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# ELEMENTS OF LEARNING ORGANISATIONS IN SINGAPORE'S QUANTITY SURVEYING PRACTICES

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الصفات الاساسية للتعليم المستمر في المؤسسات الاستشارية التي تقدم خدمات الترخمين والتعاقدات في الصناعة الانشائية في سنغافورة، ولقد برزت اهمية التعلم المستمر من الخبرات العملية من اجل تطوير الاداء المؤسسي كحجر اساس لبناء المؤسسات الفاعلة و المتطورة في العالم. ان إحدى الأسباب الأساسية للاداء الغير مرضي للصناعة الانشائية في سنغافورة تم ايعازه لنقص المهارات و الاعتماد على العمالة الوافدة الغير ماهرة، هذا مما زاد من التحديات التي تواجه هذا القطاع المهم في ضوء خطة الحكومة السنغافورية لبناء اقتصاد المعرفة. ان غاية هذا البحث هي تحديد الصفات و العوامل المساعدة لتأسيس مؤسسات قادرة على التطوير والابتكار من خلال استراتيجية التعلم المستمر. قام البحث بإجراء استبيان بالإضافة إلى زيارات موقعيه لعدد من المكاتب الاستشارية العاملة في مجال توفير خدمات الترخمين والاستشارات التعاقدية وأشارت نتائج البحث الى وجود اربعة عوامل لها اهمية في بناء المؤسسات المعرفية، هذه العوامل تتعلق بـ: (1) ممارسات الأفراد ومجاميع العمل التي تشجع وتساعد على تبادل المعرفة والخبرات والتي تشمل استغلال الاخطاء ونقاط الفشل كفرص للتعلم و التطوير، (2) الهيكل التنظيمي والوظيفي الذي يسمح ويشجع الافراد على المرونة في العمل و اخذ المبادرة في وجه التغييرات الخارجية و الداخلية للمؤسسة، (3) الحوافز والتقدير للافراد القادرين على اخذ المبادرة والمسؤولية التي تساعد المؤسسة على الانتفاع من التعلم والتطوير المستمر، (4) برامج التدريب و التعليم التي تركز على مساعدة الافراد على التعلم من اخطائهم وخبرات الاخرين وتشجيع الابتكار في حل المشاكل والتعامل مع الاخطاء، ويجب هنا التوضيح ان هذه العوامل هي ما تم التركيز عليها من قبل العاملين في هذه المؤسسات كونها تساعدهم على التعلم المستمر هذا لا يعني ان العوامل الاخرى غير مهمة في عملية بناء مؤسسات المعرفة ومنها الالتزام من قبل الادارة التنفيذية بالمباديء والمبادرات الداعمة لتقافة التعلم المستمر.

The construction industry in Singapore is facing a problem of low productivity which has been attributed, mainly, to the over reliance on unskilled workers. The Construction 21 report has called on the construction industry to raise its skills level and professionalism by embracing a culture of continuous learning. This study aims to identify the key factors that would enhance the ability of Quantity Surveying firms in Singapore to become learning organisations. In this research, a survey is conducted and case studies are presented from the top construction consultants who are mainly involved in providing quantity surveying services. The results of the study have identified 4 key factors related to individual and team practices, the organisation and job structure, rewards and recognition, and training and education. The results show that these factors will impact significantly the extent to which staff considered their organisation to be a learning organisation.

Keywords: Learning Organisation, Construction, Singapore, Education, Training.

## 1. INTRODUCTION

As Singapore strives to become a globally competitive knowledge based economy its construction industry must undergo a major transformation to equip and enhance the skills of its members and catch-up with the rest of the economy. The Construction 21 report<sup>[1]</sup> provided a blueprint spelling out the vision for Singapore's construction industry "to be a World Class Builder in the Knowledge Age". The industry, which still relies heavily on unskilled workers, will need to develop a "knowledge workforce" in order to become more progressive and professional. The C21 report identified continuous learning to be crucial for the creation of a knowledge-based construction industry. Learning would enable business organisations to develop their intellectual capital, which provides the engine for growth, the power to manage change and helps generate innovation.

McCaffer and Edum-Fotwe<sup>[19]</sup> explain that the construction industry is facing pressures from several fronts including regulations, socio-political transformations, globalisation and competition. Such pressures have made continuous learning as an essential survival strategy. Hence, new approaches, strategies, practices and tools need to be deployed<sup>[20]</sup> as well as training opportunities need to be offered to enable professionals to continuously learn.

This paper reports the results of a study that aims to identify the key factors that would enable Quantity Surveying firms in Singapore become learning organisations. The study's objective is to identify the main characteristics of learning organisations manifested in Quantity Surveying firms and the building blocks that have encouraged such firms and enhanced their ability to learn.

## 2. THE LEARNING ORGANIZATION

Research has shown that being a Learning Organisation (LO) has led to turn-around success stories in major corporations and increased organisational performance<sup>[2-4]</sup>. However, the concept of the LO is not easy to define and the extensive literature on this issue illustrates a multiplicity of perspectives. The literature on LO falls into two broad categories. The first treats the LO concept as something that can be designed into the organisation and has a significant influence on other organisational outcomes. However, the second treats the LO concept as a metaphor and sees it as a particular variant of culture<sup>[5]</sup>. Beyond this, there is no general consensus on what a learning organisation<sup>[6,2]</sup>.

Generically, an organisation may be said to learn when it acquires knowledge or know-how of any kind and by whatever means<sup>[7]</sup>. Therefore it can be argued that all organisations learn whenever they add to their “store” of information and knowledge. The literature on this topic contains different definitions for LOs, for example, Senge<sup>[8]</sup> defines the LO as “...organisations where people continually expand their capacity to create the results they truly desire, where new expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together”. However, Marquardt<sup>[4]</sup> describes the LO as “one which learns powerfully and collectively and is continually transforming itself to better collect, manage and use knowledge for corporate success”. Bennett and O’Brien<sup>[9]</sup> see LO in the same light as Marquardt as they described such an organisation to be “one that has woven a continuous and enhanced capacity to learn, adapt, and change into the fabric of its character”.

Pedler *et al*<sup>[3]</sup> define a LO as “one which facilitates the learning of all its members and continuously transforms itself”. This definition has three important notions, the first, it emphasises the role of the organisation in facilitating and encouraging individual learning. It is insufficient to have members of the organisation with a learning orientation to be a LO without providing the environment that enables and motivates employees, individually and creatively, to learn. Second, it emphasises that all members of the organisation need to participate in such initiatives, as it is insufficient to focus on selected groups only. The reason is that individuals need to learn together especially where the learning of one individual or subgroup is likely to have knock-on effect on the learning of another. Third, this definition requires the LO to experience continuous change and adaptation and, also, to focus on learning from the change process itself, while at the same time enabling individual learning.

### 3. CHARACTERISTICS OF THE LEARNING ORGANIZATION

LOs are seen to adopt a learning approach when formulating a collective direction for the company and allow individual members of the organisation to contribute to major policy decisions<sup>[3]</sup>. The culture of LOs is one that encourages learning and continuous improvement and not one of allocating blame and punishment; mistakes are allowed and learned from. Such organisations aim to remove disabling structures such as restrictive job descriptions and rigid mindsets that would impede the creation of a healthy and responsive organisation. Instead, enabling structures are put in place to create opportunities for individual and business development. There is, also, commitment to airing differences and working through conflicts as the way to reaching decisions that members are likely to support. In LOs opportunities, facilities and resources are made available to encourage people to manage their own learning and career development.

Marquardt<sup>[4]</sup> proposed a model for LO made up of five closely interrelated subsystems that interface and support one another. The first, *Learning Dynamics*, is the core subsystem which describes how learning takes place, and is shared, at individual, group and organisational levels. The second subsystem, *Organisational Transformation*, focuses on the organisation itself and describes the need for the LO’s structure to be streamlined and delayed to facilitate more frequent contacts and effective information flow<sup>[3,4]</sup>. The third is *People Empowerment*, which recognises the need of every member of the LO to learn and for managers to take on the role of coaching and to facilitate learning for the employees. This would require employers to give their employees the authority to make decisions and, hence, to take responsibility for developing their own personal development plan. *Knowledge Management*, the fourth subsystem, explains how a LO should involve its entire population in scanning the outside world for intelligence and ideas. Once such information and knowledge have been collected, it is analysed and disseminated to help the organisation monitor and continuously improve its services and products. The fifth subsystem, *Technology Application*, is the integrated networks that allow access to and exchange of information and learning. This is not limited to computer-based systems for coding and storage of information but also includes the utilisation of video, audio and multimedia technology to enhance the learning environment during training sessions. This research has adopted the above five key characteristics that a LO is expected to exhibit, representing the “evidence” of being a LO in the research model (Figure 1).

### 4. THE BUILDING BLOCKS OF THE LEARNING ORGANIZATION

Jamali and Sidani<sup>[17]</sup> explain that although LO have been described in many differing ways the assessment of this concept has been more scant and uniform. Armstrong and Foley<sup>[17]</sup> identified four core dimensions of learning organizations, revolving around the learning environment, identification of learning and development needs, meeting learning and development needs and applying learning in the workplace. Senge<sup>[8]</sup> has identified five basic disciplines that can help business organisations become LOs. He defines a discipline as “a body of theory and technique that must be studied and mastered to put into practice.” The five disciplines are systems thinking; personal mastery; mental models; building shared vision; and team learning. Senge’s philosophy lies in understanding that organisations are a product of how people think and interact; organisations cannot change in any fundamental way unless people can change their basic processes of thinking and interacting. However, Senge’s recommendations were seen to be highly philosophical and abstract<sup>[2,5]</sup>.

Bennett and O'Brien<sup>[9]</sup> provide what may be seen as more practical building blocks that will enable organisations to achieve learning organisation success. They studied the practices of twenty-five successful companies and identified twelve key pre-requisites for building a LO.

1. **Strategy/Vision:** Strategy and vision need to support and promote learning in order for learning to become integral to the organisation and contribute to its success and the development of long term commitment of staff<sup>[5,10]</sup>.
2. **Executive Practices:** Moving outward from the visionary core, the next building block consists of the practices of the executives. Executives should support the vision of being LO and lead the rest of the organisation towards the fulfilment of this vision by encouraging employees to embrace continuous improvement in their everyday work.
3. **Managerial Practices:** Management must support and encourage their staff to grow and develop, help them integrate what they have learned, and encourage risk-taking.
4. **Learning Climate:** This is the sum of the values and attitudes of everyone in the organisation regarding the way people are supposed to behave as they go about their business. A LO should adopt a climate of openness and trust; people are not afraid to share their ideas and speak their minds.
5. **Organisation and Job Structure:** LO can support continuous learning by allowing for flexible job descriptions that respond to the changing demands of the external environment, as well as to the needs of the organisation itself. Therefore, bureaucratic policies and rules that inhibit or impede the flow of information must be kept to a minimum and where possible eliminated.
6. **Information Flow:** Learning- oriented companies use advanced technologies to obtain and share information and knowledge across the organisation, and to ensure that all workers get company data, information and knowledge relevant to their jobs<sup>[11]</sup>.
7. **Individual and Team Practices:** LOs thrive when individuals and teams adopt practices that promote and encourage the sharing of learning and knowledge. Here, mistakes are seen as learning opportunities and not as reasons to blame or punish. In such environment individuals and teams would take responsibility for their own learning, discuss problems honestly and work toward solutions.
8. **Work Processes:** The LO incorporates continuous learning in work processes by teaching and practising systematic problem-solving techniques and promoting learning from others through benchmarking studies.
9. **Performance Goals and Feedback:** The value of learning lies in its ability to help the organisation better serve its customers, hence, the performance goals of employees and the performance- appraisal system should focus on meeting customer's requirements. Hence, feedback should be valued and sought as it is critical to the learning and improvement of the organisation.
10. **Training and Education:** In a LO formal training program the focus should be on helping people learn from their own and other's experience and becoming more creative problem-solvers. LOs can develop and provide non-traditional forms of training such as mentoring, demonstration projects and business-based learning projects to facilitate learning.
11. **Individual and Team Development:** LOs should seek ways to motivate their employees to develop themselves. The organisation should also promote the growth of teamwork as such organisations can only learn if teams and individuals learn collectively to reinvent their work.
12. **Rewards and Recognition:** Rewards and recognition systems should support organisational learning through rewarding and recognising employees who take risks and by ensuring that everyone benefits when the organisation learns and grows.

This study adopted Bennett and O'Brien's twelve building blocks of a LO, listed above, to investigate the key elements that have enabled Singapore's Quantity Surveying firms become LOs. The research organised the 12 building blocks under four main categories of Management Commitment, Organisation Culture, Human Resource Development and Information Technology (Figure 1).

Despite these twelve practices discussed above, no single organisation can be expected to excel in all these twelve areas. Therefore, this study attempts to identify the building blocks that will significantly help develop Singaporean Quantity Surveying firms into LOs. The hypothesis of the research is, therefore, the twelve building blocks make significant contribution to the creation of LOs in Singapore's Quantity Surveying firms.

## LO Building Blocks Bennett and O'Brien<sup>[9]</sup>

## LO Characteristics Marquardt<sup>[4]</sup>

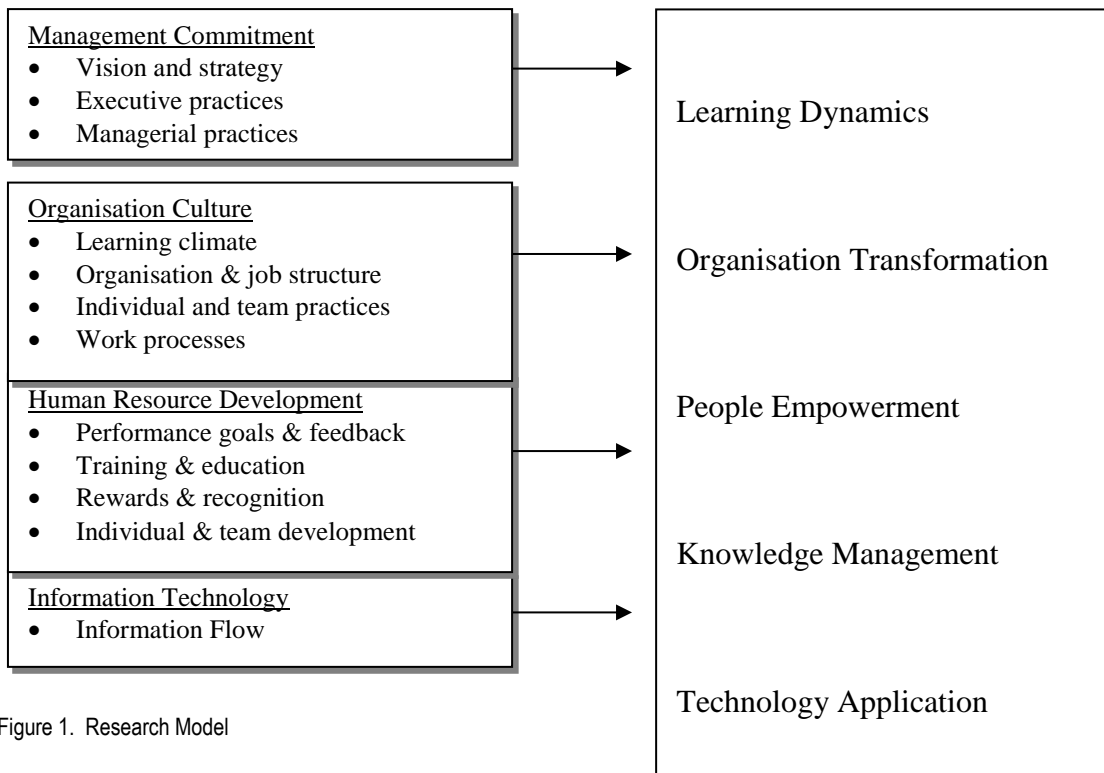


Figure 1. Research Model

## 5. RESEARCH METHOD

The main aim of this study is to identify the key building blocks (the independent variables) which would enable and influence Singapore's construction industry to realise and develop LO characteristics (the dependent variables). The adopted research method is a mix of a case study approach and a survey that was developed by targeting a small number of quantity surveying practices where a questionnaire survey and interviews were conducted.

The questionnaire used in this study was developed in two sections A and B. Section A consists of two parts. In part I was adapted from the Learning Organisation Practices Profile<sup>[9]</sup> and modified to suit the local climate. The respondents were asked to rate their organisation, on a scale of 1-5 (1 being "Strongly Disagree" and 5 being "Strongly Agree") on the twelve building blocks, with four statements used to describe and explain each building block. Section B collects information on the respondents' job title, age, years of working experience in their organisation and their level of academic qualifications.

Section A, part II, consists of fifteen statements, based on Marquardt's five-subsystem model, whose overall score is the Overall Learning Score (OLS) representing the degree to which the respective firms exhibit, or achieved, LO characteristics. The respondents were asked to rate their organisation on scale of 1-5 (1, being "Not Applicable", and 5, being "Applies Totally") on each of the statements. Adding up the scores for all the fifteen statements and taking the mean derives the OLS for that particular organisation. A pilot study of the questionnaire was first conducted using three professionals from industry and as a result the questionnaire was modified and adjusted to ensure clarity and relevance.

### The Sample

The research focuses on one type of construction organisations in order to exclude any variation in the results that can be attributed to differing disciplines or area of activity. The sample was selected from consultants providing quantity surveying services to the construction industry in Singapore. The selection of the sample would limit the extent to which the results of this study can be generalised. The research contacted six of the largest consultancy firms operating in Singapore and invited them to participate in the study. Such firms are expected to possess the resources that enable them to develop some of LO characteristics<sup>[12]</sup>. Five firms expressed interest in assisting the study and shall be referred to as ORG A, ORG B, ORG C, ORG D and ORG E.

## 6. DATA ANALYSIS AND RESULTS

A set of twenty questionnaires was personally delivered to each of the firms and distributed randomly to quantity surveyors, except for ORG C and D, where the questionnaires were distributed by the human resource liaison person. The research requested that respondents should have at least one year experience of working in their current firm. This is important, as the nature of the questionnaire requires respondents to have good understanding of their company's policies and practices. It is important to note that in two of the firms in the sample the distribution and collection of the questionnaire were done by their firm's management which may have encouraged a more favourable feedback in these two firms.

ORG A is the quantity surveying department of a multi-disciplinary firm, ORG B, C, D, and E are local firms with branches world-wide. ORG E is the smallest in size having less than 20 members of staff, while ORG B is the largest with over 100 members of staff, followed by ORG A, C and D of medium size with just over 40 members of staff. A total of 91 survey forms were distributed to quantity surveyors from the five firms, 75 were returned of which only 68 questionnaires were found useful (Table 1). This would provide a 74.7% response rate. A more detailed description of the sample is in Appendix A

Table 1. Sample Size

	ORG A	ORG B	ORG C	ORG D	ORG E	Total
No. of survey forms distributed	20	20	20	11	11	91
No. of survey forms collected	14	16	18	16	11	75
No. of survey forms discarded	0	0	4	0	3	7
No. of useful survey forms	14	16	14	16	8	68
Response rate (%)	70	80	70	80	72.7	74.7

(Note: Most of the organisations responded that they were willing to entertain 20 survey forms. Only 11 survey forms were distributed to ORG E as it is small in size.)

### 6.1 Analysis of the Twelve Building Blocks Practised by the Firms

Under Part I of the questionnaire, respondents were asked to rate their organisation on the twelve factors suggested by Bennett and O'Brien<sup>[9]</sup> as the building blocks of LOs. The results show the mean score (the average of the scores for statements for all respondents) for each of the twelve building blocks computed across the five organisations scored between 3= Neutral and 4= Agree. This means that, in general, respondents tend to perceive their organisations to have adopted and implemented the strategies, practices and attitudes described in the twelve building blocks.

### 6.2 Reliability Analysis

This study used reliability analysis to determine the internal consistency of standardised tests and allow their reproducibility across samples to be established. This internal consistency reliability, in this study, was determined using Cronbach's alpha. Overall, the twelve independent variables reliability ranged from 0.6 to 0.9 with most of the variables reliability measuring above 0.7 while the dependent variable OLS having a high reliability measure of 0.86 (Table 2). Since the suggested limit of 0.5 to 0.7 for coefficient alpha is considered reliable<sup>[16]</sup> the adopted measures can be considered reliable.

### 6.3 Pearson Product-Moment Correlation Coefficient

In this study, all the independent variables, the building blocks, exhibited positive correlation with the dependent variable, OLS, and this relationship's correlation coefficient is significant at 0.05 and less ( $p \leq 0.05$ ) (Table 2). To assess the strength of the linear association between any of the building blocks and the OLS the Pearson Coefficient was computed with expected values on a range of -1 to +1, with both extreme values indicating a strong linear relationship. The strength of the linear association of the independent variables "Work Processes", "Managerial Practices" and "Individual and Team Practices" is the highest, with a correlation coefficient of 0.57 for the first and 0.54 for the other two. "Training and Education" has a scale reliability of 0.91 and a correlation coefficient of 0.38 indicating that the items used are homogeneous in measuring this variable. However, its relationship with OLS is not strong which suggests that this factor is not associated with the degree the firm has been able to achieve or exhibit LO characteristics.

### 6.4 Multiple Regression Analysis (MRA)

In order to find out which of the twelve building blocks are significant predictors of LO characteristics (OLS) MRA was performed. The study determined that about 50% of the total variability of the dependent variable was accounted for when all the twelve independent variables were entered in this regression model (Table 3). Since the sample  $R^2$  (coefficient of multiple determination) was not close to 1 (= perfect fit) the study can conclude that this model has performed moderately.

Table 2. Scale Reliability and Pearson Coefficient

Independent variables (abbreviation)	Scale Reliability (Cronbach's alpha) Pearson Coefficient Correlation*	
Vision and Strategy (Vision)	0.60	0.41
Executive Practices (Execute)	0.65	0.53
Managerial Practices (Manager)	0.75	0.54
Learning Climate (Learning)	0.72	0.43
Organisation and Job Structure (Structur)	0.70	0.51
Information Flow (Info)	0.74	0.49
Individual and Team Practices (Practice)	0.72	0.54
Work Processes (Workpro)	0.70	0.57
Performance goals and Feedback (Perform)	0.64	0.45
Training and Education (Training)	0.91	0.38
Rewards and Recognition (Rewards)	0.72	0.49
Individual and Team Development (Develop)	0.63	0.24
<b>Dependent Variable</b>		
Overall Learning Score (OLS)	0.86	

\* All coefficients are significant at  $p \leq 0.05$

Table 3. MRA Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.714	0.509	0.402	0.4219

R: Multiple Correlation Coefficient

Predictors: (Constant), DEVELOP, STRUCTUR, TRAINING, PRACTICE, REWARDS, VISION, PERFORM, LEARNING, INFO, EXECUT, WORKPRO, MANAGER.

A good set of predictors could be obtained by performing a model selection using one of three types of selection methods, namely: Forward, Stepwise and Backward. Both Draper and Smith<sup>[13]</sup> and Stevens<sup>[14]</sup> recommended the stepwise regression as the best compromise between finding an "optimal" equation for predicting future randomly selected data sets from the same population and finding an equation that predicts the maximum variance for the specific data collected in this study. The research has, therefore, decided to use the stepwise regression method (Tables 4 and 5).

Running the stepwise regression procedure at significance level, regression coefficient ( $\alpha$ ) = 0.15<sup>[15]</sup> produced eight models with the last model, Model 8, being the most optimal model,  $R^2$  0.467. This implies that this model of these four predictors, namely, individual and team practices, rewards and recognition, organizational and job structure, and training and education can account for the highest amount of variability of the dependable variable, OLS.

Table 4. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
8	Regression	9.321	4	2.330	13.810	0.000
	Residual	10.631	63	0.169		
	Total	19.952	67			

F: the distribution of ratio; Df: Degrees of Freedom; Sig: significance level

Model 8 Predictors: (Constant), PRACTICE, REWARDS, STRUCTURE, TRAINING

Dependent Variable: OLS

Table 5. Individual Regression Coefficients

Model		Unstandardised Coefficients B	t	Sig.
8	(Constant)	0.167	0.414	0.68
	PRACTICE	0.294	2.767	0.007
	STRUCTURE	0.257	2.287	0.026
	REWARDS	0.23	2.107	0.039
	TRAINING	0.115	1.825	0.073

t: t-test of individual coefficient

B: Beta values

a Dependent Variable: OLS

Note: the predictors are placed in order of their significance level.

Table 5 shows that the four predictors in Model 8 have a significant regression relation with the dependable variable, as the F statistic test is significant. Most importantly, t- test for individual regression coefficient, as noted in Table 5, showed that each of them were significant indicators of OLS at  $\alpha = 0.15^{[10]}$ . These results give further credential to the importance of organisation having to address these four issues/predictors in order to be able to become a learning organisation. In particular, the repeated strong association of PRACTICE with OLS reinforces the importance of paying attention to individual and team practices by fostering a culture of learning from practice and encouraging staff to share experience and knowledge gained from identifying and solving problems.

The linear regression model is expressed:  $OVERALL\ LEARNING\ SCORE = 0.167 + 0.294\ INDIVIDUAL\ and\ TEAM\ PRACTICES + 0.257\ ORGANIZATIONAL\ and\ JOB\ STRUCTURE + 0.23\ REWARDS\ and\ RECOGNITION + 0.115\ TRAINING\ and\ EDUCATION$  Due to the high *p*- value the building block Training and Education have to be excluded (Table 5). Therefore the research can conclude that *Individual and Team Practices, Organisational and Job Structure, and Rewards and Recognition* are the significant predictors of LO in the chosen sample.

For the above linear regression model to be accepted the assumptions of the linear regression model which have been stated earlier in this paper must hold. Values of the residuals versus the predicted values of OLS and also with each of the four predictors of the model were plotted. These plots exhibit randomness, normality and constancy of error variance about the horizontal line of 0, indicating no violations of assumption (Figure 2 shows one example). In this example although the data seems to be scattered between 2 and 5 there is a concentration between score of 3 and 4 indicating positive views of the Individual and Team Practices in the sample organisations that encourage learning and promote creativity.

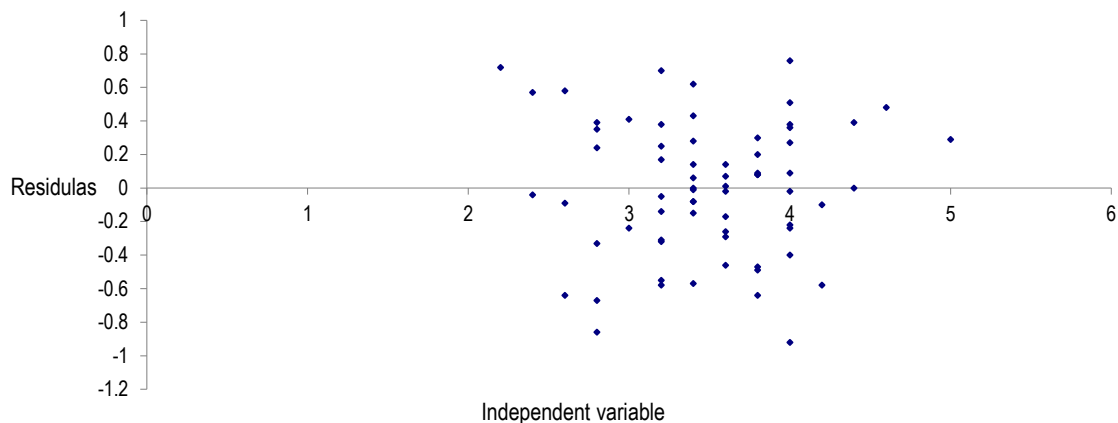


Figure 2. Plots of Residuals against Individual and Team Practice

## 6.5 Analysis of OLS

The OLS of the five firms was measured by fifteen statements under five dimensions, Learning Dynamics, Organisational Transformation, People Empowerment, Knowledge Management and Technology Application. Figure 3 illustrates the responses from the 68 quantity surveyors regarding the extent, on a scale of 1-5 (1 being “Not at all” and 5 being “Apply totally”), to which their organisations display the characteristics of LO as described by the fifteen statements. The results have shown that respondents tend to perceive their firms to have the characteristics of a LO, however, the scores ranged from 2.95 to 3.48, showing that the five consultant firms have displayed the characteristics of a LO to a moderate extent. ORG A has the highest OLS among the five companies and it also scored highly for most of the learning characteristics, as shown in Figure 3. It is interesting to recall that this firm has the highest proportion (36.0%) of Quantity Surveyors (Qs) holding post-graduate qualifications in the sample (Appendix A, Figure 4).



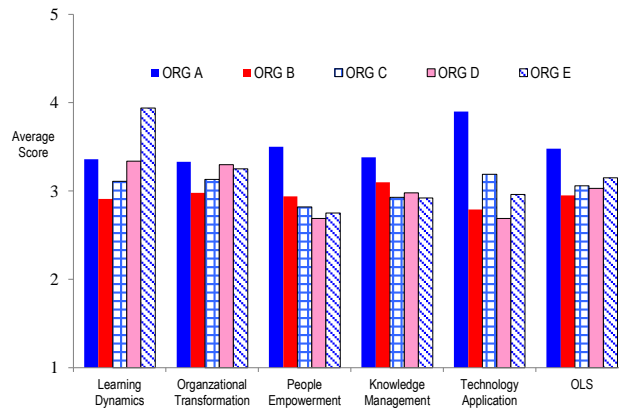


Figure 3. The Sample's Average Score for the LO Characteristics and OLS

## 7. FURTHER ANALYSIS

Interviews were conducted with senior management at organisation A, B, C and E (Organisation D declined an invitation to participate in this exercise) to gain a further understanding of their practices related to the LO building blocks. The investigation has focused on the building blocks found to be significant by stepwise regression. A summary of the survey results was presented to the respective organisations to provide the participating firms with an overall view of how they fared in this study.

The interviewees agreed that progressive change has taken place and that enhancing the knowledge and skills of their discipline is very important to ensure their firms' continued success. In examining the organisational set up the research has found these firms adopting a more centralised management style where decisions tend to be made by a few senior staff. At the same time, all staff were encouraged to participate in policy-making and to express their views on a range of issues. ORG A, C and E encouraged their staff to email their views and ideas to executives and directors directly. Staff in ORG B are encouraged to drop their views in a 'suggestion box' that is placed at a convenient place and is not exposed to view, in addition, a staff feedback is conducted every two years to gather staff views on the company's policies. ORG A also holds a corporate planning exercise at the end of every year which has increasingly over the years involved lower levels of management in its planning process. However, all the above seem to be not enough as the survey did not show that the organisation's vision and strategy, executive and management practices to have made significant contribution to being LO.

The interviewees considered Training and Education an important building block to increase their staff's knowledge and skills. ORG A has set mandatory training targets of twelve training hours per year for every member of staff which should aim to improve individual skills in three areas: core skills, soft skills and IT skills. Seminars and courses are sourced and placed on the company's intranet and staff who attend such activities are required to give lectures of about 1 hour to their colleagues to facilitate learning and dissemination of knowledge. ORG B, C and E also adopted similar approach. However, a worthy difference to note is that in ORG A members of staff who are sponsored to attend seminars receive honorarium of S\$300 when he/she delivers a lecture.

ORG A used a key performance indicator (KPI) to measure the performance of the firm. The KPI score would determine the year-end bonus for the department. Thus, senior management is motivated to encourage their staff to attend training courses to improve their performance and so achieve the targeted KPI. To source for relevant seminars, ORG A regularly carries out "Training Needs Analysis" where performance gaps and training needs of the staff are identified. Every member staff has a 'training work-map' and is also encouraged to go for further education as part of a Continuous Professional Development (CPD) program.

ORG B and C have structured training programs for their staff, which include 'hands-on' exercises that allow trainees to deal with real problems and tasks. ORG C makes it mandatory for 80% of its staff to attend seminars held monthly; in addition, an overall training survey is carried out, twice a year, to solicit feedback from staff. However, no specific studies have been done to assess how such programs have contributed to improving the organisation's performance. ORG B contributes 4% of each employee's wages into the training budget and has its own training facilities to accommodate in-house training on software skills and legal issues. This organisation does not mandate its staff to attend seminars/courses, as senior management wants to encourage their staff to take on personal responsibility for their own development. However, this has resulted in poor attendance during training seminars that were being held on Saturdays, an official non-working day. It is not surprising to see three out of 4 predictors of the model that has emerged from the survey relate to rewards, training and individual practices.

The interviewees explained that their organisations do not “severely punish” their staff when they make mistakes. These views are supported by this study which showed that 57.1% of the respondents in ORG A, 75.0% in ORG B, 78.6% in ORG C and 87.5% in ORG E agree that they were always encouraged to analyse mistakes. 50.0% of all respondents agree that blaming is minimised during conflict situations. These figures indicate the organisations are tolerant of mistakes and encourage learning from mistakes. ORG A conducts sharing sessions twice a year where staff are urged to share more of their experience and problems encountered on big projects and is currently aiming to develop plans for a web-based library to document problems and experience gained. ORG B, C and E have created a record system of completed projects that allows younger members of staff to learn from the experience of senior colleagues.

In conclusion, when the senior managers were asked to name critical factors that have enabled their organisation to be LO most cited strong management support and commitment towards establishing a learning climate, and promoting training and education. However, the survey did not support this view as management commitment and training and education were not retained as of the main predictors of being a LO.

Senior managers involved in this study explained that professional bodies push for the whole construction industry to become a knowledge-based industry provided the impetus for their own organisations for further investment in training. ORG E, which has the second highest OLS, commented that although it does not have an extensive training program, its small size has enabled the creation of a flexible organisational structure and effective communication and information flow between top management and staff.

## 8. CONCLUSION

Developing a learning culture is essential to the creation of a knowledge based economy. This research has shown evidence that QS firms in Singapore have developed the characteristics of LO, although to moderate levels only. The main predictors of LO, based on the analysis of this research sample, are “individual and team practices”, “organisational and job structure” and “rewards and recognition”. These are the building blocks that tend to refer individual and group issues, micro level, rather than related to more strategic, macro level issues. This does not mean necessarily that the strategic level factors are not important to the creation of LO, rather it may suggest that such factors did not have as a significant impact on the respondents as the group level ones. Senior management stressed the importance of management commitment as being the key in developing the vision, strategy, and executive and management practices in order to promote learning within the organisation and contribute to the long-term commitment of staff. This would indicate the need for these organisations to embrace a learning culture through the development and integration of the firm’s vision for continuous improvement and development into business strategies and practices. These results may also be a reflection of the national and business culture in Singapore where authority and decision making powers tend to be concentrated with senior management rather than adopting a more involving style.

## REFERENCES

1. C21 (1999). *Construction 21: Re-inventing Construction*, Singapore: Ministry of Manpower and Ministry of National Development, SNP, Singapore.
2. Garvin, D. (1993). Building a Learning Organisation. *Harvard Business Review*, 71(4), 78-91.
3. Pedler, M., Burgoyne, J. and Boydell, T. (1991). *The Learning Company: A Strategy for Sustainable Development*, London: McGraw-Hill.
4. Marquardt, M.J. (1996). *Building the Learning Organisation: A Systems Approach to Quantum Improvement and Global Success*, New York: McGraw-Hill.
5. Garavan, T. (1997). The learning organisation: a review and evaluation, *The Learning Organisation*, 4(1), 18-29.
6. Huber, G.P. (1991). Organisation learning: The contributing processes and the literatures, *Organisation Science*, 2, 88-115.
7. Argyris, C. and Schon, D.A. (1996). *Organisation Learning II: Theory, Method and Practice*. Addison Wesley: Reading, MA.
8. Senge, P.M. (1990). *The Fifth Discipline: The Art & Practice of the Learning Organisation*, New York: Doubleday.
9. Bennett, J.K. and O’Brien, M.J. (1994). The building blocks of the learning organisation. *Training*, 31(6), 41-51.
10. Campbell, T. and Cairns, H. (1997). Developing and measuring the learning organisation: from buzzwords to behaviours. *Industrial and Commercial Training*, 26(7), 10-15.
11. Iles, P. (1994) Developing learning environments: challenges for theory, research and practice. *Journal of European Industrial Training*, 18(3), 3-9.
12. O’Brien, M.J. (1994). *Learning Organisations Practices Profile*, San Diego, CA: Pfeiffer and Company
13. Draper, N.R. and Smith, H. (1998). *Applied Regression Analysis*, New York: Wiley.
14. Stevens, J. (1996). *Applied Multivariate Statistics for the Social Sciences*, New York: Lawrence Erlbaum Associates.
15. Chia, K.H. (1998). Factors affecting the performance of consultant quantity surveyors, Unpublished undergraduate dissertation, Department of Building, National University of Singapore, Singapore.
16. Nunnally, J.C. (1978). *Psychometric Theory*, McGraw-Hill, USA.

17. Jamali, D, and Sidani, Y (2008) Learning Organizations: Diagnosis and Measurement in a Developing Country Context, *The Learning Organization*, 15(1), 58-74.
18. Armstrong, A. and Foley, P. (2003). Foundations for a learning organization: organization learning mechanisms", *The Learning Organization*, 10 (2), 74-82, Emerald Group Publishing Ltd.
19. McCaffer, R. and Edum-Fotwe, F.T. (2000). Engineering and the Future of Construction. Industry: realities and emerging possibilities. In: *Proceedings, 4th Asia-Pacific Structural Engineering and Construction Conference (APSEC2000)*, 13-16 September 2000, Kuala Lumpur, 33-40.
20. Freeman, M.A. and Capper, J.M. (2000). Obstacles and opportunities for technological innovation in business teaching and learning. *International Journal of Management Education*, 1, 37-47.

## Appendix A

### The Research Sample

The qualifications of those who participated in the survey were as follows: 16 of them are Diploma holders; 46 are degree holders and the rest received postgraduate qualifications (Table 6). Participants in this survey held positions of assistant quantity surveyors, quantity surveyors, and senior/executive quantity surveyors. The contingency table test was used to determine whether the difference in the qualifications among the respondents of the five organisations is significant.

$H_0: F_a = F_e$

$F_a$ : Refers to *Actual Frequency*

$F_e$ : Refers to *Expected Frequency*

$H_a: F_a \neq F_e$  (implies  $F_a$  are significantly different from  $F_e$ )

It is concluded, therefore, that there is significant difference in the qualifications among the five organisations with ORG A having the highest proportion, 35.7% (Figure 4) of its QSs holding post-graduate qualifications compared to other organisations.

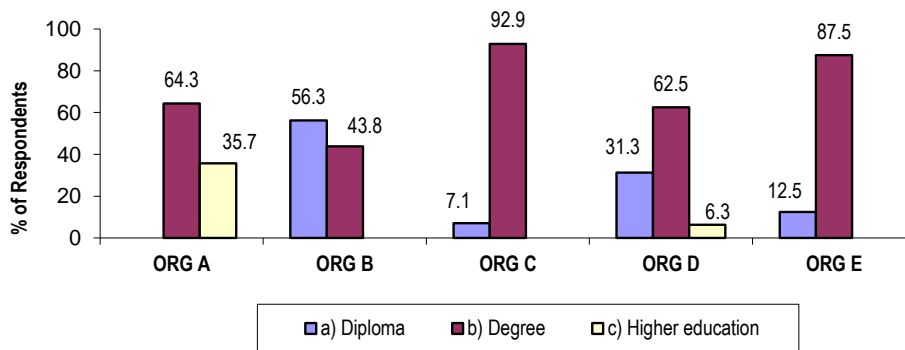


Figure 4. Qualifications of Respondents

Table 6. Contingency Table Test

Actual Frequencies( $F_a$ )						
Qualifications/ Organisations	ORG A	ORG B	ORG C	ORG D	ORG E	Total
Diploma	0	9	1	5	1	16
Degree	9	7	13	10	7	46
Higher Education	5	0	0	1	0	6
Total	14	16	14	16	8	68
Expected Frequencies ( $F_e$ )						
Qualifications/ Organisations	ORG A	ORG B	ORG C	ORG D	ORG E	
Diploma	3.29	3.76	3.29	3.76	1.88	
Degree	9.47	10.82	9.47	10.82	5.41	
Higher Education	1.24	1.41	1.24	1.41	0.71	

Calculated  $\chi^2 = \sum \{(F_a - F_e)^2 / F_e\} \chi^2$   
 =Chi-square statistic  
 = 32.44 > Critical  $\chi^2_{0.05, 8} = 2.733$   $H_0$  is rejected