

Contractor Quantity Surveyor Using ERP System in Cost Reporting

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Abstract

Quantity surveying is the key profession in cost management for construction business. However, construction industry is notorious in using information technology that makes reporting inefficient. A construction company in Hong Kong has been using an enterprise resource planning system as the information communication technology in management and cost reporting backbone since 2003. This paper investigates if such system represents an efficient tool for quantity surveyors and any intervening actions are required to enhance its efficiency. In doing so, a team of surveyors interviewed and then the soft system methodology was used as the research approach to depict the situation. This leads to the improvement needs and list of actions. Participants have prioritized working closely with top/senior management to design a proper report format; avoiding unnecessary adjustments and undue influence to reporting, and ensuring accurate data as the top three critical actions crucial for reliable cost reporting.

Keywords

Cost Management, Cost Reporting, Enterprise Resource Planning System

1. Introduction

Construction industry is the major GDP contributor to the economy and always an important industry (Chadaga et al. 2012; Chan, E 2012; Mummmenthey & Du Preez 2010; Naderpajouh, Boppana & Hastak 2012), but it appears notorious for the slow uptake and implementation of information technology (IT) and information communication technology (ICT) when other industries frequently use advanced technologies. This is despite of many research studies discussed the benefits of ICT in construction and have identified the competitive benefits from its use. For example, Enterprise Resource Planning (ERP) system has been widely perceived as an efficient means of communication but seldom used by construction organizations (Chan, C & Sin 2010; Chan, E & Mills 2011; Rankin & Luther 2006; Tambovcevs 2012).

According to Chan & Mills (2011), ICT innovation can support communication, management information and document exchange within and among project members, thus it would be valuable to study how a stand - alone system (e.g. ERP) could be integrated with other ICT/IT systems/tools in construction project management and cost reporting. In fact, ERP system can be used to assist reporting (Chan, C & Sin 2010; Chan, E & Mills 2011; Shi & Halpin 2003; Tambovcevs 2012) which is one of the quantity surveyor (QS) major functions in the cost management process. However, QS profession appears to make sluggish progress towards effective ICT implementation, and mean it

remains weak and data cannot be exchange efficiently (Usman, Said & Yahaya 2012). This research study is to investigate the usefulness of ERP in cost reporting by QS in a leading construction company and intervening actions needed to enhance its efficiency.

In doing so, series of interviews with and participation of QS professions were conducted and descriptive studies using the Soft System Methodology (SSM) were then completed accordingly. This research methodology provides an effective way to analyze systems and processes in which the technological matters and human activities are perceived interdependently. It involves repeated interviews and meetings to gain an understanding of the problem situation which will then be represented by the use of “rich pictures” (Checkland 1981). The descriptive study further leads to list of improvement and intervening actions.

2. Background Theory

2.1 QS Function in Cost Reporting

Quantity surveying has been part of the construction industry for over one hundred and seventy years and many QSs work in construction organizations (Cartlidge 2011). Contractor QS plays a central role in the management of construction projects, their role has been extended beyond measurement to the day-to-day running of building projects, such as commercial, cost and project management (Towey 2012). Nowadays, cost management and post contract cost control is one of the major QS functions. In fact, contractor QS has involved heavily in project monitoring and reporting. Towey (2012) states that QS is responsible for the contractual, commercial and financial elements of such report. It is therefore important to dedicate time to ensure (cost) information is correct for inclusion in the report and coordinate with other team members in the process to ensure the accuracy of such information. Failure to issue a report on time is not an option and would serve to undermine the project team's pride in the job. The cost report should be informative, completed without missing parts, concise, clear and accurate and give advice on the project's true status. It cannot be a figment of the imagination and needs to be developed from available data. Towey adds that an intention of the report is to provide executives with a snapshot of the scheme so they can gain an understanding of the project status and the liabilities and responsibilities forecasted by the project team.

In order to complete cost reports in an efficient and accurate manner, the question is about how and what effective commutation tool, such as ICT, can be used.

2.2 ICT in Construction Industry

ICT can help to enhance communication and manage information processes and also benefit the management of construction projects. Rankin & Luther (2006) state that the industry is seeking to make positive changes by exploring alternative practices ranging from the use of novel management approaches and delivery arrangements to the application of advanced communication and information management technologies. Effective application of advanced ICT will lead to more efficient management of project execution and to a more productive industry. Effective application will depend on the development of prototype systems appropriate to the unique needs and conditions of the construction industry. Combined with effective implementation strategies, the prototype systems will contribute to a broader analysis of the industry's adoption of technology. ICT benefits will only be possible if the construction industry becomes knowledgeable about the existing frameworks for quantifying the benefits of various technologies and can then define any missing elements. Successful adoption of an innovative technology is only possible if a sufficient framework is developed, fully understood, properly applied, and used to its full potential.

Shi and Halpin (2003) state that ERP system is one facet of ICT that can be utilized to improve communication. This system is a communication platform and provides a general working environment for an enterprise to integrate its major business management functions with one single

common database so that information can be shared, and efficient communications can be achieved amongst management functions. This implies that using ERP system can assist cost reporting.

2.3 ERP for Reporting and Cost Control

ERP systems have the potential to integrate seamlessly organizational processes using common shared information and data flows (Tambovcevs 2012). This makes ERP systems to be very useful in cost management system, because ERP can facilitate speedy and cohesive conversion of cost data to useful cost information in cost report. However, according to (Chan, E & Mills 2011), ERP systems require different parts of the company to connect via a common ICT infrastructure to enhance the information flow. The system's design affects existing organizational process and determines possible improvements available to increase the diffusion of information. Therefore, the efficiency of the ERP system is hinged on the collaboration of many parties. In fact, many construction organizations are in the process of implementing ERP systems; however, the success rate for these systems remains low (Chan, C & Sin 2010; Zhang et al. 2005). For example, according to Chan & Sin (2010), five variables are identified as important: availability of helpdesk service from vendor/IT department, need for process reengineering, price level, capability of customization and level of training to users. It is therefore worthwhile to study how useful ERP system is and what the improvement needs are for cost reporting.

3. Methodology

In doing so, soft system methodology is chosen because it is an approach that provides the opportunity for incremental improvement that is needed to address undefined and uncertain problems (Barry & Fourie McIntosh 2001). In fact, according to Chan & Mills (2008), SSM helps: 1.achieving the systems and holistic view of the situation under consideration; 2.obtaining the overviews of various participants involved in the situation; 3.addressing the span of control over the situation; 4.knowing the problematic areas within the system; 5.understanding the inhibitor against improvement; 6.involving those participants who are looking for the solution to the problems; 7.brainstorming actions for improvement; 8.inviting participants in the action learning cycle; and 9.reinstating the existing system into a proper system.

In summary, Checkland (1981) proposes the seven steps of SSM: 1.finding out about the problem situation; 2.expressing the problem situation through “Rich Pictures”; 3.confirming the “Root definition”, “CATWOE- Customers, Actors, Transformation process, Weltanschauung, Owners and Environmental constraints”; 4.building conceptual models for improvements; 5.comparing of the conceptual models with the real world; 6.identifying feasible changes to improve the situation; and 7.proposing actions to improve the problem situation. The next section details each step of the case study completed in a leading construction company which uses ERP system in cost reporting.

4. Case Study

4.1 Background of Organization

According to Coghlan and Brannick (2005), a better pre-understanding of the studied organization is important for action research. These understandings are about the organizational dynamics and the lived experience. The studied organization (pseudonym = G-Force) is one of the approved contractors for all public works of the Hong Kong SAR and eligible for all public work categories. Today, this organization maintains approximately 20% of the market share of the total industrial turnover. In 2012, the organization celebrates its 55 years anniversary. G-Force employs approximately 3,000 full-time staff, more than 50% of which have a diploma or higher academic qualification, including 600 professional engineers and builders. The organization’s headquarters is in Hong Kong and it operates throughout Mainland China and Southeast Asia. Therefore, tight and close, reliable and standard,

timely and accurate cost reporting is an integral part in its management agenda. In fact, the organization's culture indicates that it appreciates the importance of using advance ICT in management and reporting and the company has been using the ERP system in cost reporting since 2003.

4.2 Interviews

The first stage of this action research case study requires unstructured interviews with people involved in the cost reporting process. A group interview was conducted with a QS team of eight participants who were involved in a major civil engineering project (contract value is HK\$2.8 billion, and contract duration is 1,700 days commencing since October 2008) of G-Force. These interviewees were well qualified and very experienced in construction cost management and cost reporting, with at least 6 years to maximum 18 years. The interviewees' profile enables not only good reflection of the ERP system's usefulness in the process, but also stimulation of improvement ideas. The interviewer's questions were about their involvement in the reporting process, based upon their experience and expectations. Accordingly, the role, process and procedure, belief, expectation and perception, and value and goal of cost reporting, as Table 1, are defined.

Table 1: Role, Process & Procedure, Belief, Expectation & Perception, and Value & Goal

Role:	Consolidate all cost information and data as required by the system Follow the reporting system and format requirement, and company procedures Input different types of data to the system Ensure accuracy and consistency of information and data Ensure timely data entry
Current Process & Procedure:	Access different sub-systems: - Quantity Surveying - Procurement - Accounts - Finance
Belief, Expectation, Perception:	Generate a reliable cost report Compare performance against other projects Compare performance against the industry norm
Value & Goal:	Serve as common tool for performance review and management decision Enjoy using standard report Enable top/senior management to read the report on-line real time Ensure problems are identified for earliest correction and resolution Provide a reliable base for relevant parties to get access to required information Enable top/senior management using it as a base to monitor performance

4.3 Conceptual Model for ERP & Cost Reporting

The second stage is model built-up for comparison. According to the interview and subsequent confirmation with the participants about the role, process and procedure etc. for cost reporting by ERP system, Table 2 and Figure 1 for the "Roof Definition and CATWOE" and conceptual model for cost reporting were developed.

Table 2: Root Definition and CATWOE

ROOT DEFINITION -	CATWOE -	
Cost Reporting by the ERP System	Customer:	Senior management staff
Report prepared by the project quantity surveying team who work together with the site costing staff and head office account and finance staff. The team consolidates project cost and status information and inputs data into the ERP system to produce standard cost reporting for use by the senior management staff.	Actors:	Q.S. Manager, Site Q.S. and Cost Clerk
	Transformation:	By consolidating all data and information together, project cost and status information and data are input into the ERP system and converted to standard cost report which helps to monitor project performance.
By comparing with budget and rolling forecast, cost report is used to assist Project Manager in monitoring project performance. Report must be completed within fixed timeframes to enable reporting in top/senior management meetings. This is taken place in a very demanding environment where accuracy and consistency is very important because it will not only affect the reporting project profit but also become the basis for future claims strategies.	Weltanschauung:	Project cost information and status report are useful for project monitoring. It forms the basis for cost resources re-allocation or adjustment as well as claims direction which affects the profitability of the project.
	Owner:	Project Costing Team
	Environment:	Meet the quality, cost and time requirements; cope with project budget and corporate goals.

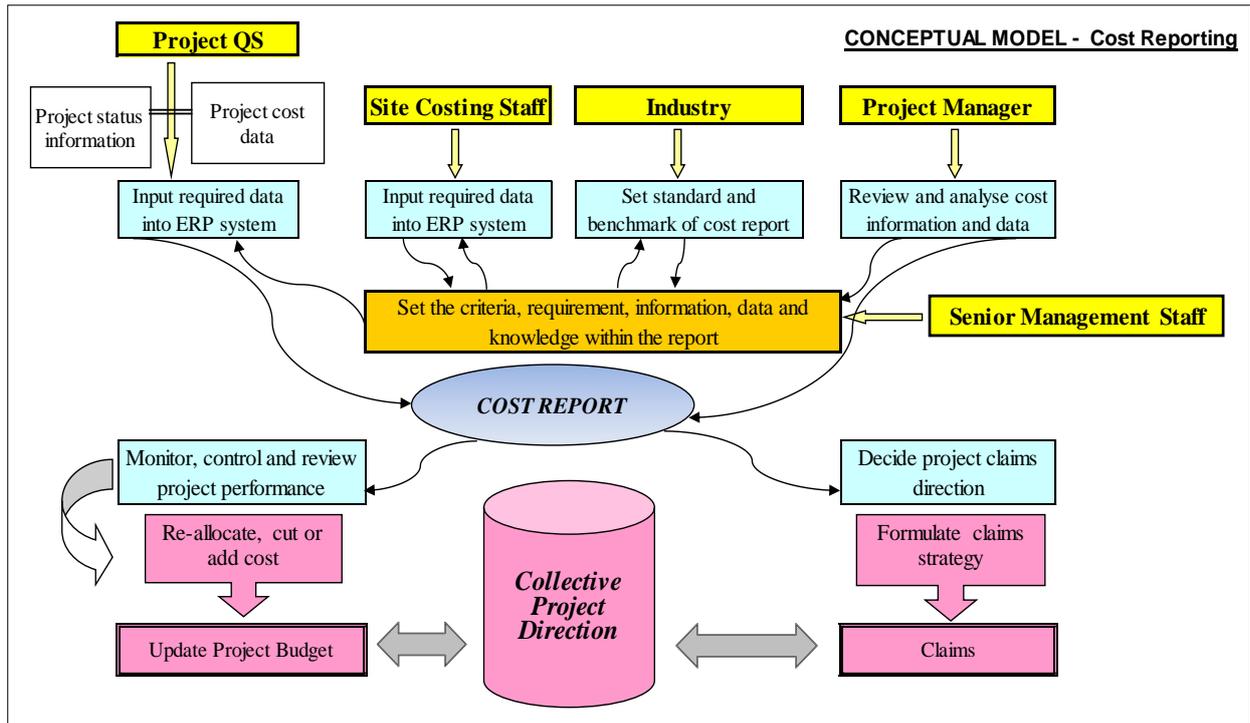


Figure 1: Conceptual Model

4.4 Developing the Rich Picture

Rich picture aims at giving a structure to the problematic situation. After collecting the data, the findings are then summarized in the form of a rich picture. Drawing rich pictures is a creative skill which represents the narration of a story as told by interviewees from their perspective and worldview. It is a cartoon-style representation of the problem situation, and includes a collection of vivid symbols. Flows of dialogue, expectations and perceptions, as obtained from the interview notes, are also represented, with key issues highlighted, in this case the “Cost Reporting”. Relationships between key components and perceived sub-systems are also indicated with arrow-links. This rich picture therefore allows for the representation of myths and meanings, in addition to facts, and Figure 2 is the final result.

4.5 Comparison and Required Changes

In essence, comparison provides the framework for a structured debate about improving the problem situation. Interviews were conducted based upon the key actions described in the conceptual model, and considered against the rich picture. Participants were asked to propose intervening actions that could be undertaken in relation to cost reporting, and how could these actions be accomplished. This not only provides a reality check but also throws forth a challenge to the owners of the situation, to rethink and re-analyse underlying assumptions in order that a more creative and fulfilling outcome can be reached. The overall result is to indicate important areas where changes can be made to improve the performance of cost reporting. This result forms the basis for further actions.

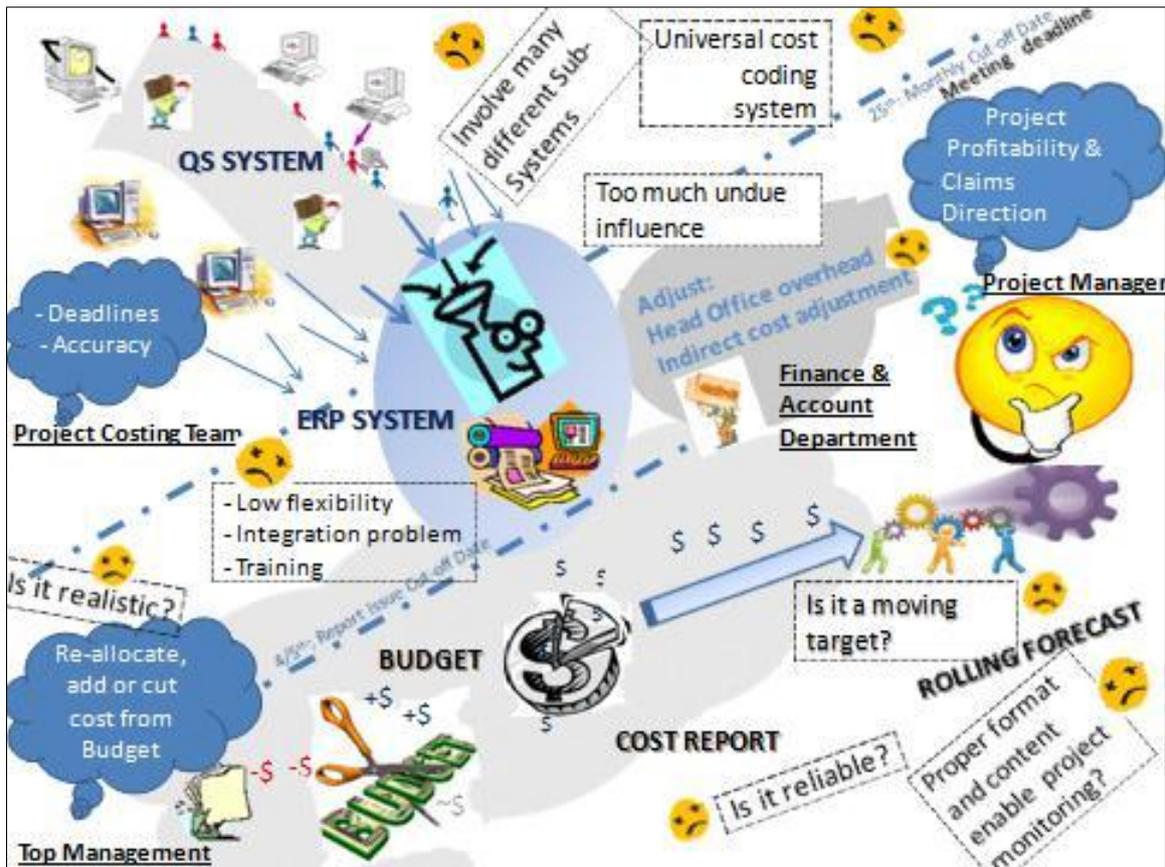


Figure 2: Rich Picture

4.6 Action and Priority

Participants were asked to prioritize various actions after all viable proposed actions, in cost reporting, to improve the situation. In Table 3, those proposed actions are listed as appropriate and effective means to improve the cost reporting process by the ERP system.

Table 3: Action List

Proposed Actions	Priority
Eliminate paper work	6
Work closely with top/senior management to design a proper report format	1
Use common coding and sub-coding systems for easy tracing	4
Avoid unnecessary adjustments and undue influence to reporting by other cost centers	2
Improve system user-friendliness such as mobile data entry	8
Ensure accurate data is used for a reliable report	3
Standardize rolling forecast but not just for "moving targets"	9
Upgrade and update software and hardware	10
Integrate with other system/software	7
Streamline integration of sub-systems to reduce data entry time in order to meet deadlines	5

5. Conclusion

There is a need for QS to use advanced technology in the work and ERP system is one of the efficient communication tools to help QS in cost reporting. However, the system used by the case studied construction company posed some shortcomings: unreliable cost sources; low flexibility of the ERP system; undue influence by other parties and integration problems. There are several actions that were proposed by the QS team to utilize this information communication technology in enhancing communication efficiency in cost reporting. The top three critical actions are: working closely with top/senior management to design a proper report format; avoiding unnecessary adjustments and undue influence to reporting, and ensuring accurate data in a report. All these are crucial for a reliable and

accurate cost report. In fact, many organizations have used ERP as their ICT backbone to facilitate coordination to control aspects of management and other operational facets. Such system can also integrate numerous project monitoring and control processes such as cost management. When construction companies choose to use ERP system for cost management as part of the project management reporting, cost reports are produced following the interaction between the many departments and the QS. Purpose-made systems are costly and inflexible, and the collaboration with various departments and stakeholders, together with the top/senior management commitment are always necessary.

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