

## STATUS OF PERFORMANCE MEASUREMENT SYSTEMS IN INFRASTRUCTURE CONSTRUCTION FIRMS OF PAKISTAN

Asadullah Saleem\* and Nadeem Ehsan\*

### ABSTRACT

*Construction sector, even in developed countries, is criticized for sub-optimal performance. The situation is no different in case of Pakistan construction industry. Being regarded as an answer to challenges framed by globalized competitive environment, performance measurement discipline has received much attention among researchers and construction firms during last two decades. Before a solution in the form of a suitable performance measurement framework could be prescribed to domestic firms to solve performance related problems, it is a pre-condition that one gets to know the health of performance measurement system (PMS) currently practised by these organizations. Questionnaire based survey revealed that there is an empirical evidence that most of the infrastructure firms find their PMS in need of urgent attention while one third of the surveyed firms consider their system needs improvement. Analysis of the results points out that current PMSs ignore the performance information needs of critical stakeholders like employees, customers and suppliers. Further the system design is marred by short-termism and less attention is paid to non-financial performance drivers necessary for achieving long term goals.*

**KEY WORDS:** *Performance measurement, performance measurement systems, construction, infrastructure construction firm, organizational development*

### INTRODUCTION

While performance measurement involves taking into account different indicators related to planning and managing organizational business, Performance Measurement System (PMS) helps in quantifying the efficiency and effectiveness of actions taken by an organization<sup>1</sup>.

Competitive environment of globalized world has made performance measurement critical to business success in many industries. Performance measurement is a business tool that is used to evaluate management performance, manage resource and formulate and achieve corporate strategies. As means of communication, it helps in attracting future investment, increasing share value and attracting high calibre employees. As Niven<sup>2</sup> put it "If you cannot measure it, you cannot manage it". Continuous improvement is also linked to this tool as "what gets measured gets attention, particularly when rewards are tied to the measures"<sup>3</sup>. In last 20 years, performance measurement has gained attention and importance in research to the extent that it is described as revolution. This sort of measurement is done as part of internal management of organization and can be different from the one that is carried out by clients or external evalua-

tors. Neely<sup>4</sup> gives seven reasons why performance measurement is now on the management agenda of business organizations. All of the points are relevant to the construction industry: the changing nature of work; increasing competition; specific improvement initiatives; national and international quality awards; changing organisational roles; changing external demands; and the power of information technology. The focus of recent research is more on performance measurement system and performance measurement frameworks. The former is the system customized by a company for its use and is based on any available theoretical frameworks. Which framework is suitable for company is a challenge faced by many organizations. The effort is directed towards neither missing important information nor wasting valuable resources. The demands for changes in corporate reporting are also likely to force organizations to adopt a more balanced approach to performance measurement<sup>5</sup>.

At company level, reliance on financial data has proved to be inadequate to determine exact well-being of the organization. There are certain problems that are associated with the financial measures. Financial information is lagging in nature and measures the past and tends to measure the easily measurable.

---

\* Centre for Advanced Studies in Engineering(CASE), Islamabad

Decision makers come to know the results of their decisions after at least one reporting period. They describe short-term success of managerial decisions. They ignore strategy focus and do little to suggest future improvements, identify mistakes and wrong strategies, assess individual performance or identify weaknesses<sup>6</sup>. These flaws led the research towards use of non-financial measures and development of balanced scorecard, quality excellence model and key performance indicators (KPIs). Measurement-managed companies exhibit better performance compared to other companies that do not use performance measurement as a key management tool<sup>7</sup>.

### PERFORMANCE MEASUREMENT IN CONSTRUCTION

Construction Industry, almost in every part of world, has been criticized for displaying less than optimal performance and resistance to change, and lack of innovative approaches to business improvement<sup>6,8,9</sup>. However, uncertain economic conditions, social pressure and fierce competition have forced construction firms to concentrate more on measuring organizational performance to address these challenges. Construction companies often find it difficult to identify and select an adequate set of measures, considering their strategies, and critical process. Many managers still make decisions mostly based on their intuition and common sense, and on a few broad financial measures that are inadequate in today's competitive environment. Lin and Shen<sup>10</sup> concluded that owing to rapid development of application of performance measurement methods in other sectors, the increasing complexity of construction projects and development of both management and technology in construction have greatly increased publication of performance related research in construction.

Traditionally, in construction, performance measurement approaches are related to (a) the product as facility (b) creation of the product as a process<sup>6</sup>. Performance measurement, in general, can be undertaken at individual, team, business unit, organizational, stakeholders or market level. If we ignore the individual performance measurement that is usually covered under performance appraisals by human resource section, it can be carried out particularly at three levels in construction; projects, company and industry. Construction being mainly a project-oriented in-

dustry, performance aspect has traditionally been focused more on projects than on organization level where debate has been around three traditional indicators of cost, time and quality. However, recent studies on performance measurement frameworks have discussed performance more at company level.

Owing to the simultaneous implementation of various projects and the control of many input resources within the construction industry, it becomes more acute to carry out performance measurement at company level<sup>10</sup>. The research focus has shifted from project to company level recently<sup>11</sup>. This trend is coupled with complementing financial measures with non-financial measures for determining performance. Traditionally, company level performance in construction has been limited to measuring return on capital, efficiency and profitability which has rightly been criticized for being narrow, reactive and mainly financial. Robinson et al<sup>12</sup> reported increased use of non-financial aspects related to customers, social and environmental impact, and internal stakeholders in performance measurement systems of UK construction firms.

### PERFORMANCE MEASUREMENT SYSTEMS IN CONSTRUCTION

No consensus is found in research regarding what exactly is meant by performance measurement system (PMS). From operations management angle, PMS can mainly be perceived as 'set of metrics used to quantify both the efficiency and effectiveness of actions'<sup>1</sup> or as the reporting process that gives feedback to employees on the outcome of actions<sup>13</sup>. From a strategy management perspective, it reflects the procedures used to cascade down those performance metrics used to implement the strategy within organization<sup>14</sup> and it provides with the information necessary to challenge the content and validity of the strategy<sup>15</sup>. From a management accounting perspective, a PMS is synonymous with management planning and budgeting<sup>16</sup>.

A performance measurement system is characterised by its features, the roles it plays and processes that are part of it. For each of the three aspects, there are certain necessary and sufficient conditions that need to be met for existence of a PMS. Santos *et al.*<sup>17</sup> identified these characteristics after methodical review of over 300 relevant documents.

According to this literature review, ‘performance measures’ and ‘supporting infrastructure’ are necessary features while a PMS plays roles of measuring performance, managing strategy, communicating with internal and external stakeholders, influencing behaviour through rewards and compensation, and learning and improvement of organization. To perform these roles, a PMS should have processes of selection and design of measures, collection and manipulation of data, information management for decision making, performance evaluation and rewards and system review through feedback loops. The mentioned features, roles and processes define boundaries of a PMS which distinguish it from other management processes.

Irrespective of industries, organizations in general find it challenging to design, implement, review and update a performance measuring system. In construction, developing PMS is more acute given the execution of many projects simultaneously by the organizations and control of many input resources. Due to this aspect additional problems exist as identified by Costa<sup>18</sup> like different performance indicator system and processes have to be designed at the beginning of each project. The need of performance improvement has led to the implementation of industry-specific KPIs. In view of this, some recent studies have discussed the need for key performance indicators (KPIs) that reflect both a construction company’s characteristics, and some of the problems in performance measurement of a construction company<sup>19,20</sup>.

To determine organizational performance, construction firms of developed countries are making use of mostly three frameworks namely; Balanced Scorecard, European Foundation for Quality Management (EFQM) and Key Performance Indicators (KPIs) scorecard to design PMSs. To begin with, firms find it convenient to measure their performance based on project specific KPIs like cost, quality, scope, safe, environmental impact, stakeholders’ satisfaction, etc. Use of KPIs based PMS eventually leads to performance framework that helps in aligning operations with the organizational strategy.

#### **BARRIERS TO PMS IMPLEMENTATION IN CONSTRUCTION**

Few studies have been carried out to identify the factors that influence the difficulties that com-

pany face in design and implementation of performance measurement system. Robinson et al<sup>5</sup> discussed four barriers in the adoption of performance measurement models;

- i. Determining and monitoring indicators**
- ii. Lack of data**
- iii. Time, and**
- iv. Financial resources**

Problems associated with determining and monitoring indicators include choosing the wrong measures not aligned to business objectives or relying on lagging measures reflecting past performance. Data problem relate to the process of collection, collation and standardisation. ‘Determining and monitoring indicators’ was faced as the most significant barrier. Smaller organizations find data collection and financial resources as more important problem while large organizations consider time as more significant barrier. The managerial attitude is the most complex barrier to the implementation of performance measurement systems because it is related to the way that managers perceive the problem, captures, analyses and shares information, involving issues such as leadership and decision making<sup>7</sup>. One of the weaknesses of performance measurement models is their inability to deal with the capability for change. Introducing new systems tends to be fraught with difficulties. People and organisations often find change difficult and there is sometimes resistance to adopting new ways of doing business.

Costa and Formoso<sup>18</sup> described in detail problems associated with PMS in construction. They argued that some of the difficulties in the implementation of performance measurement are related to the fact that construction is a project-oriented industry. Although there may be several repetitive processes from one project to another, each project is unique in terms of design, site conditions, organisation structure, and supply chain.

#### **PERFORMANCE MEASUREMENT AND CONSTRUCTION FIRMS OF PAKISTAN**

Promotion of the Construction Industry generates economic activities in thirty eight downstream industries. The Pakistan Construction Sector has

shown 6.5 percent growth during FY 2011-12 as compared to negative growth of 7.1 percent during FY 2010-11<sup>21</sup>. The Pakistan construction industry has started to take its current modern shape in the earlier 1980s. Today's well-known and prestigious construction companies were established in that period. Few indigenous firms started doing business in Middle East in late 90s when domestic market was facing recession. At inception, they have worked with international firms as their subcontractors in the Middle East. Today, Pakistani construction companies are significantly active in the Middle East and African countries. In resonance with national economy, the industry exhibited growth rate of above seven percents during as the business at home was booming during 2001 to 2007. This boom was cyclical as again the local market has been under stagnant period for the last five years. Generally, indigenous companies are mostly involved in labour-intensive construction whereas foreign companies that do their business in Pakistan are mostly engaged in mega infrastructure and industrial projects that involve high technology. Federal and Provincial government and authorities are major clients for mega projects though no serious step has been taken by the government for revival of industry. Relative better economic growth six years back led to sharp increase in growth of construction industry. Despite achieving rapid growth, most of domestic organizations find it difficult to identify adequate set of measures and formulate their strategies.

Pakistan construction firms are facing inefficient processes in business environment<sup>22</sup>. Performance measurement is mostly limited to financial performance of the company. Continuous improvement is directed more towards operation effectiveness i.e. doing something in a better way that others are doing, instead of adopting strategic positioning, i.e. doing something different than others. Urgent problems related to very existence of domestic companies are given more attention by top managers and little attention is paid to strategy management. Appropriate measures are needed to be identified to make them appropriate to country-specific environment. Given the existing scenario, step towards establishing a performance measurement framework that is customized according to needs of domestic firms and that is in line with characteristics of national construction industry is the need of hour.

Most of performance measurement systems, if ever these exist, are used to report historical data and are seldom reviewed and changed to respond to changes being happened in the environment of construction industry. Over the time, the established performance systems did not remain dynamic and became insensitive towards internal and external environment of the firm. Few PMSs make use of Management information system (MIS). There is no trend to go for integrated MIS infrastructure. Consequently collection, sorting, maintaining and reporting performance information are cumbersome and time consuming processes. Though one can have good idea about the situation prevailing in contractor firms of Pakistan related to performance measurement system but dimensions of the problem need to be understood in detail.

## **RESEARCH METHODOLOGY**

The aim of this research is to investigate the current status of performance measurement systems currently practiced by domestic infrastructure construction firms of Pakistan. This research was carried out as part of major study related to developing performance measurement framework for domestic infrastructure construction firms. As the contractors are the largest in number than other players of construction industry like consultants or works departments, and their nature of work is relatively more complicated, hence, construction firms doing their business as contractors were selected. Secondly, infrastructure construction firms were focused as these make large portion among contractors that also have firms that deal with electrical / mechanical erection and installation, irrigation and hydel construction etc. The objective of the research is to establish the purpose, characteristics and features of performance measurement systems currently practiced by country construction firms and identify the gaps, best practices and barriers to incorporating performance measurement framework into existing performance practices.

The unit of analysis for this research is infrastructure construction firms of Pakistan which are called 'constructors' registered with Pakistan Engineering Council (PEC). PEC is a statutory body that regulate engineering profession in the country. The main statutory function, inter alia, includes registration of constructors for which it has different eight

categories depending on certain criteria. The highest category is CA category which is normally called 'No Limit' category that contains contractors who can undertake projects worth of any amount. In other words, all large contracting firms of Pakistan are registered under no limit category of the PEC. There were 122 construction firms that were registered in 'No limit' category with PEC on August 2011 while 104 were infrastructure construction firms. Among 104 firms, 32 (31%) organizations that have head offices at Islamabad were approached for this survey. Since presence of a PMS is only likely in large firms which are only 104, practically speaking, almost one third of whole population of this research was included in the sample.

Survey method (questionnaire technique) has been used to collect primary data about status of performance measurement systems. To deal with questionnaire criteria like validity, measurability and comparability, attempt was made to adopt questionnaire from some widely cited research work. Hence questionnaire related to PMS assessment was adopted from Neely<sup>23</sup>. The questionnaire given at the end of article provides, as suggested by the author, a quick method of assessing whether an organisation's measurement system measures up. It contains 50 questions. Every question can be answered either yes or no. Score 1 point for a yes and 0 points for a no. As suggested by Neely<sup>23</sup>, firms have categorised in three groups based on the score obtained. Scores of 30 or less suggest the measurement system being assessed requires urgent attention. Scores of 31–45 highlights the fact that there is room for improvement. Scores of over 45 indicate that the measurement system is in great shape. The questionnaire consists of three sections; purpose of measuring system, characteristic of measuring system and exploitation of performance measures.

Every PMS is supposed to inform and alert management and other stakeholders about key financial and strategic information. The section on purpose of PMS has six sub-sections as it addresses performance information needs of i) owners or shareholders of business, ii) directors running the business, iii) managers of the business, iv) employees of the company, v) suppliers, vi) customers. There are nineteen questions used to answer whether the firm's PMS is adequately serving its 'purpose'. There are seven sub-

sections used to describe and assess characteristics of a PMS. First three sub-sections deal with performance measures characteristics while the remaining four address performance measuring system. The third section related to exploitation of measures has two sub-sections. First one assesses whether the performance measures are reviewed regularly and result in action. Similarly, second asks whether PMS is reviewed regularly and updated when appropriate i.e. strategies are changed to respond to markets and customers.

Respondents were interviewed face-to-face at their offices instead of using posted or e-mailed questionnaires to obtain more reliable data, and the interviews ranged from 1–1.5 hour. The telephone conversations explaining the content of the study were carried out with the interviewees before the interview. Of the total 32 firms, 21 contractors (66%) responded positively to the survey request. Simple statistical and arithmetic analysis has been used for defining characteristic of data.

## RESULTS AND ANALYSIS

As shown in Figure 1, distribution of number of responses provides a good overview of different management levels of construction firms. Of the total 21 responses obtained in this study, 11 (53%) were construction executives, 7 (33%) were project managers while 3 (14%) were finance managers. Construction executives and finance managers usually are handling more than one project at a time and are mostly involved in activities that are across departments and across projects whereas project managers are focusing mostly one project at a time but have good deep practical knowledge of construction and problems related to performance.

With respect to annual volumes, majority (48%) firms fall in less than Rs. 1 billion category while the 45% of the respondents work for companies in the "Rs. 1-5 billion" category. The remaining respondents, 14% were from large firms in the "over Rs. 5 billion" category.

The other important feature is the length of experience of respondents. Given the nature of topic and significance of research, an intentional attempt was made to interview senior professionals in construction. It was successfully achieved as the average

experience of respondents exceeds 26 years. A person with such length of experience is most likely to know the challenges and problems that are to be faced while undertaking organizational performance measurement.

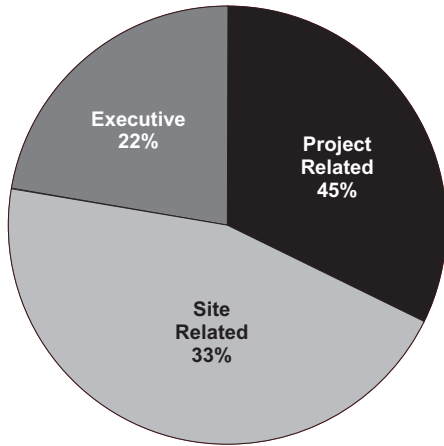


Figure 1: Survey Respondents Classification

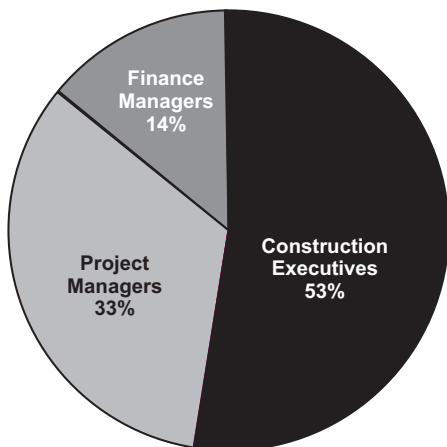


Figure 2: Break down of respondents' experience

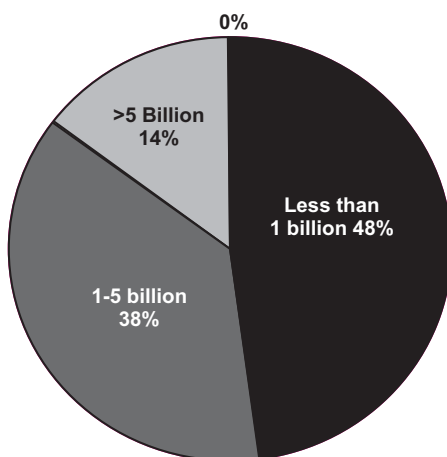


Figure 3: Break down of firms' annual volume

The other aspect of experience is also significant. Participants of survey, cumulatively, have very balanced experience (Figure 3) regarding operating single site (33%), looking after whole project (45%) and executing multiple projects (22%). The diversity of experience also helped in getting balanced results regarding performance measurement system.

As clarified, the score obtained through questionnaire divides the performance measurement system of organizations into three categories; systems in need of urgent attention or improvement or those that are in good shape (Table. 1). Majority of respondents (53%) view their PMS being in critical conditions and that it needs immediate attention. One third firms (33%) have PMS that is relatively in good condition but it still needs improvement. A few of them (14%) regard their PMS is fulfilling the objective and is in good shape. Detailed data table is given at Table.2 while Table.3 shows the correlation and variance among different sections / parameters used in assessing PMS of a firm. Since the response to questions was in 'yes' or 'no' and no mean value is involved, hence no statistical test like t-test or ANOVA was performed to find significant difference between three groups. Each category is further explored separately.

**PMS IN NEED OF URGENT ATTENTION**

Eleven firms (52%) out of total 21 find their PMS in critical condition and 'in need of urgent attention' as per the collected data. As sample of the research comprises best constructors of the country, the category 'PMS in need of urgent attention' then becomes the 'worst of the best' group of constructors. While selecting sample for this research, it was argued that 'no limit' constructors have been taken in sample owing to the observations that large organizations are most likely to have established formal performance measurement system. This argument is in line with Robinson's assertion that large organizations have resources to establish a PMS. It can be further

**Table: 1 Survey Results: Assessment of PMS**

Performance Measurement System	No. of Firms
Is in great shape (score 46-50)	14%
Needs improvement (score 31- 45)	33%
Needs urgent attention (score <30)	52%

**Table 2: Overall statistics of responses**

Description		Sr. #		No. of Yes responses	% yes responses	Sub-section average score	% Sub-section yes responses	Section average score	% Section yes responses
PURPOSE OF THE MEASUREMENT SYSTEM	Owners	1.1	a	19	90	16	76	11	53
			b	13	62				
	Directors	1.2	a	15	71	15	73		
			b	15	71				
			c	16	76				
	Managers	1.3	a	18	86	15	71		
			b	16	76				
			c	11	52				
			d	15	71				
	Employees	1.4	a	6	29	8	39		
			b	6	29				
			c	13	62				
			d	8	38				
	Suppliers	1.5	a	6	29	6	27		
			b	7	33				
			c	6	29				
			d	4	19				
	customers	1.6	a	10	48	9	40		
b			7	33					
CHARACTERISTICS OF THE MEASUREMENT SYSTEM	Simple	2.1	a	13	62	15	72	14	66
			b	14	67				
			c	15	71				
			d	16	76				
			e	18	86				
			f	15	71				
	Effieient	2.2	a	18	86	14	67		
			b	18	86				
			c	16	76				
			d	11	52				
			e	8	38				
			f	13	62				
	Action-able	2.3	a	18	86	18	86		
	Well-de-signed	2.4	a	13	62	13	61		
			b	10	48				
			c	6	29				
			d	17	81				
			e	18	86				
	Robust	2.5	a	12	57	10	45		
			b	7	33				
	consistent	2.6	a	11	52	13	63		
b			11	52					
c			15	71					
d			12	57					
e			17	81					
f			13	62					
Flexible	2.7	a	17	81	17	81			
EXPLOITATION	KPIs	3.1	a	16	76	16	76	16	75
			b	16	76				
	PMS	3.2	a	15	71	16	74		
			b	16	76				

**Table 3: Coefficient of Correlations and Variance – Status of PMS of domestic infrastructure construction firms of Pakistan**

PMS sections and Sub-sections	Purpose of Measuring Systems						Characteristics of Measuring Systems						Exploitation of measures		
	Owners	Directors	Managers	Employees	Suppliers	Customers	Simple to understand	Efficient measures	Actionable measures	Well-designed measures	Robust measures	consistent with rest of organization	Flexible PMS	Measures review	PMS review & update
Purpose of Measuring Systems	Owners	0.047	0.063	0.046	0.041	0.025	0.029	0.040	0.014	0.031	0.024	0.010	0.002	0.019	0.015
	Directors	1.000	0.106	0.011	0.026	0.054	0.039	0.034	0.025	0.034	0.051	0.011	-0.004	0.053	-0.001
	Managers	0.617	0.799	1.000	0.016	0.044	0.048	0.052	0.031	0.036	0.070	0.026	0.005	0.076	0.033
	Employees	0.470	0.086	0.405	1.000	0.038	0.036	0.040	0.009	0.027	0.078	0.018	0.015	0.031	0.058
	Suppliers	0.390	0.192	0.125	0.319	1.000	0.044	0.018	0.027	0.021	0.037	-0.005	0.016	-0.035	-0.030
	customers	0.200	0.331	0.299	0.222	0.247	1.000	0.073	0.036	0.034	0.043	0.036	-0.042	0.047	0.013
Characteristics of Measuring System	Simple to understand	0.269	0.278	0.372	0.291	0.333	1.000	0.056	0.095	0.041	0.050	0.029	-0.005	0.009	-0.026
	Efficient measures	0.497	0.333	0.545	0.439	0.182	0.554	1.000	0.024	0.032	0.032	0.029	0.016	0.054	0.012
	Actionable measures	0.132	0.189	0.252	0.073	0.215	0.228	0.739	1.000	0.039	0.017	0.034	-0.027	-0.009	-0.010
	Well-designed measures	0.553	0.477	0.546	0.431	0.309	0.305	0.582	0.614	1.000	0.024	0.021	0.011	0.027	0.017
	Robust measures	0.243	0.390	0.587	0.689	0.299	0.296	0.399	0.341	0.142	1.000	0.022	0.015	0.039	0.012
	consistent with rest of organization	0.147	0.115	0.315	0.220	-0.058	0.350	0.323	0.444	0.404	0.459	1.000	-0.008	0.041	0.026
Exploitation of measure	Flexible PMS	0.020	-0.026	0.037	0.117	0.116	-0.037	0.149	-0.198	0.152	0.110	-0.080	1.000	0.016	0.026
	Measures review	0.171	0.372	0.589	0.246	-0.262	0.068	0.525	-0.066	0.378	0.299	0.479	0.123	1.000	0.081
	PMS review & update	0.137	-0.005	0.261	0.475	-0.227	-0.196	0.120	-0.080	0.238	0.100	0.298	0.182	0.592	1.000

Note: Lower left corner is Pearson's correlation coefficients; upper right corner is Spearman's variance coefficients



argued that similar analogy is present among the firms included in the sample and relatively large firms in the sample are likely to have more mature PMS. This assumption was confirmed with the results as 73% (8 out of 11) of organizations falling under the category of 'PMS in need of urgent attention' are small firms having annual volume less than Rs. 1 billion. It can conversely be argued that firms with sound PMS are likely to enter organizations club that earns more. Firms involved in PMS questionnaire having less than Rs. 1 billion annual turnovers make 52% of total responsive firms. It would be interesting to investigate further those firms specifically that have small turn over (less than a billion rupees) but consider their system in relatively good condition. There were three such cases having one common feature regarding their past. In the recent past, the three firms were earning much more than the present turn over and then the business started performing badly resulting in reduced volumes currently maintained by them. One can argue that wrong perception that the PMS is working when it is not highlights the lack of understanding of issues that present PMS is facing and are yet to be addressed by respective organizations. There can another reason that the respondents were those persons that were continuing their job despite large layoffs in recent past and they responded to questionnaire in defensive mode.

Since responses were obtained during face to face interviews, discussions other than the questions of survey were also held. Given the prevailing slump in construction sector at the time of survey, many respondents mentioned the bad patch their organizations were going through. Respondents indicated that reason for lack of a formal and well organized PMS is that they have difficulties in making their strategic plans due to the economic and political instability in the country. Moreover, long-term planning is perceived as unnecessary since future expectations are decreasing owing to pessimistic scenarios arising due to the external environment and lack of foreign investment. Construction companies serving the private sector usually receive their progress payments on time, and thus they can make more rational plans for the future. However, payment delays in the public sector that is main sponsor of infrastructure construction frequently prevent companies from short- and long-term planning. This situation is similar to other developing countries like one mentioned by

Kazaz and Ulubeyli<sup>24</sup> regarding Turkish construction companies.

There is one other observation noted during interviews regarding small organizations. Most of them are single family owned businesses with dysfunctional board of directors and permanent employees other than family members were very few. The main problems found in the companies were very much in line with what suggested by Costa and Formoso<sup>18</sup> i.e. (a) lack of definition of the team responsible for data collection, processing and analysis; (b) little use of measures in strategic decision making; (c) lack of use of measures for benchmarking; (d) centralisation of data collection, processing and analysis; (e) lack of measure cost-effectiveness analysis; and (f) ineffective communication and dissemination of results. Some companies had too many measures, most of them are related to supporting rather than critical processes.

When we look at the individual score of sections and sub-sections of questionnaire, different aspect of deficiencies in PMSs emerge. Two types of comparisons can be made; one based on comparing with average score of all firms and second based on absolute individual score of sub-sections of firms having PMS in critical condition. PMSs that need urgent attention lack almost in all areas of analysis when compared with overall average score of firms. Striking differences are noticed in case of purpose of measuring system for owners (22% less than average score), directors (18% less), managers (21% less), suppliers (18% less), customers (22% less) and employees (19% less). In case of suppliers, customers and employees, besides difference, individual score of respective sub-sections is quite low indicating a performance measuring system in such organizations does not provide any information to employees, customers and employees. In other words, owners and top management employ PMS for their own purpose and information and other important stakeholders have nothing to do with it. This is quite contrary to construction firms in developed countries. For example, about 90 per cent of the survey respondent organisations of UK measure aspects of customer characteristics such as customer satisfaction, expectation, complaint or after sales service<sup>5</sup>. In case of Pakistan, the phenomenon of neglecting employees can be explained against ownership background of these firms as these are run mostly as family-owned business. Secrecy and restricted access to informa-

tion is the unwritten company policy. When most of the performance data is to be generated by that level of employees who have no clue of its usage and significance, role of performance measurement system in improving performance gets questionable. Purpose of PMS as leading indicator of future performance and that it acts as warning and alert system is missing even in case of owners, directors and managers when compared with average score of overall firms. For example, information about likely continuity of appropriate return on investment is not available even for owners of the business (27% yes) and managers do not know about effective use of resources (18% yes).

The other low score as compared to average score is regarding understanding of performance measures (21% less than average score). Specifically, respondents find it difficult for their PMS to give explicitly defined measure formula (only 36% yes), source of data (45% yes) and easy—to-understand reporting format (45% yes). Strategic and operational knowledge about PMS has vital importance and good companies continuously strive to educate employees in this regard. This principle appears to be neglected in these organizations. Also, for construction, learning perspective is considered problematic as participants of projects are mostly temporary and retention of knowledge and experience becomes a challenge<sup>6</sup>.

The other critical factor that is considered relatively more troublesome is non-comprehensiveness of the system and that it encourages short-termism (this is often at the cost of long term strategic objectives). Only one fourth organizations (27%) that should pay urgent attention to PMSs do not find this problem.

Despite the 'lacking' and 'lagging' problems discussed above, there is also good news for the organizations having their PMSs 'in need of urgent attention'. Large majority of these firms (82% yes) consider their systems flexible that can be modified easily. Further, they continuously try to review performance measures and measuring systems (73%) and that they have measures which are actionable (73%). This fresh air provides them a window from where a new beginning can be made. Usually, relatively smaller organizations have informal measuring systems and there are fewer persons that are involved in implementing it. Small scale of business becomes a 'strength' when modifying and updating activity is required.

When score comparison of three sections namely 'purpose', 'characteristics' and 'exploitation' of measuring systems is made, the first one gets the lowest score (33% yes). Most of questions in the purpose section relate to process being followed in organizations. The relatively low proportion of organisations using process measures generally reflects the difficulties in measuring diverse and often complex processes in construction and engineering activities<sup>5</sup>.

### PMSS THAT NEED IMPROVEMENT

Seven (33%) out of 21 responding organizations consider their PMSs in condition relatively better though it still needs improvement. These firms are better of the best constructors included in the sample.

Starting with the best part, the organizations under this category perform almost equally in all three sections of performance; purpose of measuring system (69% yes), characteristics of measuring system (73% yes) and exploitation of measures (68% yes). Going more deeply, these firms consider their PMSs doing much better in eight out of fifteen sub-sections. Also, leaving 15 questions aside, 'yes' response exceeds 70% in case of remaining 70% questions (35 No.). Average score of this category exceeds overall average score of every section and sub-section individually.

Among seven sub-sections of questionnaires that obtained higher score include questions on purpose of measuring systems for owners (100% yes), directors (95% yes) and managers (93% yes). The other positive areas pertain to understanding of measures (93% yes), actionable measures (100% yes), flexibility to modify measures (71% yes) and review and updating of measures and measuring systems (71% yes). Traditionally, performance information is considered to be something that is required only by management and that it has nothing to do with lower level employees. One of the main objectives of performance measurement is strategic measurement. One school of thought remain sceptical about communicating strategy to entire organization under the apprehension that valuable information would be leaked to competitors or regulators. However, many researchers including Kaplan and Norton<sup>25</sup> suggest that knowing the strategy and scorecard is necessary for employees before they can execute it. Hence, Organizations should communicate strategy and scorecard ho-

listically to all employees. Firms in Pakistan need to shift their paradigm of performance information needs.

The other positive areas that are claimed by respondents to be well-addressed by their organizations under this category relate to understanding of measures (93% yes), actionable measures (100% yes), flexibility to modify, review and update measures (71% yes). Given the fact that in construction, some specific measures have to be designed or modified at the start of a project depending on nature of project and needs of the client, qualities of flexibility and modifiable are good strengths. But to capitalize this strength, responsiveness to customer stands at 64% which means these capabilities are under-utilized by these firms.

On the negative side, if score is viewed independently, PMSs of these particular organizations have little to do regarding performance information needs of employees (only 43% yes) and suppliers (only 39% yes). Also, PMSs in 71% cases are marred with symptoms of short-termism thus compromising long-term strategic objectives. On extreme side, against question of whether system enables employees to know how well business is performing, response was only 14% yes. If the negative effect of the three aspects is combined, the situation emerges that firms are not pursuing or rather managing long term strategic objectives which require that needs of important stakeholders like employees and suppliers are addressed. Respondents confirmed this notion when asked whether performance measures provide advanced warnings when something is going to out of control, 71% answered these do not. Performance measures that help in knowing stakeholders' response of employees and customers are categorized as leading indicators as act as advanced warnings of future failures or predict successful future performance. Contrary to the scenario prevailing in domestic firms, Groen et al<sup>26</sup> developed a model that explains why participation in designing and implementing performance measurement system influences employees' initiatives as three variable of attitude, social pressure and capabilities are significantly correlated with employee initiatives.

It results of questions are viewed individually, there are certain exceptions that differ from overall average score of sub-sections. One such example that relates to advanced warning mechanism has earlier

been discussed. This was again confirmed by second exception that relates to design of measures whether it includes short- and long-term measures. The response was 14% against 71% average score of sub-section. It indicates consistency in response and confirms the opinion formed earlier that firms are not pursuing or rather managing long term strategic objectives which require that needs of important stakeholders like employees and suppliers are addressed. The other two departures from sub-section score related to consistency of measuring system with organization structure and types of construction (both 43% yes). The study conducted by Lee et al<sup>27</sup> indicates that organization structure is significantly associated with the design of PMSs among superior performing organizations. One can argue that as an organization improves its PMS through review and update, eventually organizational structure and type of product would be factored in.

#### PMSS IN GREAT SHAPE

Only 3 (14%) out of 21 firms have established and are implementing PMS that is considered by respondents to be in great shape. Overall score of the three organizations is same, i.e. 92% (46 'yes' against 50 questions). One organization responded in negative regarding; purpose of measuring system for suppliers and customers, automatic collection of performance data, company and market focused measures, less number of measures, consideration of stage of project and taking into account type of market. Due to less number of firms in this category, generalization of results is not possible. However, limitations of the questionnaire apply to the validity of conclusion that PMSs are in great shape. Despite this aspect, sub-sections related to customers and suppliers consistently get relatively less score. This deficiency is consistent irrespective of the categories of PMSs formed on the basis of scores. One can safely argue that domestic firms have so far ignored the role of PMS to address performance information for employees, suppliers and customers. Among these three stakeholders, suppliers are paid no heed in design, implementation and use of PMS.

#### STATUS OF PMSS

So far discussion has been around score based on number of 'yes' responded by firms regarding

PMS questionnaire. It would also be interesting if score is analyzed for individual sections, sub-sections and related questions.

A quick view at the individual score of questions and sub-sections highlighted two significant trends which have also been discussed partly in different categories. Firstly, purpose of measuring systems is not served regarding employees, suppliers and customers. Secondly, long-term measures are considered irrelevant hence short-term actions are pursued. Questions covering these two aspects received overall less than 33% 'yes' response. The next important dimensions of performance measurement that are missed by majority (getting less than 50% 'yes' response) is role of PMS to provide advanced warning of lowering performance level. In other words, measures used for assessing status of performance drivers are not employed. Financial measures are preferred or rather exclusively used while paying less heed to non-financial measures. The last aspect that received less than 50% score is designing PMS by taking into account market-focused measures.

## DISCUSSIONS

There were 104 infrastructure construction firms registered with Pakistan Engineering Council under 'No Limit' category at the time of survey (September 2011). All of these firms were made part of sample for study related to determining relevance of KPIs for assessing organizational performance. However, only 32 firms (31%) were surveyed regarding assessing health of PMSs of local infrastructure construction firms, out of which only 21 firms (66%) responded positively. There are two important aspects that need consideration when small size of the sample is analyzed. Firstly, performance measurement system is most likely the need of large firms that have diverse business or are handling multiple projects simultaneously. Also, it required large resources that only big firms can afford. Against these two conditions, over all sample of 104 appears more like whole population of infrastructure construction firms of Pakistan. However, one cannot ignore the need of smaller firms to get benefit from the study in order to improve the business even when its use is made partially. So one may conclude that a sample comprising 31% population can be representative of whole population. Further, significance of this sample size is endorsed when

results of KPIs of pilot study and whole sample are compared. Pilot study firms provide almost the similar results that were obtained after administering the questionnaire to whole sample. Also, sample for PMS study contains the firms with diverse annual volume making it possible to generalize the results to all infrastructure construction firms. In view of the foregoing, author argues that results of PMS study hold the generalization to all similar firms of Pakistan.

Questionnaire used to determine status of PMS assesses status of system in terms of fulfilling its purpose for owners, directors, managers, employees, suppliers and customers. Further, it diagnoses the characteristics of PMS regarding its simplicity, efficiency, having actionable measures, design of measures, robustness and consistency with other system components. Finally, it investigates exploitation of measures by asking whether PMS is reviewed and updated. Overall, the questionnaire suggested by Neely<sup>23</sup> is comprehensive and is considered a quick guide to determine status of PMS. Results yielded through this questionnaire very much indicate the position that one observes through an inquisitive glance and come across in the literature.

After going through the whole exercise, one may argue that Questionnaire still does not cover some aspects that may be important in understanding the health of a PMS. It may slightly be missing the aspects related to implementation, review and updating as these topics were covered through few questions. Also, existence of functional MIS is not investigated. One can argue that score obtained by firms might have gone less as organizations with established PMS find such aspects challenging.

Majority of firms that fall in 'immediate attention' category happened to be small firms. Historically, all firms develop their PMS from simple planning and controlling system like the one owned by small firms. Performance systems in these organizations are limited to input, output and some procedural detail. Information is kept secret as stakeholders get nothing out of it. Most of the firms are run as family owned businesses. With passage of time, however, these organizations based on their learning fine tune the system similar to those having currently a functioning PMS. One can argue that PMS in small infrastructure firms of Pakistan will get mature through evolution similar to large firms. However, travelling

this journey in smaller span of time will decrease the cost and increase the benefits. This set of action is very much in line with the objective of this research study. Recovery of economy which is undergoing a meltdown period can trigger this change quickly. This recovery can convince organizations to formulate long-term plan. These plans would likely to be coupled with a better performance measurement system.

Lack of mechanism of sharing performance information with customers, suppliers and employees is common to sample construction firms. This appears to be a major problem that calls for redesigning of strategies, policies and processes. The other drawback is absence of early warning function supposed to be performed by a PMS. This aspect is symptom of excessive dependence on lagging indicators while paying no attention to leading indicators.

Performance measurement systems have been diagnosed mostly for addressing needs of stakeholders, design, function and reviewing of the system. If the questionnaire is analyzed on the lines of balanced scorecard, one can easily notice that financial, customer and internal business process perspectives have been covered while learning and growth perspective has not been paid due attention. Finally, the major oversight by the local firms is ignoring strategic planning and its achievement. Short-termism dominates the activities. Short-term objectives are achieved at the cost of long-term gains. Stable economic conditions can make them think in this regard.

## **CONCLUSIONS**

- Majority of surveyed firms consider their PMS in need of immediate attention while one third regard it as in need of improvement.
- Health of performance measurement system appears to be a function of size of the firm as majority of 'small firms' (with annual volume less than a billion rupees) happen to fall in a category whose performance measurement system requires 'immediate attention'. Conversely speaking, firms with relatively mature PMSs are doing better in financial terms.
- Smaller firms, as observed during face to face interviews, were marked by family-owned business, dysfunctional board of directors and having very few permanent employees.

- Firms with PMSs in need of urgent attention design their PMS to serve the information needs of owners only while directors, managers, employees, customers and suppliers formally get no clue about health of the business or what the business is trying to do. Secrecy and restricted access to information is the unwritten company policy.
- Lack of strategic and operational knowledge is another hallmark of infrastructure firms as respondents mentioned problems regarding understanding of performance measures related to formula, source of data and particular formats being used.
- It is widely believed among the sample population that PMSs encourage short-termism as performance heavily depends on lagging indicators and no or low importance is given to leading indicators.
- Among PMS aspects of purpose, characteristics and exploitation of measures, firms are comparatively more lagging in properly addressing purpose of the system. Of course, if changes are made in this aspect, it would positively influence the other two dimensions.
- Strategic planning which is pre-requisite for a PMS is not undertaken formally by most of the respondent firms who consider it useless under prevailing political instability, uncertain economic conditions and unpredictable market dynamics.
- Most of the firms were undergoing bad patch of the business for last couple of years. The current negative scenario could have exaggerated the negative picture of existing PMSs.
- Performance information needs of stakeholders are ignored; long term measures are considered irrelevant; performance drivers related to customers and learning and growth are not measured; advanced warning is not happening. Indigenous firms need to overcome these shortcomings to improve the existing PMSs. Pakistan Engineering Council can take a lead role by providing constructors with needed technical facilitation.

## **LIMITATION AND FUTURE RESEARCH**

The study is subjected to the usual limitations of the survey method. While the survey method is

useful in ascertaining associations rather than causal relationships between variables<sup>28</sup>, this approach generates potential threats as respondents may answer questions in accordance with social desirability bias. The respondents may not give their full attention to the job of replying to the questions. The answers may lack depth resulting in superficiality. If the respondent misinterprets a question, there is little that can be done to correct. There could then be inconsistencies in the replies. Future studies could collect data from multiple respondents across different management levels. This may assist in overcoming the common method bias associated with the single respondent approach. To enhance the generalizability of the findings, future studies could be conducted using similar parameters in other industries such as service and the non-profit sector. This study mainly focuses performance measurement systems of domestic contractors, similar studies can be undertaken regarding design and implementation problems being faced by such firms. More important, research needs to be done for performance frameworks and systems for consultants and construction client organizations as performance dimensions can be significantly different for each sector.

#### REFERENCES:

1. Neely, A.D., Gregory, M.J. and Platts, K. (1995), "Performance measurement system design: a literature review and research agenda", *International Journal of Operations & Production Management*, Vol. 15 No. 4, pp. 80-116.
2. Niven, P. R. (2002). "Balanced scorecard step-by-step", Wiley, New York.
3. Eccles, R. (1991). "The performance measurement manifesto." *Harvard Bus. Rev.*, 69(1), 131-137.
4. Neely, A. (1999), "The performance measurement revolution: why now and what next?".
5. Robinson, H.S., Carrillo, P.M., Anumba, C.J. and Al-Ghassani, A.M. (2005), "Business performance measurement practices in construction engineering organizations", *Measuring Business Excellence*, Vol. 9 No. 1 2005, pp. 13-22.
6. Kagioglou, M., Cooper, R. and Aouad, G. (2001), "Performance management in construction: a conceptual framework", *Construction Management and Economics*, 19, 85-95.
7. Schiemann, W. A.; Lingle, J.H. (1999) "Bulls' eye – hitting your strategic targets through high-impact measurement". New York: The Free Press.
8. Lee, A., Cooper, R. and Aouad, G. (2000), "A methodology for designing performance measures for the UK construction industry", paper presented at Bizarre Fruit Postgraduate Research Conference on the Built and Human Environment, Salford.
9. Smith, M. (2001), "Getting construction back on track. In: beyond the bottom line, the industry in developing countries", *Proceedings of the First International Conference of CIB*, November 2002, South Africa.
10. Lin, G.B. and Shen, Q.P. (2007), "Measuring the performance of value management studies in construction: critical review", *Journal of Management in Engineering*, Vol. 23 No. 1, pp. 2-9.
11. Bassconi H. A., Price, A.D.F and Hassan, T.M (2004), "Performance Measurement in Construction", *Journal of Management in Engineering*, Vol. 20, No. 2.
12. Robinson, H.S., Carrillo, P.M., Anumba, C.J. and Al-Ghassani, A.M. (2004), "Developing a business case for knowledge management: the IMPaKT approach", *Construction Management & Economics*, Vol. 22 No. 7, pp. 733-43.
13. Bititci, U.M., Carrie, A.S. and McDevitt, L. (1997). *Integrated performance measurement systems: an audit and development guide*. *The TQM Magazine*, 9(1), 46-53.
14. Gates, S. (1999), *Aligning Strategic Performance Measures and Results*, The Conference Board, New York, NY.
15. Ittner, C.D., Larcker, D.F. and Meyer, M.W. (2003), "Subjectivity and the weighting of performance measures: evidence from a balanced scorecard", *The Accounting Review*, Vol. 78 No. 3, pp. 725-58.

16. Otley, D.T. (1999), "Performance management: a framework for management control systems research", *Management Accounting Research*, Vol. 10 No. 4, pp. 363-82.
17. Santos et al (2007), "Towards a definition of a business performance measurement system", *Intl Journal of Operations and Production Management*, Vol. 27 No. 8, pp. 784-801.
18. Costa, D.B. and Formoso, C.T. (2002): "Evaluating Performance Measurement System for Construction Companies", available at <http://strobos.cee.vt.edu/>
19. Beatham, S., Anumba, C., and Thorpe, T. (2004). "KPIs: A critical appraisal of their use in construction." *Benchmarking Int. J.*, 11(1), 93-117.
20. Best, R., and Langston, C. (2006). "Evaluation of construction contractor performance: A critical analysis of some recent research." *Constr. Manage. Econom.*, 24, 439-445.
21. Government of Pakistan (2012) "Economic Survey 2011-12", Ministry of Finance, Islamabad. [http://www.finance.gov.pk/survey\\_1112.html](http://www.finance.gov.pk/survey_1112.html)
22. World Bank (2007), "Pakistan Infrastructure Implementation Capacity Assessment", Report 41630-Pk, World Bank, South Asia Region.
23. Neely, A.D. (2002), *Measuring Business Performance: Theory and Practice*, Cambridge University Press, Cambridge UK.
24. Kazaz, A., Ulubeyli, S. (2009), "Strategic management practices in Turkish construction firms", *Journal of management in Engg.*, Vol. 24 No. 4.
25. Kaplan, R., S. and Norton, D.P. (2001) "The strategy - focused organization. How balanced scorecard companies thrive in the new business environment; Boston. Harvard Business School Press.
26. Kaplan, R. S., & Norton, D. P. (2001). "The strategy-focused organization: How balanced scorecard companies thrive in the new business environment", Boston: Harvard Business School Press.
27. Groen, B.A.C, Wouters, M.J.F. and Wildrom, C.P.M (2012), "Why do employees take more initiatives to improve their performance after co-developing performance measures? A field study", *Management Accounting Research*, in press.
28. Lee, C.L. and Young, H.J. (2010), "Organization structure, competition and performance measurement systems and their joint effects on performance", *Management Accounting Research*.
29. *International Journal of Operations & Production Management*, Vol. 19 No. 2, pp. 205-28.
30. Singleton, R. A., & Straits, B. C. (2005). *Approaches to social research 4th ed.* New York: Oxford University Press.