

Adoption of Integrated Management System (IMS) by Construction Firms in Pakistan

Rehan Masood, Babar Mujtaba, Muhammad Ali Khan, Tariq Ali

Abstract—Construction firms faced multi-faceted challenges to adopt standards due to unique operations in comparison with manufacturing firms having repetitive processes. Management systems (quality, environment and safety & health) in firms helps in development of standardized procedures and operations which are beneficial to get high performance on construction sites. Integrated Management system (IMS) is based on management system related to quality, environment and safety, which enhance the performance of firms and projects as well. This study aims to investigate the adoption and implementation of IMS in construction firms of Pakistan. Firms' websites visited for evidence of ISO certifications and then online questionnaire survey was conducted for availability and status of ISO standards; level of implementation, alignment and integration; internal and external barriers in adoption of IMS. Results showed that adoption of IMS is very low among construction firms but firms having all certifications have effective IMS; level of implementation gradually decrease from top to low category of firms; for implementation internal barriers were found as lack of skill and training, lack of awareness and requirement of high effort; external barriers were inexperience consultants; insufficient driver and benefits and high cost of certification; external barriers are more significant than internal barriers. International standards certifications should be considered by engineering councils for registrations and should be legitimate by government through national and international bodies. These standards should also be considered during contractor procurement. Contracting firms should embed international standards in to organization management system to get maximum benefits and training of these systems should be essential part of employee growth.

Index Terms—Integrated management system (IMS), International standards, Construction firms, Pakistan.

I. INTRODUCTION

Construction industry is unique in nature unlike a stationary or fixed workplace such as a factory. Construction operations are typically performed by semi-autonomous, often contracted, work crews, engaged on a temporary basis to complete the contractual work. Scenarios on construction projects portray as continual changes, bombardment of varying technologies, poor working conditions and need for coordination of different interdependent trades and operations. [1] [2] [3].

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* Correspondence Author (s)

Rehan Masood, Department of Civil Engineering, The University of Lahore, Lahore, Pakistan.

Babar Mujtaba, Department of Civil Engineering, The University of Lahore, Lahore, Pakistan.

Muhammad Ali Khan, Department of Civil Engineering, The University of Lahore, Lahore, Pakistan.

Tariq Ali, Department of Civil Engineering, The University of Lahore, Lahore, Pakistan.

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A. Integrated Management System (IMS)

All the measures to improve practices up to standards on construction projects are the imprints of management systems (for quality, safety and environment) adopted in the construction firms/company/enterprise. In order to enhance construction project performance, true implementation and strong integration of management systems is needed at firms. At firm level documentation of management systems is addressed and at project level implementation is focused. Quality, environmental, and safety (QES) management systems are generally considered to be an integration of International Standards Organization (ISO 9000, ISO 14000, and ISO 18000) regulations, with very similar structure [4], and known as Integrated Management System (IMS).

B. Implementation of IMS

Implementation of these systems under IMS maximize the competitiveness of an organization through the continual improvements (with application of total quality management – TQM) of its product, services, people, and environment by emphasizing customer focus. [5] Nature of work (procedures) related to quality management, environmental protection, employee health and safety management in different organizations are eighty percent similar, in this way IMS ensures the effectiveness. Similar measures could also be taken by other organizations to eradicate poor quality, unsafe and unhealthy working conditions, and lack of environmental control [6]. There is still provision of incompatibility among these systems which is evidence that these are not organically blended but documented next to each other [7].

C. IMS in Construction Firms

The implementation of IMS in construction firm is limited at present with focus on the links suggested in the standards of quality, health & safety and environment to merge the documentation. This approach do not let organization to reap the real benefits from truly integrated systems [8], because of lacking basic understanding of integration [9]. [10] It has been derived from case studies, development of integrated management systems is an organization specific decision and different circumstances will lead to different decisions as to the degree of integration that is desirable or achievable. Nevertheless, the contractor organizations are open and willing to embrace the integrated management systems application in order to make the management systems for quality, health & safety and environment more efficient, effective, user-friendly, streamlined and more acceptable on sites. Development, implementation and improvement of IMS in construction companies can lead to improved quality production, safety of all employees of construction company, application of all national and international standards concerning the environmental aspects and finally, the customer satisfaction.



It is essential, that IMS must include all employees of company and each person must try to find the way to customer satisfaction, safety work and environment protection during all building processes [11].

D. Significance of IMS

Implementation of IMS is true test of company policy and instilling culture with continual improvement [9]. [12] Only when people realize that systems are tools to help and not hinder them, only than integrated approach be fully adopted. Tendency of clause-wise implementation of systems for compliance and certification is resulting in the frustration and dissatisfaction with the management systems. The need is to understand the nature of systems and mold them around the business needs, to take advantage of implementation. [12] The essence of IMS catch by suggesting the systems be imbued in the core processes, as part of culture rather than superimposed separate functions. IMS is essential because it grow management system requirement; improved effectiveness; reduced cost; less redundancy and conflicting elements. IMS is a combined system containing a QMS, EMS and OH&SMS where each of these three systems/subsystems has lost its independence; their outputs and the boundary of each is the same. Moreover, in construction firms the alignment of implementation for standards is quality, environment and safety. [13]. [14] Barrier to IMS implementation can be categorized as internal (resource, attitude/perception and implementation) and external (support and guidance, economic, and certifiers/verifies).

II. RESEARCH PROBLEM

Pakistan construction industry is facing multifaceted challenges in construction firms with ineffective organization management system [15] including poor safety management system [16], poor quality management system [17] and no consideration for environment. Current study aims to investigate the adoption of integrated management system (IMS) in construction firms of Pakistan.

III. HYPOTHESIS

There are four main hypothesis developed for this research;

1. Construction firms have international standards certifications for quality, safety and environment.
2. Level of implementation of International standards is high.
3. Adoption of International standards is higher in construction firms with high technical and financial capability.
4. Alignment of standards is as quality, environment and safety.
5. Integration among quality, safety and environment standard is strong.
6. External barriers are more influential on adoption of IMS than internal.

IV. RESEARCH INSTRUMENTS

Following research instruments were used for this study;

1. *Observation:* A survey was done [18], to investigate the availability of websites of construction firms and there were around 66 which had comparatively effective websites. These websites along with new websites were visited to witness (through content or scanned copies of

certifications) the ISO standards such as ISO 9001 (Quality), ISO 14001 (Environment) and ISO 18000 (Safety) excluding energy system standards.

2. *Online Questionnaire Survey:* A questionnaire was designed and developed to fulfil the objectives of the study and provided online to respondents. This questionnaire was comprised of following sections:
 - a. Designation of respondent (Owner/Manager/staff)
 - b. Type of stakeholder (Main/Sub Contractor or Project Management)
 - c. Category of Construction Firm according to Pakistan Engineering Council (PEC). Categories (CA, CB, C1 to 6) are based on technical and financial capability of firm.
 - d. Status (Yes/No, In process/Expired) and availability (Yes/No) of ISO certification for IMS
 - e. Level of implementation of IMS from 100% to Not sure (respondent perception)
 - f. Internal barriers in Implementation of IMS (Likert Scale of agreement)
 - g. External barriers in Implementation of IMS (Likert Scale of agreement)
 - h. Content of or perception about policies for Quality, Environment and Safety in firms.

V. DATA COLLECTION

TABLE 1. Number of Firms Having ISO Certifications (Standard Wise Data/Percentage Wise)

Total Firms Visited	ISO 9001	ISO 14001	ISO 18000
73	27 (37%)	11 (15%)	4(5%)

These steps were used to collect primary and secondary data for this study;

- Initially seventy three firms (having websites) were visited online for checking the availability of ISO certifications (for IMS), refer to [table-1].
- Secondly, detailed online questionnaire survey was conducted to investigate the prevailing practices in construction firms. Respondents from 35 firms filled the online questionnaire form and out of them only 31 were selected on basis of relevant sample of study, response rate was 88%. In terms of response validation, designation of respondents are taken in account as 90% were at Managerial level (Project manager/Construction manager/Engineer), 6% were staff and only 3% were at owner ship level.

VI. DATA ANALYSES

Respondent’s data is analyzed according to sections and variables, as following;

- 48% (15 numbers) of sample has been awarded ISO certifications and only 10% of them are in process to get certifications, rest of them have not pursued.



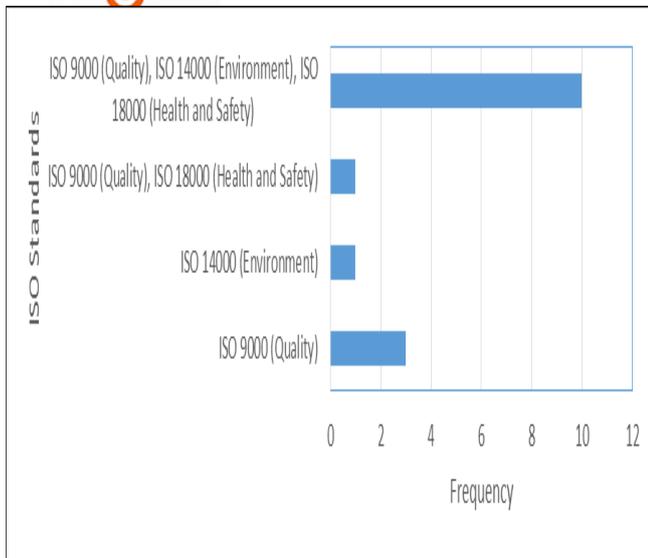


Fig. 1 Establishment of IMS in Construction Firms

- For establishment of IMS, a firm must induct ISO9001, ISO14001 and ISO18000. Fig 1 shows, only 32% (66% of certified firms) of sample have all ISO certifications for IMS. 45% (93% of certified firms) have ISO 9001 (Quality) certification. Least adopted standard is ISO 18000 (Health and Safety).

TABLE 2. Implementation of ISO Standards

Firms	ISO 9001	ISO 14001	ISO 18000
A*	100% ~ 75%	75% ~ 50%	75% ~ 50%
B*	75% ~ 50%	75% ~ 50%	75% ~ 50%
C*	100% ~ 75%	100% ~ 75%	100% ~ 75%
D*	100% ~ 75%	100% ~ 75%	75% ~ 50%
E	50% ~ 25%	Not sure	50% ~ 25%
F*	100% ~ 75%	50% ~ 25%	Less than 25%
G	75% ~ 50%	75% ~ 50%	75% ~ 50%
H*	75% ~ 50%	75% ~ 50%	75% ~ 50%
I*	75% ~ 50%	75% ~ 50%	100% ~ 75%
J*	100% ~ 75%	100% ~ 75%	100% ~ 75%
K*	100% ~ 75%	100% ~ 75%	100% ~ 75%
L	75% ~ 50%	Not sure	Not sure
M	75% ~ 50%	75% ~ 50%	75% ~ 50%
N	75% ~ 50%	Less than 25%	Not sure
O*	75% ~ 50%	75% ~ 50%	75% ~ 50%

* Firms Which have Certification in All Standards

- Level of implementation of ISO standards has been asked from respondents, who provided their perception on scale of 100% to Not sure. Table-2 shows level of implementation by the firms. ISO9001 has more effective as average scale is more than 75%, ISO14001 and ISO18000 has 75% to 50%, but ISO18000 has comparative lower implementation among other standards.

- According to Table 2, those firms having certification in all selected standards have more than 75% implementation level except ISO18000 which has comparatively lower implementation.
- There were 10 firms belong to CA category which have more certifications other than C1 and C3 categories.
- In tune to explore the barriers in adoption of IMS, respondents from firms which are not certified (12Nos) /in-process of certification (3 Nos)/no knowledge (1 No) were asked to provide their opinions in two streams i.e. internal and external barriers. Internal barriers (IB) are divided into resources (R); Attitude (A) and Implementation (I). External barriers are divided into support and guidance (SG); economics (E); certifiers and verifiers (CV).

Table 3. Internal Barriers for Implementation of IMS

INTERNAL BARRIERS (IB)	Mean Score
Lack of financial resources (R)	4.06
Lack of management and/or staff knowledge skills and training (R)	4.31
Lack of employee involvement/motivation (R)	4.06
Lack of management and/or staff time (R)	4.13
Mean Score of R	4.14
The changes appears too revolutionary/resistance to change (A)	4.00
Low awareness of the benefits (A)	4.38
Other priorities more important (A)	4.13
Perception of bureaucracy (A)	3.69
Short-term orientation (A)	3.94
Mean Score of A	4.03
Culture differences between disciplines (I)	3.25
Complexity and differences among management systems (I)	4.25
High effort for implementation (I)	4.31
Mean Score of I	3.94
Mean Score of IB (R+A+I)/3	4.03

- According to Table-3, top internal barriers are related to lack of skills and training (4.31), low awareness of the benefits (4.38) and high effort for implementation (4.31). Factors under lack of adequate resources is more significant internal barrier than attitude and implementation.



TABLE 4. External Barriers for Implementation of IMS

EXTERNAL BARRIERS (EB)	Mean Score
Lack of support schemes (SG)	4.00
Lack of sector specific implementation tools and examples (SG)	4.13
Lack of experienced consultants to assist firms/poor quality information and conflicting guidance (SG)	4.63
Lack of promotion of IMS (SG)	4.31
Mean Score of SG	4.27
Insufficient drivers and benefits (E)	4.00
Uncertainty about the value of IMS in the market place (E)	4.00
Different stakeholders demands (E)	4.00
Mean Score of E	4.00
High costs of certification/verification (CV)	4.31
Duplication of effort between certifiers/verifiers and internal auditors (CV)	4.13
Mean Score of CV	4.22
Mean Score of EB (SG+E+CV)/3	4.16

- According to Table-4, top external barriers are lack of experienced consultants to assist firms/poor quality information and conflicting guidance (4.63); Insufficient drivers and benefits (4.00, with low variance and high standard deviation within domain of economics, E); and High costs of certification/verification (4.31). Factors under improper support and guidance for implementation of IMS is more significant barriers than economics and certifiers role. Mean score of EB (4.16) is greater than IB (4.06) which means external factors are more influential for the implementation of IMS.

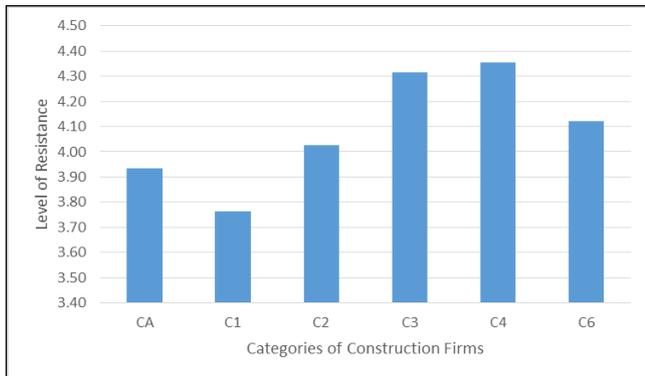


Fig. 2 Level of Resistance for Adoption of IMS

- According to Fig 2, level of resistance for implementation of IMS was measured by calculating average score of each category of construction firm against the agreement of barriers for adoption and implementation of IMS. C1 category showed less resistance in comparison with rest categories but C6 category has low score against C3 and C4.

VII. CONCLUSIONS

Following results can be interpreted from data analysis;

- Adoption of IMS with at least one certification is very low. It shows firms are in transition phase to conform management systems to international standards.
- Level of implementation in firms having certifications is good but gradually decrease in order of quality, environment and safety and health standards.
- Mostly firms adopted quality standards first then environment and in last safety and health standards are

considered, this is the alignment of adoption and in few cases first two standards are applied concurrently.

- CA category (high technical and financial capability) has adopted IMS in comparison with lower categories (CB, C1 to C6) having gradually decrease in adoption. This means firms having more experience, market share and repute in local and foreign markets are more concern for ISO certifications.
- High implementation and integration for systems were found in firms having all certifications. This shows IMS is implemented in true means if all the standards are followed concurrently.
- Level of resistance for implementation of IMS is lower in top category of firms and increase with decrease in category.
- This study endorse the hypothesis that external barriers have more impact on adoption of IMS than internal barriers. Construction firms provides services on civil engineering projects which has various stakeholders (client, consultant, supplier etc.) and for each of them level of satisfaction vary. Mega projects are executed by top category construction firm and likewise scale of projects decrease with the category. These firms have to opt at least international standards to streamline their firm management system which help in providing service in proper manner.
- Internal barriers are mainly based on lack of skills and training of management as well as staff, because firms are not investing in human resource capacity building and change management; people have no knowledge about the proper management systems of any firm and benefits from standardization of these systems, due to globalization every firm has to adopt the management system conform to international standards; implementation of ISO standards need more work force and effort from management which has monetary cost, if the firm operation and process are producing satisfactory results then level of effort decreases until unless client or market require. External barriers are based on Lack of experienced consultants to assist firms/poor quality information and conflicting guidance, which shows that local consultants who help in acquiring ISO certifications are not capable, there is provision that construction is unique type of firm with extension of sub system on projects, standards valid for manufacturing firm are not valid for construction firms nonetheless these are conformed so; on economic scale establishment of ISO standards needs investment with longer pay back time which is based on level of implementation within firm, moreover lack of vision to focus on outcomes of ISO standards cause limit to documentation only not the true implementation; ISO is an international organization which has well recognition with high repute but along with this cost of certification in context of developing countries (like Pakistan, India etc.) is comparatively high, which make firms to rely on their conventional or traditional management system.



VIII. DISCUSSION

This paper is an effort to investigate the adoption of ISO standards and level of implementation in construction firms. IMS concept is new for construction firms where ISO certification is not compulsory from client or employer. Client satisfaction is the prime element of quality management on construction sites which urge construction firms to get certification for ISO 9001 standard which is shown during prequalification even in tender submission. Poor safety conditions are evident from high rates of injuries and fatalities but client is least concern on this matter so only multinational firms consider this certification. Firms having understanding of all the standards and got certifications are applying the standards fully in the firms and on the constructions sites. These firms have clear policies and procedures for operations but these have conformed the standards according to firms' goals and objectives. The implementation process was found to have been strongly influenced by a number a factors including: the background experience of the implementation team; communication between team members; input to the implementation process from quality and health and safety management; the contract nature of company business; the integrated nature of interfaces with clients; and the high level of influence exerted over relatively large numbers of subcontractors. Integration among management systems is only seen when all the certifications are applicable, this happens because these system have around 80% of similarity which reduce effort and enhance efficiency with connectivity of management systems. Construction Firms in Pakistan are in a position to adopt isolated certification mostly quality standards so conflicts among management systems because of IMS seems not the problem. Firms need to address both internal and external barriers in order to implement IMS in true means. Change from conventional management system to IMS rely on dedication, devotion and commitment of firm at all organization level. Capacity building in terms of resources with international market vision and support reduce internal issues for adoption of IMS in firms. Firms hire local consultants (including franchise to get certification but pay huge cost and in return the standards are not conforming to firm goal, policy and procedures. Construction firms in Pakistan are experiencing projects funded by foreign aid (USAID, AUSAID etc.) or agencies (UN, World Bank, Asian development bank etc.), who procure those having international affiliation (at least ISO standards) and some cases projects are run on joint venture (in which one firm has international standing). There is earnest need of reform for change which help construction firms to cope with challenges as quality service, environment friendly and zero accident philosophy.

IX. FUTURE RESEARCH

Integrated Management System (IMS) elements as policy, planning, management control and improvement should be considered for peer evaluation on the basis of content in documentation.

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Engr. Rehan Masood, is Currently Working as Assistant Professor at Department of Civil Engineering, The University of Lahore, Lahore, Pakistan. He has Bachelor Degree in Civil Engineering; Masters Degree in Construction Engineering and Management; and Masters in Business Administration Degree in Management. He has Published his research work in peer reviewed Conferences and Journals (visit his Google Scholar page [here](#)). He has Professional Experience of Construction Management for five years at Mega Projects. He is member of Pakistan Engineering Council, Pakistan Engineering Congress, Institution of Engineers (Pakistan), ASCE, CIB, and ARCOM. He is member of Scientific Committee for Conference Series CITC, ICCIDC, ICSCOMP and ICETEMS.



Engr. Babar Mujtaba, is Currently Working as Assistant Professor at Department of Civil Engineering, The University of Lahore, Lahore, Pakistan. He has Bachelor Degree in Civil Engineering; and Masters Degree in Irrigation and Hydraulics Engineering.



Engr. Muhammad Ali Khan, is Currently Working as Assistant Professor at Department of Civil Engineering, The University of Lahore, Lahore, Pakistan. He has Bachelor Degree in Civil Engineering; and Masters Degree in Computational Engineering from Germany. He has Practical Experience of Europe and South African Construction Industry.



Engr. Tariq Ali, is Currently Working as Assistant Professor at Department of Civil Engineering, The University of Lahore, Lahore, Pakistan. He has Bachelor Degree in Civil Engineering; and Masters Degree in Structural Engineering.