, sales by product, sales growth rate, return on assets and return on capital employed as the measures of the financial performance of the organizations.

2.6 Cost

The external stakeholders have more concern with the cost based measures of the performance, so that is why the organizations use cost accounting system which include measures of efficiency and effectiveness, represent an effort to relate internal performance measures to external ones (White 1996). Neely and Platts (2005) has identified the manufacturing cost, value added cost, selling price, running cost and services cost as the measures of the cost performance. White (1996) has identified cost relative to competitors, perceived relative cost performance, manufacturing costs, capital productivity, labour productivity, machine productivity, total factor productivity, total product cost as a function of lead time, direct labour cost, indirect labour cost, percentage improvement in labour, relative labour cost, labour productivity, labour efficiency, material cost, inventory cost, scrap cost, repairing cost, cost of quality, design cost, relative R&D cost, distribution cost, overhead and transactions per product as strategy related measures of cost. De Toni and Tonchia (2001) have identified the material cost, labour cost, machinery energy cost, machinery material consumption cost, inventory cost, machine saturation, total productivity, working capital productivity, value added productivity and value added productivity/employee costs as the measures of cost performance of the organizations.

2.7 Employees satisfaction

The employees' satisfaction is the key to success for every organization. If the employees are satisfied then there will be satisfied customers and overall organizational performance will boost up (Leong et al. 1990; Mapes and Szwejczewski 1997). Parmenter (2009) was of the view that analysis of absenteeism, %age of staff working flexible hours, turnover rate, new recruits which are employee's referrals, employees' satisfaction per survey, employees' complaints resolution effectiveness, empowerment index and length of service of staff who has left are the measures to check the employees satisfaction in any organization.

2.8 Learning and growth

Leaning and growth provides the organizations with competitive advantage over their competitors. It happened because the learning organizations keep training their employees with the

new technological advancements (Sadler-Smith and Chaston 2001). Parmenter (2009) mentioned in his book that the %age of managers having IT literacy, %age of employees having required education, employees terminated for performance this year, employees certified for skilled job function or position, investment for training, number of internal promotions, managers who have performance management training, number of new staff, times in training (days/year) and number of research paper generated are measures by which the organizations can check their performance in terms of learning and growth. The more the leaning organizations involve in innovativeness the more they develop new product development projects (Utterback 1975; Sadler-Smith and Chaston 2001).

2.9 Environment/social performance

The organizations owe something to the society in which they operate and the realization of this liability is actually the social responsibility or we call this as corporate social responsibility. The socially responsible organizations actually take steps for the welfare of the society in which they operate (White 1996; Neely and Platts 2005). Parmenter (2009) has mentioned in his book that the discharge from production into the environment, waste and scrap produced, dollar donated to community, percentage of local residence in total workforce, number of media coverage events, number of photos in papers, number of sponsorships undertaken by organizations, number of environment complaints received in a year, %age of current projects that are environment friendly and the environment safety awards are the true measures of the environment/social performance of the manufacturing organizations.

2.10 Customer satisfaction

The higher customer satisfaction improves financial performance by increasing the loyalty of existing customers, reducing price elasticity, lowering marketing costs through positive word-of-mouth advertising, reducing transaction costs, and enhancing organization reputation (Ittner 1998 and Neely and Platts 2005). According to Parmenter (2009) stock outs, revenue gained from top customers in a week, number of complaints, customer loyalty index, customer lost, new customers, number of customer referrals, market share in term of customers, on time delivery, product quality, number of quality service guarantee issued and order frequency are the measures of the customer satisfaction.

2.11 Delivery reliability

White (1996) has proposed the perceived relative reliability, reliability relative to competitors, percentage on-time delivery, due date adherence, percentage increase in portion of delivery promises met. Percentage of orders with incorrect amount, schedule attainment, average delay, percentage reduction in lead time per product line, percentage improvements in output, percentage reduction in purchasing lead time and percentage reduction in average service turnaround per warranty claim as the measures of the delivery reliability. There is little discrepancy between researchers about the measures of delivery reliability.

In summary, there are many indicators available in literature that can be applied for measuring the organization's processes performance. During the late twentieth century, most of the organizations focus more upon the efficiency, and lesser upon the effectiveness. Performance measurement serves to reduce cost rather than to improve the organization's profit related issues. In order to avoid misguiding management the organizations should focus on

the selection of performance indicators which are mostly related to their strategy. The other thing which should be in the minds of managers during the selection of indicators is that they should link these selected indicators to their business vision, mission and objectives. This will result in strategic performance indicators that support senior management in indicating toward the desired strategic direction. Hence, the indicators are highly dynamic, and the selection of advantageously important performance indicators is related to the concept of "critical success factors". In order to be successful, each organization has to determine performance indicators and performance measures that are strategically relevant to its particular situation (Heckl and Moormann 2010).

3 The methodology and model

In this article survey research method is used. For this study a structured questionnaire is used in order to get primary and qualitative data on the topic. The likert scale was used in the questionnaire of study and it is filled by the top management of the sampled organizations. The sample size of 84 respondents were randomly selected from four different manufacturing industries of Pakistan. The respondents were asked to fill the questionnaire on the basis of their organizations' practices and their personal experiences. Then the data collected from these questionnaires was entered into the SPSS 17 database for analysis. To prioritize the different performance indicators we use analytical hierarchy process (AHP). The indices of the eleven broad indicators are calculated on the basis of global priority weights. Correlation analysis is used to check the impact of various performance indicators indices on each other and the overall performance index to know how they are helping each other and in which direction. At the end we run the simple regression in order to check the impact of these eleven indicators indices on the overall performance indicators index.

3.1 Research model

The 4-stage research model for this study is given in Fig. 1. In this research model the number of items (sub indicators) in each performance indicators EPI and IPI (as 2nd stage) are recognized as the qualitative part of the study and the final number of dimensions are determine by factor analysis (stages 3 and 4). Overall performance index is calculated (as 1st stage) by using AHP's given global weights of the performance indicators.

4 The findings

Rolstadås (1998) has identified that performance measurement of an organization is a complex interrelation criteria between the effectiveness, efficiency, quality, productivity, quality of work life, innovation, and profitability. In order to be successful, each organization has to determine performance indicators and, subsequently, performance measures and performance figures that are strategically relevant to its respective situation. Different organizations use different performance indicators with respect of their competitive strategy. The organizations, which have cost based competitive strategy focus more on the cost based measures of performance and the organizations with responsive competitive strategy focus more on the quality and other non cost based measures. The financial measures are equally important for all sort of organization, even the organizations put more focus on Non-financial measures of performance (Leong et al. 1990). This study is conducted to assess the relative importance of

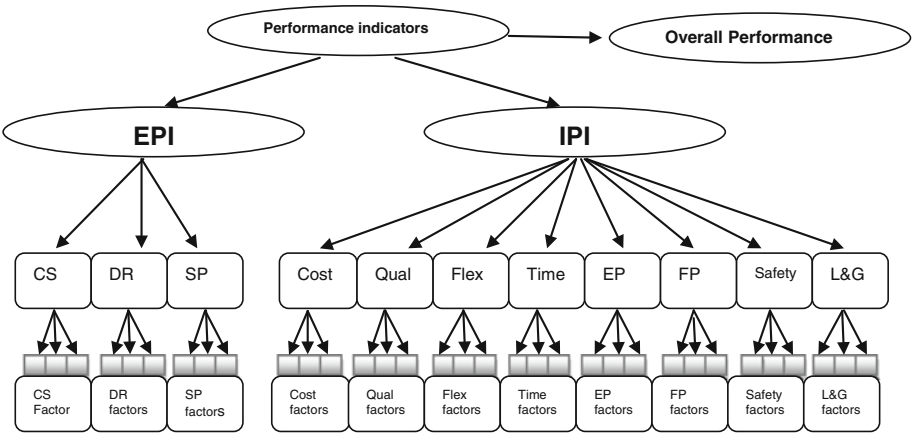

Fig. 1 The Research model for performance indicators and overall performance index

these performance indicators in manufacturing sector of Pakistan. This study will be helpful for manufacturing organizations in Pakistan in order to select the KPIs for their performance management.

4.1 Analytical hierarchy process (AHP)

In order to achieve the first objective of the study, which are the important performance indicators used by the organizations, we have applied the AHP. AHP is a multi-criteria decision making (MCDM) method. MCDM is a well known class of decision making that was first introduce by Wind and Saaty (1980). The AHP actually converts respondents' preferences into ratio-scale weights that are pooled into linear additive weights for the alternatives. These resultant weights are used to rank the alternatives and thus assist the decision maker in making a strategic decision (Forman and Gass 2001). The three primary functions of AHP are the structuring complexity, measurement on a ratio scale and synthesis. By understanding these functions one can understand that why the AHP should be considered as a general methodology that can be applied to a variety of problems. The first function of AHP technique is that it is used to face problems in the way humans deal with complexity: the hierarchical structuring of complexity into homogeneous clusters of factors. Wind and Saaty (1980) pointed that the large range of organizations are mostly hierarchical in structure, which means that they are divided into functions which are sub-divided into sub-functions. The hierarchical sub division is not a strange phenomenon for the human organizations. The second function of AHP is that it uses the ratio scale to rank different factors. The need to have a mathematically approved, patently obvious methodology caused Saaty to use paired comparisons of the hierarchical factors to derive ratio-scale measures that can be interpreted as final ranking weights. The third main function of AHP is that it synthesis or putting together the parts into a whole. As complex decisions involves many factors which need to synthesize manually. Although the AHP facilitate the complex decision making by synthesize the multitude factors into a hierarchy. We don't know of any other methodology that facilitates synthesis as does the AHP (Forman and Gass 2001).

The respondent were asked about different performance indicators which are arranged in the form of eleven broad categories like, cost, quality, delivery reliability, flexibility, time,

customer satisfaction, employees satisfaction, financial indicators, safety, organization performance in terms of its contribution in environment and community and the organization learning and growth which are also the first degree performance indicators. The respondents were required to give their response in terms of many performance indicators arranged in different categories. A detailed analysis is done in order to develop a hierarchical index based on the global priority weights of sub-indicators for performance management (Table 1), which indicates the relative importance toward selecting these indicators as the KPIs for the manufacturing organizations in Pakistan.

Results from AHP given in Table 1 illustrate the relative importance of these sub-indicators or measures provided by the top level management of different organizations from overall manufacturing sector (OMS) of Pakistan and the selected manufacturing industries. The results indicates that for the manufacturing organizations in Pakistan product quality is the most important performance indicator which also reveals that the manufacturing organizations in Pakistan focus more on the product quality (Global weight = 0.571) as compare to other performance indicators. The organizations focus more on dollar donated to community (Priority weight = 0.519) as the second important factor and the conformance to community as the third important factor (Priority weight = 0.444). The results indicate that for the automobiles organizations in Pakistan the conformance to customer perception is the most important performance indicator which also reveals that the manufacturing organizations in Pakistan focus more on the product quality according to the customer perceptions (Priority weight = 0.684) as compare to other performance indicators. The automobile organizations in Pakistan focus more on dollar donated to community (Priority weight = 0.541) as the second important factor and the a/c receivable turnover as the third important factor (Priority weight = 0.450). In our study sample, there were eight electronics organizations from Pakistan. The respondent from these organizations were also asked the same question regarding performance indicators either these are being used in their organizations or not. The results about the electronics organizations suggest that the electronics organizations in Pakistan are more concerned about material costs (priority Weight = 0.634) as performance indicator, which is on top among other performance indicators. Other indicators are respectively the conformance to customer perception (priority Weight = 0.509) which is second important indicator of performance, product performance (priority Weight = 0.427) as third important indicator, dollar donated to community (priority Weight = 0.422) as fourth important, percentage of local residence in total workforce (priority Weight = 0.422) as fifth important performance indicator etc. These results suggest that the sports organizations in Pakistan are more concerned about A/c receivable turnover (priority Weight = 0.629) as performance indicator, which is on top among the other performance indicators. The other sub-indicators are the dollar donated to community (priority Weight = 0.564) as second important, conformance to customer perception (priority Weight = 0.401) as third important, material costs (priority Weight = 0.398) as fourth important, product quality (priority Weight = 0.392) as fifth important, products performance (priority Weight = 0.342) as sixth important, reliability relative to competitors (priority Weight = 0.323) as the seventh important indicator of performance (etc). At the end, results for the textile organizations in Pakistan show that the product quality is the most important performance indicator which also reveals that the textile organizations in Pakistan focus more on the product quality (Priority weight = 0.520) as compare to other performance indicators. The other part of the results show that the textile organizations focus more on A/c receivable turnover (Priority weight = 0.472) as the second important factor and the conformance to customer perception as the third important factor (Priority weight = 0.422). A detailed analysis is made in order to develop a hierarchical indices of performance indicators based on the global priority weights of sub-indicators for perfor-

Table 1 AHP based ranking of performance indicators

Indicators	Sub indicators	Global weights				
		OMS	Auto	Elect	Sports	Textile
Cost	Labour costs as %age of T. Sales	0.1980	0.1474	0.1779	0.2135	0.2020
	Cost relative to competitors	0.2821	0.2704	0.2409	0.2206	0.2651
	Cost of quality	0.2815	0.2704	0.2409	0.2206	0.1235
	Overhead cost	0.0692	0.1431	0.2262	0.2506	0.2490
	%age of total manufacturing cost	0.1152	0.0999	0.0606	0.0255	0.1102
	Service cost / warranty	0.0253	0.0291	0.0266	0.0348	0.0250
	Scrap cost as %age of T. sales	0.0283	0.0394	0.0266	0.0341	0.0250
	Material costs	0.2676	0.3174	0.6344	0.3983	0.3931
	Distribution cost	0.1731	0.2085	0.1009	0.2180	0.1233
	Value added cost per unit	0.3450	0.1006	0.1009	0.1086	0.1406
	Running cost per unit	0.0510	0.1961	0.0680	0.1002	0.1568
	Cost of goods sold/sales	0.1630	0.1773	0.0955	0.1747	0.1860
Financial	A/c receivable turnover	0.2856	0.4500	0.2948	0.6297	0.721
	Cash flows	0.4322	0.3788	0.2948	0.2281	0.2268
	Days in inventory	0.2355	0.1297	0.3551	0.0626	0.2606
	Days sales in receivables	0.0465	0.0413	0.0551	0.0794	0.0404
	Net income	0.2535	0.2170	0.1927	0.2147	0.2392
	Sales	0.1934	0.2306	0.2752	0.2403	0.1707
	No. of profitable customers	0.0863	0.0673	0.1114	0.0613	0.1035
	Return on equity	0.1136	0.1706	0.1114	0.1264	0.1497
	Sales by product	0.0660	0.0541	0.0545	0.0503	0.0478
	Sales growth rate	0.0713	0.0642	0.0950	0.1398	0.1260
	Return on assets	0.1463	0.1420	0.1379	0.1329	0.1308
	Return on capital employed	0.0693	0.0540	0.0215	0.0340	0.0319
Quality	Products performance	0.3123	0.3480	0.4277	0.3425	0.3632
	Products features	0.1126	0.1015	0.1830	0.1062	0.1565
	Products reliability	0.1596	0.2286	0.1302	0.1198	0.1218
	Machine reliability	0.1070	0.0748	0.0641	0.1198	0.0671
	Out put quality	0.1541	0.0999	0.0898	0.1586	0.1455
	Input quality	0.1541	0.1470	0.105	0.1528	0.1455
	Conformance to customers	0.4444	0.6840	0.5099	0.4010	0.4226
	Technical durability / expected life	0.2366	0.0950	0.2118	0.2327	0.1647
	Serviceability	0.0855	0.0950	0.0826	0.0887	0.1743
	Perceived quality by customer	0.2332	0.1258	0.1955	0.2775	0.2383
Time	Cycle time	0.1338	0.3823	0.2206	0.2826	0.1901
	Order processing time	0.1569	0.1734	0.1138	0.2055	0.1746
	Response time	0.2056	0.0867	0.1526	0.0987	0.2261
	Move time	0.0508	0.0486	0.0588	0.0489	0.0474
	Wait time	0.0597	0.0610	0.1113	0.0634	0.0529
	Order carrying out time	0.0642	0.0709	0.0711	0.1287	0.0525
	Time to market	0.1966	0.0610	0.0859	0.0913	0.1538

Table 1 continued

Indicators	Sub indicators	Global weights				
		OMS	Auto	Elect	Sports	Textile
	Breakeven time	0.0341	0.0500	0.1009	0.0402	0.0498
	Throughput time	0.0979	0.0655	0.0846	0.0402	0.0525
Flexibility performance	Volume flexibility	0.1706	0.2301	0.1469	0.1624	0.1760
	Mix flexibility	0.0908	0.1570	0.0894	0.0865	0.0918
	Product modification flexibility	0.1177	0.0789	0.1226	0.1276	0.1067
	Expansion flexibility	0.1290	0.0982	0.1385	0.1388	0.1643
	Ability to perform multiple tasks	0.1288	0.1355	0.1385	0.1431	0.1501
	Labor flexibility	0.1896	0.1473	0.1385	0.1425	0.0759
	New product developments	0.1004	0.1143	0.1385	0.1425	0.1433
	Job classification	0.0380	0.0191	0.0538	0.0285	0.0735
	Lot size flexibility	0.0345	0.0191	0.0327	0.0275	0.0181
Delivery reliability	Reliability relative to competitors	0.2396	0.3204	0.2035	0.3233	0.2400
	Perceived delivery reliability	0.1151	0.0754	0.1869	0.0733	0.0743
	On time delivery percentage	0.1426	0.1485	0.0889	0.0870	0.1488
	Average delay	0.2063	0.1960	0.0889	0.0978	0.1814
	%age of incorrect orders	0.0379	0.0740	0.0531	0.0596	0.0470
	%age reduction in lead time	0.0386	0.0412	0.1137	0.0969	0.0779
	%age improvements in output	0.0417	0.0412	0.1137	0.0969	0.0409
	%age on-time delivery	0.0675	0.0750	0.1008	0.0725	0.1077
	Schedule attainment	0.1102	0.0278	0.0501	0.0922	0.0817
Safety	Level of risk and safety perceived.	0.2219	0.2029	0.2256	0.1740	0.3026
	Accident rate	0.3957	0.3083	0.2256	0.2764	0.3026
	Level of employees cooperation	0.1140	0.2393	0.2256	0.2764	0.0678
	Safety attitude of employees	0.0853	0.0722	0.2256	0.1135	0.1623
	Level of physical risk on work place	0.0476	0.0433	0.0321	0.0437	0.0471
	Level of safety information	0.1354	0.133	0.0653	0.1156	0.1172
Customer satisfaction	Customer loyalty index	0.3181	0.2405	0.25	0.2421	0.2247
	Product quality	0.5716	0.3871	0.25	0.3923	0.5207
	quality service guarantees	0.0493	0.1732	0.25	0.1788	0.1224
	Order frequency	0.0607	0.1991	0.25	0.1866	0.1319
	Stock outs	0.2280	0.1958	0.1276	0.1866	0.3518
	No. of complaints	0.0919	0.3291	0.2947	0.2845	0.3518
	Customer lost	0.0924	0.0856	0.0942	0.0947	0.0592
	New customers	0.1266	0.1068	0.1985	0.1376	0.0653
	Number of customer referrals	0.1567	0.0535	0.0785	0.0528	0.0419
	Market share in term of customers	0.0976	0.0996	0.0785	0.1158	0.0618
	On time delivery	0.0924	0.1292	0.1276	0.1277	0.0678
Employees satisfaction	Analysis of absnteeism	0.2687	0.3110	0.2746	0.2219	0.1565
	%age of staff working flexible hours	0.1045	0.0815	0.1617	0.1012	0.1653
	Turnover rate	0.2735	0.2374	0.2502	0.1759	0.2171
	New employees referral recruits	0.0896	0.0966	0.0559	0.1134	0.0913

Table 1 continued

Indicators	Sub indicators	Global weights				
		OMS	Auto	Elect	Sports	Textile
	Employees satisfaction per survey	0.1202	0.1613	0.1216	0.1892	0.2016
	Complaint resolution effectiveness	0.0298	0.0333	0.0312	0.0447	0.0658
	Empowerment index	0.0366	0.0333	0.0522	0.0308	0.0271
	Tenure of staff who has left	0.0765	0.0452	0.0522	0.1225	0.0750
Social	Dollar donated to community	0.5199	0.541	0.4229	0.5644	0.3676
	%age of locals in total workforce	0.3027	0.2850	0.4229	0.2304	0.4012
	Number of media coverage events	0.0802	0.0770	0.0495	0.1133	0.1543
	Number of photos in papers	0.0472	0.0484	0.0522	0.0459	0.0384
	Sponsorships undertaken	0.0498	0.0484	0.0522	0.0459	0.0384
	Iste discharge into environment	0.3759	0.4149	0.2557	0.2557	0.2
	Iste and scrap produced	0.4227	0.2576	0.2557	0.2557	0.2
	Yearly environment complaints	0.0539	0.0725	0.2557	0.2557	0.2
	Environment friendly projects	0.0644	0.0786	0.0561	0.0561	0.2
	Environment safety awards	0.0828	0.1762	0.1765	0.1765	0.2
Learning and growth	Managers having IT literacy	0.1816	0.1812	0.2383	0.1793	0.2432
	Employees with required education	0.2566	0.2397	0.2383	0.2469	0.2432
	Employees certified for job position	0.3823	0.2397	0.2383	0.2469	0.2432
	Managers with PM training	0.0866	0.2748	0.2604	0.2662	0.2432
	No. of research paper generated	0.0927	0.0645	0.0245	0.0605	0.0270
	Yearly fire outs for performance	0.1542	0.1871	0.2347	0.2465	0.2557
	Investment for training	0.2546	0.4347	0.3854	0.3186	0.2557
	Number of internal promotions	0.2934	0.1923	0.1875	0.2211	0.2557
	Number of new staff	0.1778	0.0635	0.0560	0.0571	0.0561
	Times in training (days/year)	0.1197	0.1222	0.1362	0.1565	0.1765

mance management, which indicate the relative importance toward selecting these indicators as the KPIs for the manufacturing organizations in Pakistan. We learn from the descriptive statistics in the Table 2. That the means' value of overall indicators index for overall manufacturing sector and the electronics industry is 2.0913 and 2.2448. This difference is significant ($p=0.15$). The differences between the overall manufacturing sector and electronics industry ($p=0.07$), sports ($p=0.02$) and textile ($p=0.04$) are significant. The social performance and learning and growth are the best performance indicators among all other performance indicators in all industries, where as the quality and financial performance indicators are the quite less important performance indicators in all industries.

4.2 Correlation

Correlation analysis is used to check the impact of various performance indicators indices on each other and the overall performance index to know how they are helping each other in formulating the overall performance index and in which direction, which is also used to answer our second research question. The Pearson correlation coefficients (R) between performance

Table 2 Weighted indices of all performance indicators

Indicators indices	overall manufacturing sector		Automobile		Electronics		Sports		Textiles	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cost	2.196	1.035	1.944	.626	2.272	1.018	2.229	1.192	2.178	.9487
Financial	1.660	.4621	1.532	.462	1.695	.3992	1.681	.4839	1.648	.4690
Quality	1.807	1.080	1.406	.399	2.118	1.321	1.897	1.074	1.702	1.090
Time	1.832	.5710	1.615	.432	2.075	.7583	1.886	.5865	1.754	.5234
Flexibility	1.958	.5504	2.073	.765	1.677	.3140	1.963	.5731	2.002	.5476
Del reliability	2.270	1.231	3.183	1.69	2.142	1.269	2.198	1.098	2.265	1.299
Safety	2.563	1.673	2.069	1.95	1.951	1.324	2.961	1.721	2.387	1.647
Customer satisfaction	2.062	.8377	2.343	.742	2.003	.6936	2.122	1.017	1.990	.7049
Employee satisfaction	2.448	1.333	2.419	1.75	2.157	1.221	2.496	1.234	2.469	1.441
Social	3.152	1.635	3.189	2.09	2.425	1.601	3.382	1.620	3.100	1.628
Learning and growth	3.511	1.554	3.481	1.82	2.698	1.616	3.806	1.502	3.428	1.553
OPI	2.091	.4241	2.244	.486	2.015	.4733	2.120	.4245	2.049	.4636

Table 3 Correlations coefficients between the performance indicators

	Cost	Fin	Qual	Time	Flex	DR	Safety	CS	ES	Social	L&G	OPI
Cost												
R	1											
Sig.												
N	84											
Fin												
R	.076	1										
Sig.	.489											
N	84	84										
Qual												
R	−.011	.282	1									
Sig.	.918	.009										
N	84	84	84									
Time												
R	.250	.427	.497	1								
Sig.	.022	.000	.000									
N	84	84	84	84								
Flex												
R	−.004	.474	.146	.247	1							
Sig.	.969	.000	.187	.024								
N	84	84	84	84	84							
DR												
R	−.351	−.139	.312	.015	−.178	1						

Table 3 continued

	Cost	Fin	Qual	Time	Flex	DR	Safety	CS	ES	Social	L&G	OPI
Sig.	.001	.206	.004	.893	.105							
N	84	84	84	84	84	84						
Safety												
R	.211	.612	.267	.217	.449	−.202	1					
Sig.	.054	.000	.014	.047	.000	.066						
N	84	84	84	84	84	84	84					
CS												
R	−.214	.191	.147	.071	.352	−.069	.181	1				
Sig.	.050	.082	.183	.524	.001	.530	.100					
N	84	84	84	84	84	84	84	84				
ES												
R	.000	.434	−.016	.070	.397	−.254	.688	.412	1			
Sig.	.999	.000	.883	.525	.000	.020	.000	.000				
N	84	84	84	84	84	84	84	84	84			
Social												
R	.346	.125	.027	.069	.132	−.042	.573	.096	.564	1		
Sig.	.001	.262	.808	.537	.238	.705	.000	.390	.000			
N	82	82	82	82	82	82	82	82	82	82		
L&G												
R	.427	.111	−.021	.163	.003	.002	.437	.013	.494	.845	1	
Sig.	.000	.319	.851	.145	.981	.985	.000	.907	.000	.000		
N	82	82	82	82	82	82	82	82	82	82	82	
OPI												
R	−.052	.391	.576	.451	.360	.538	.404	.570	.347	.367	.329	1
Sig.	.637	.000	.000	.000	.001	.000	.000	.000	.001	.001	.003	
N	84	84	84	84	84	84	84	84	84	82	82	84

indicators are listed in Table 3 for overall manufacturing sector. The results for correlation show that the quality has a significant positive correlation with time, delivery reliability and safety, which means that the increase in time, delivery reliability and safety will result into the increase in overall quality performance of the organization. The time has a significant positive correlation with flexibility and safety. It means that increase in the flexibility and safety performance will result due to the increase in the time performance. The flexibility has a significant positive relation with the safety, customers' satisfaction and employees' satisfaction. These correlation values mean that the increase/decrease in the safety, customers and employees' satisfaction will result into the increase/decrease in the performance of the organization in terms of the flexibility. The delivery reliability has a significant negative correlation with the safety and employees' satisfaction. The safety has a positive significant relation with employees' satisfaction, social performance and learning and growth performance. The customers' satisfaction is positively correlated with employee's satisfaction. The employees' satisfaction is positively correlated with social and learning and growth performance. At the end all the indicators other than the cost have a positive significant correlation with the

overall performance index. And if we write the results of Pearson correlation between all performance indicators and overall performance index the most significant positively correlated performance indicator is quality (p = .000, R = .576) followed by the customers' satisfaction (p = .000, R = .570), delivery reliability (p = .000, R = .538), time (p = .000, R = .451), safety (p = .000, R = .404), financial (p = .000, R = .391), social (p = .001, R = .367), flexibility (p = .001, R = .360), employees' satisfaction(p = .001, R = .347) and learning and growth (p = .003, R = .329). The cost is negatively correlated (R = −0.637) with overall performance indicator but their relationship is not significant (p = .637).

4.3 Regression analysis

In order to address third research question which was the impact of these performance indicators upon the overall performance of the organizations? We have used the regression analysis with the overall performance indicators index as the dependent variable and the eleven performance indicators indices as the independent variables. The results of the simple regression are given in the Table 4, which show that measuring the performance in terms of cost, financial, quality, time, flexibility, delivery reliability, safety, customer satisfaction, employees' satisfaction and social performance indicators have positive significant impact on the overall performance of the organizations at 0.01 significance level. But the learning and growth index has no effect on the overall performance indicators index. On the basis of beta coefficient the delivery reliability (beta = 0.591) has more impact on the overall performance index followed by customers' satisfaction (beta = 0.443), quality (beta = 0.232), cost (beta = 0.150), employees' satisfaction (beta = 0.143), financial (beta = 0.119), flexibility (beta = 0.108), time (beta = 0.103), social (beta = 0.094) and safety (beta = 0.081). The R square (Coefficient of determination) is 0.965 which is the degree of variation explained by the eleven indicators in overall performance index. It means that these eleven performance indicators are explaining the much of the variability in the overall performance of the organizations.

Table 4 Regression coefficients for the performance indicators indices

Model	Un-standardized coefficients		Standardized coefficients	t	Sig.
	B	SE	Beta		
(Constant)	−.027	.067		−.406	.686
Cost	.064	.014	.150	4.699	.000
Financial	.114	.032	.119	3.543	.001
Quality	.100	.014	.232	7.320	.000
Time	.079	.024	.103	3.329	.001
Flexibility	.089	.023	.108	3.830	.000
Delivery reliability	.212	.011	.591	19.990	.000
Safety	.022	.012	.081	1.877	.065
Customers' satisfaction	.233	.015	.443	15.810	.000
Employees satisfaction	.049	.015	.143	3.363	.001
Social	.026	.014	.094	1.883	.064
Learning and growth	.022	.014	.076	1.533	.130

5 Summary and conclusions

The performance management is an important factor for organization to get a competitive advantage over their competitors. This is the only way for organizations to check either they are going in right direction and achieving their targets in terms of their preset objectives and goals or not. For this purpose, the performance measures are used to evaluate and control the overall business operations. They are also used to measure and compare the performance of different organizations both within the organization and outside of the organization. The performance can be compared within the departments, sub departments, teams and individual processes (Ghalayini and Noble 1996). This study is an attempt to know that which are the KPIs used by the manufacturing sector of Pakistan? What is the relationship between these performance indicators and overall performance index? And what is the impact of these KPIs on the overall Organization's performance Index in manufacturing sector of Pakistan?

Fernandes et al. (2006) has discussed four types of performance indicators like financial, customer related, learning and growth and internal business process and he also discussed the KPIs for these four types. Bernard et al. (2004) have discussed three perspectives of performance measurement, which are the growth/renewal, efficiency and stability. Munir Ahmad and Dhafr (2002) also explored three perspectives of performance measurement indicators the financial performance indicator (business performance), technical performance indicator (productivity measurement) and efficiency indicator (human contribution measurement).

The results of AHP analysis show that the overall manufacturing organizations put more focus on the customer satisfaction and delivery reliability. The automobiles organizations put more focus on the customer satisfaction and social performance. The electronics, sports and textiles industries put more focus on the customers' satisfaction and delivery reliability. On the basis of regression analysis we can conclude that measuring the performance in terms of cost, financial, quality, time, flexibility, delivery reliability, safety, customer satisfaction, employees' satisfaction and social performance indicators have positive significant impact on the overall performance of the organizations, whereas the learning and growth index has no impact over the overall performance of the organizations.

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