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Organizational Creative Climate & Learning Organization: Factors Contributing Towards Innovation Within an Organization

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ABSTRAK

Kajian inovasi mencadangkan bahawa satu iklim organisasi yang kreatif cenderung untuk memainkan peranan penting dan sebagai satu prediktor inovasi. Walau bagaimanapun, baru-baru ini, kehadiran budaya pembelajaran dalam sesebuah organisasi cenderung untuk menerangkan kesan yang harus dipertimbangkan turut mempengaruhi inovasi dan untuk menentukan yang mana satu boleh menjadi prediktor yang lebih baik untuk inovasi teknologi dan organisasi. Hasil keputusan menunjukkan bahawa kedua-dua budaya pembelajaran dan iklim kreatif secara signifikannya menyumbang 80.4% kepada varians dalam inovasi yang dibentuk dengan iklim kreatif organisasi yang menyumbang 55.6% dan budaya pembelajaran menyumbang 63.7% varians dalam inovasi yang diperhatikan. Hasil kajian juga mendapati bahawa dimensi organisasi pembelajaran menyumbang lebih kepada varians dalam inovasi, khususnya dimensi "Kepimpinan Strategik" mempunyai kuasa prediktor tinggi signifikan ke atas inovasi berlaku di dalam organisasi kes dibandingkan dengan sepuluh faktor iklim kreatif organisasi dan selebihnya enam dimensi organisasi pembelajaran.

ABSTRACT

Studies on innovation have suggested that a creative organizational climate tends to play an important role and is a predictor for innovation. However, lately, the presence of learning culture in an organization tends to explain a considerable influencing effect on innovation too. This particular case study tries to examine the influence of both variables on innovation and to determine which one of the two can be a better predictor for technological and organizational innovation. The results indicated that both learning culture and creative climate significantly contributed 80.4% to the variance in the innovation construct with organizational creative climate on its own, contributing 55.6% and the learning culture on its own, contributing 63.7% of the observed variances in innovation. The results of the study also found that the learning organization dimensions contributed more to the variances in innovation, particularly the dimension of 'Strategic Leadership' which had a significantly high predictive power on innovation occurring within the case organization as compared to the ten organizational creative climate factors and the rest of the six learning organization dimensions.

INTRODUCTION

There is a substantial body of evidence that suggests innovation can be considered as a dominant factor in national economic growth and international patterns of trade, while at the micro level (within organizations) R&D is seen as enhancing an organization's activity to absorb and make use of new technologies of all kinds (OECD 1997; Freeman 1994). French and Bell, Jr. (1995) considered three elements to ensure continuous innovation in organizations; these are empowering employees, encouraging employee participation and employee involvement. Innovation, for example, could be

one of the outcomes that result from successful change efforts (Beer and Nohria 2000; Chain Store Age 1998; OECD 1997; Mensch 1975).

Among the many streams of research regarding influencing factors on innovation, the idea of having a creative working climate (or environment) within an organization which relates to a suitable working culture to facilitate an environment which will then enhance the organizational power is very often mentioned. This idea was put forward during the middle 1980's and late 1990's by several scholars among others Ekvall, Arvonen and Waldenstrom-Lindblad (1983), Ekvall and Tangeberg-Anderson (1986), Zain Mohamed (1995), Zain Mohamed and Rickards (1996) and Amabile and Conti (1999) who focused on organizational climate factors which are said to foster creativity and innovation. Zain Mohamed (1996) in his study involving eight Malaysian firms used the Ekvall *et al.*'s (1983) Creative Climate Questionnaire (CCQ) which contained ten dimensions of creative climate to compare the innovation level of the organizations. In addition Zain Mohamed's (1995) study identified fifteen factors deemed favorable for innovation implementations in private organizations both large and small, of which five are similar to Amabile and Conti's (1999) eight organizational climatic factors likely to foster innovation. The five major factors favorable for innovation are mentioned and common to both Amabile and Conti's and Zain Mohamed's studies though phrased differently. They are (1) Organizational encouragement (commitment), (2) Sufficient resources (user friendly technology), (3) Teamwork support, (4) Freedom (open to new ideas), and (5) Supervisory encouragement.

Research on innovation has also identified a number of human, social and cultural factors which are crucial to the effective operation of innovation at the organizational level (OECD 1997). These factors, according to OECD (1997), were mostly centered around learning; it is learning by organizations as a whole (diffusion of knowledge to a broad range of key individuals within them) which is critical to an organization's innovative capabilities. Beginning in the late 1990's and the year 2000, the idea of learning at the organizational level and knowledge management have been closely linked to innovation (Argyris and Schon 1978; Drucker 1988; Garvin 1993; Nonaka and Takeuchi 1995). This stream of research also called the neo-Schumpeterian approach stems from earlier scholars such as Polyanyi (1966) and Nonaka (1991), who viewed innovation in terms of interaction between market opportunities and the organization's knowledge base and capabilities. This approach has been followed up on recent studies by Mohanty (1999) and Sta Maria (2000).

STATEMENT OF THE PROBLEM

Despite achieving considerable success economically, the innovation practices in the Malaysian private organizations still remain relatively under-researched as asserted by a few scholars (Zain Mohamed and Rickards 1996; Malaysian Science and Technology Information Center (MASTIC) 1996). This statement is also supported by Sta Maria (2000) and Khairuddin (1999). Axtell, Holman, Unsworth, Wall and Waterson's (2000) were of the opinion that there was a large literature on creativity in general but few relating to innovation per se. Even though there has been a huge volume of research on innovation, with 3,085 publications on the diffusion of innovation out of which 2,297 are empirical works (Rogers 1983), surprisingly, good models and principles on innovation have yet to be developed as stated by Zairi Mohamed (1994). MASTIC (1996), realizing the situation and the need for Malaysian organizations to upgrade their innovations, has since conducted a nationwide survey on innovation in 1994 involving a large number of Malaysian private organizations. Following which, another survey was conducted in 1998 (M. Kamaruzzman personal communication, October 2000). Thus, the problem statement of this study can be summarized as "the critical need for more studies to be conducted linking organizational creative climatic factors and learning factors in order to analyze their influences on innovation within the Malaysian context is pressing". Specifically, the fields of organizational creative climatic factors and learning factors should be empharised. Undoubtedly with more research, more crucial information could be obtained which will further assist in organizational decision making and subsequently improve the national growth. Hence, the implementation of this study was taken up generally to add value for the theoretical development in this particular area and specifically to obtain insights into the areas

of working climate and learning culture on innovation.

OPERATIONAL DEFINITIONS OF TERMS

The three major operational definitions of terms used in this study are as follows:

Organizational Creative Climate

The definition of organizational climate for creativity, takes the definition by Ekvall (1996) and Ekvall *et al.* (1983) who regard climate as an attribute of the organizations, a conglomerate of attitudes, feelings, and behavior which characterises life in organizations, and exists independently of the perceptions and understandings of the members of the organization (p. 105); it is conceived as an organizational reality in an 'objectivistic' sense and therefore is not identical to organizational culture. By Ekvall's (1996) understanding, climate is regarded as a manifestation of culture. The organizational climate for creativity contained several factors (Ekvall 1996) deemed favorable for such climatic culture one which could stimulate creativity and innovation. These factors then are referred to as creative climate factors. The creative climate in this study is assessed by the ten factors of the Creative Climate Questionnaire (CCQ) forwarded by Ekvall *et al.* (1983) and Ekvall (1996). The factors are: challenge/motivation, freedom, idea support, liveliness/dynamism, playfulness/humour, debates, trust/openness, conflicts, risk taking and idea time.

Learning Organization

A learning organization is one in which learning and work are integrated in an ongoing and systematic fashion to support continuous improvement and includes learning at the individual, group, organization and global levels (Watkins 1996, p. 91). This learning occurs at all levels within the organization and outside the organization by Watkins' (1996) understanding and forms the basis needed for a learning organization. Watkins and Marsick (1996a, 1999) forward seven dimensions for a learning organization and these are known as learning organizational factors. The learning culture in this study is assessed by the seven dimensions of the Dimensions of the Learning Organization Questionnaire (DLOQ) forwarded by Watkins and Marsick (1996a). These are continuous learning, dialogue and inquiry, team learning, embedded systems, empowerment, system connection and strategic leadership.

Innovation

Innovation is defined as the process of creating a commercial product from invention (Hitt *et al.* 1999, p. 476). This definition which equates innovation to commercialization of invention (which includes improvement on already available product or service) is similar to those of several scholars (OECD 1997; Rickards 1985; Robbins and Decenzo 2001; Taylor 1991). When an organization innovates, it often does so both ways, which is in radical manner (technological) as well as non-technological (OECD 1997). The non-technological component of innovation in this study focuses on organizational innovation. Organizational innovation (OI) is included in this study together with technological innovation (TI) since OI occurs as part of technological innovation (OECD, 1997). The major component being emphasized in OI in this study is the managerial innovation or what some scholars would call administrative innovation (Sta Maria, 2000) which is the incremental (soft) side of innovation.

Technological Innovation

Technological innovation comprises implemented technologically new products and processes and significant technological improvements in products and processes (OECD 1997). Technological innovation is deemed implemented if it has been introduced to the market (product innovation) or used within a production process (process innovation).

Organizational Innovation

Organizational innovation in this study includes the implementation of advanced management techniques such as the practice of quality assurance program. In this study organizational innovation is reflected by the ISO 9000 program being adopted or implemented by the sampled organizations as well as the practice of the four basic pillars of TQM. The basic pillars of TQM are: (1) satisfying the customer, (2) effective management system/process such as ISO 9000 program, (3) teamwork practice and (4) improvement tools for continuous improvement. The component is being assessed by statements in the questionnaire relating to the ISO 9000

program implementation and its procedures as well as the basic pillars of TQM.

Justifiably and also for ease of use, the term innovation which is widely referred to in this writing includes the two major constructs of innovation, namely, technological innovation and organizational innovation.

METHODOLOGY

The study used a quantitative case method with multivariate statistical analysis, namely, multiple regression analysis and multiple correlation in an attempt to find answers to the research questions being posed. Multivariate analysis is suitable in analyzing phenomena either for discovery or hypothesis testing (Davis 2000). In this study, the analysis used was more for getting answers to the questions posed rather than for hypothesis testing. The survey case method as a form of causal-comparative is seen suitable for conducting studies that are seeking explanation on attitudes and behavior on the basis of data gathered at a point in time (Ary Jacobs and Razavieh 1990-pg. 407). The survey involved convenient sampling on a cross sectional basis which was deemed appropriate for making generalizations from samples being studied to the broader population group. Since the study involved three different variables which were not controlled or manipulated and which concerned the relationships among the variables and the ability to explain and predict values on a variable from the relationships, a multiple regression analysis is seen appropriate to use in summarizing Lehman's (1995) point of view. The independent variables were assumed to share very little variance with each other (not collinear) but together, they accounted for much of the variance in the dependent variable (Davis 2000). In addition, the multiple correlation analysis was conducted to obtain explanation of the relationship of the criterion variable on the entire set (not just one in particular) of the predictor variables. Thus, the analysis can explain how much of the total variation in the criterion variable, innovation, is accounted for by the independent variables taking the idea from Lehman's (1995) statement. Thus this study is also an explanatory study (Ary *et al.* 1990).

Along with the multiple regression analysis, ANOVA also used and a post hoc test was followed, where appropriate, to investigate differences among population means.

INSTRUMENTATION

Three instruments were used in this study, of which two were the ones developed by researchers for their previous work and have been validated. Two instruments which form part of the whole questionnaire were obtained from the original questionnaires developed by various scholars (Ekvall *et al.* (1983); Watkins and Marsick 1996a). All the statements were in the English language. The third instrument to assess innovation was developed by the researcher, Meriam Ismail.

The instrument used to measure the organizational climate factors is the Creative Climate Questionnaire (CCQ) developed by Ekvall *et al.* (1983). The ten factors are (i) challenge/motivation (5 items), (ii) freedom (5 items), (iii) idea support (5 items), (iv) liveliness/ dynamism (5 items), (v) playfulness/humour (5 items), (vi) debates (5 items), (vii) trust/ openness (5 items), (viii) conflicts (5 items), (ix) risk taking (5 items) and (x) idea time (5 items). The total items are fifty. The items consisted of statements which required the respondents to determine the degree to which the statements are true or otherwise of the organizational working climate occurring in the organizations. The scales used representing each statement is from a continuum of 0 to 3. The "0" represented a degree equivalent to "not at all applicable" and the "3" represented "applicable to a high degree". The CCQ was selected for this case study over other instruments because of its wide range of ten factors covering working climate within an organization both stimulating and hampering innovation. It was also selected because the factors were said to be able to explain effects on productivity, job satisfaction, profit, quality, innovation, well-being which in turn will give performance impact on the organizational resources both human and non-human according to Ekvall (1990) as cited by Ekvall (1996). The stability aspect of the reliability of the CCQ has been illustrated in a longitudinal study of a product development project in a high-tech company (Ekvall 1993) as cited by Ekvall (1996). The CCQ has previously been applied for use in many researches both in Europe and Asia, in particular in a study involving Swedish, German and Spanish organizations.

The instrument used to measure learning organization dimensions is the Dimensions of Learning Organization Questionnaire (DLOQ)

forwarded by Watkins and Marsick (1999) with each dimension having at least six items or more. The seven dimensions of learning organization with the relevant items are (1) continuous learning- 7 items, (2) dialogue and inquiry- 6 items, (3) team learning – 6 items, (4) embedded systems- 6 items, (5) empowerment- 6 items, (6) system connections- 6 items and (7) provide leadership- 6 items. The total items are forty-three. The instrument has been constructed in a way where each item requires the respondent to determine the degree to which the statement is true or otherwise of the extent of organizational approach practised in the organization. Each statement of either instrument will be measured on a common scale of 1 to 6 continuum ranging from "1" representing "almost never" to "6" representing "almost always". The DLOQ was selected for this study because it has been widely used in studies involving innovation in Malaysia and in the USA besides other parts of the world. It has proved to be a reliable measure of learning culture. The DLOQ has also been used in over 200 companies worldwide.

The innovation construct, on the other hand, contained two main constructs namely (I) technological product and process innovation (technological transfer & absorptive capacity, and diffusion of innovation), and (2) organizational innovation focusing on basic elements of TQM and quality assurance program such as ISO 9000 certification. There were thirty-two items to cover all the two sub constructs. The breakdown of the items were nineteen for technology transfer/absorptive capability, five for diffusion of innovation and eight for organizational innovation concentrating on aspects of ISO 9000 implementation and basic foundation of TQM. The thirty-two items on the two constructs of technological innovation and organizational innovation were constructed by the researcher Meriam Ismail and validated using factor analysis (Rotation method), based on the guidelines provided by Wong *et al.* (1999), OECD(1997) and MASTIC (1996). The statements required the respondents to determine the degree to which something is true or otherwise. All the items were constructed using rating scales on a continuum of 1 to 6. The "1" represented a degree equivalent to "almost always" and the "6" represented a degree equivalent to "almost never" of the statements. The scales "2", through "5" represented the degrees equivalent to between "almost always" to "almost never" of the statements. All items for the three constructs have been reviewed by two academics (Zain Mohamed and Ekvall) in the related fields (please see Appendix 1).

Finally, the fourth section contained eight items that seek information on the respondents' demographic backgrounds. This included gender, age in years, job category, education background, tenure of service with the organization, and the length of organization establishment in years.

MEASURES

Following are Tables 1 and 2 depicting reliability estimates for each of the ten factors of the CCQ and each of the seven dimensions of the DLOQ. The original estimates of the CCQ are determined by Ekvall and colleagues (Ekvall 1996). The reliability estimates for the innovation constructs are shown in Table 3 after a pilot test of the instrument was conducted during the case investigation.

The Cronbach Alpha's reliability index for this innovation questionnaire is .97. The constructs have proved consistently reliable with all the scales above the recommended .70 (Nunally 1978).

POPULATION AND SAMPLE

The sample of respondents from the case organization was obtained through convenient sampling (selected by the liaison person in the case organization) from a cross section of a population of about a hundred employees and was close to random sampling. A total of forty respondents from three major levels of employment namely top/senior management, middle/lower management/supervisory and the technical/administrative support staff responded to the questionnaire. All the responses were usable.

ANALYSIS

The analysis procedures conducted were in line with the research questions being posed. Two major types of analyses were conducted; one was the simple descriptive statistics and the other was the inferential statistics (multiple regression and ANOVA and independent T-Test). Before the data was analyzed, an exploratory data analysis EDA was first executed on the data. This is to determine whether the spread of data subscribed

TABLE 1
Reliability estimates for the original measures in the CCQ inventory

Subscale	Number of items	Cronbach's Alpha (original)	Cronbach's Alpha (from current pilot test)
Challenge/motivation	5	0.82	0.78
Freedom	5	0.74	0.68
Idea support	5	0.89	0.83
Liveliness/dynamism	5	0.79	0.76
Playfulness/humour	5	0.81	0.74
Debates	5	0.75	0.78
Trust/openness	5	0.79	0.55
Risk taking	5	0.73	0.68
Idea time	5	0.78	0.72
Conflicts	5	0.85	0.61
Total	50		

The overall reliability for 50 items of the CCQ in the pilot test was .94

TABLE 2
Reliability estimates for the measures in the DLOQ

Subscale	Number of items	Cronbach Alpha's (original)	Cronbach Alpha's (current pilot test)
Continuous Learning	7	0.81	0.83
Dialogue and Inquiry	6	0.87	0.89
Team Learning	6	0.86	0.87
Embedded Systems	6	0.82	0.81
Systems Connections	6	0.84	0.88
Empowerment	6	0.79	0.90
Provide Leadership	6	0.77	0.92
Total	43		

However the overall reliability for the 43 items of the DLOQ is .97

TABLE 3
Reliability estimates for the innovation construct

Subscale	Number of items	Cronbach Alpha's (original)
Tech. Transfer/Absorptive capability	19	0.96
Diffusion of innovation	5	0.93
Organizational innovation	8	0.94
Total items	32	

to the normality test, an assumption needed when running the inferential statistics. Another purpose for conducting EDA is to test the data for homogeneity of variance, a needed assumption for multiple regression analysis. From the EDA it was found that the normality assumption was met for all the three variables based on the Kolmogorov-Smirnov and Shapiro-Wilk's normality test: organizational climate for creativity (P=.200, P=.827), learning organization (P=.200, P= .643) variables and the innovation constructs (P=.200, P=.827). Then the data was assessed for collinearity. A highly correlated coefficient (near or equal to 1) between the two predictor variables denotes a high collinearity. In examining the data for collinearity for n=40,

the analysis revealed that the two predictor variables have a moderate collinearity from the table of coefficients analysis.

The research questions posed are:

1. To what extent do the factors of the variable organizational creative climate independently explain observed variances in organizational members' perceptions on innovation in the organization?
2. Which factor/s of the organizational creative climate variable is/are highly predictive of innovation?
3. To what extent do the dimensions of the learning organization variable independently explain observed variances in organizational members' perception on innovation in the organization?
4. Which dimension/s of the DLOQ is/are highly predictive of the innovation construct?
5. To what extent do both organizational creative climate and learning organization variables explain observed variances in organizational members' perceptions on innovation in the organization?
6. Which factor/s together from either criterion variables contributes highly to the prediction of innovation in the organization?
7. What are the differences in the members' perceptions on innovation, organizational creative climate and learning culture among the three levels of employee groups in the organization?
8. Are there any differences in the members' perceptions on innovation, organizational creative climate and learning culture between (1) males and female employees; (2) employees of different ages; (3) employees' education background; and (4) employees' tenure of service in the organization?

FINDINGS

The case organization is a medium sized consulting quantity surveying firm. The full time employees in the department are about a hundred. The demographics of the respondents can be summarized as made up of 55% male to female, 85% of top to middle/lower management level, the rest are supervisory and support staff. In addition, 70% are between the ages of 20 to 40 years, while the rest are above 41 years of age. Nearly 75% of the respondents have at least a bachelor's degree while the rest have at least an 'A' level equivalent. Forty-five percent of the respondents have served the organization for less than 5 years.

RESULTS

In answering research question 1, the multiple regression analysis was conducted involving the ten factors of organizational creative climate with the innovation construct. The findings revealed that the organizational climate for creativity factors did explain significantly observed variances of the members' perceptions on innovation as much as 55.6% with F value significant as seen from Table 4 and Table 5, using the enter method. However, none of the ten factors were seen to contribute significantly as reported from Table 7.

The analysis also found that the correlation of the organizational creative climate variable with the innovation construct was moderate

TABLE 4
Descriptives- innovation level and organizational climatic factors

	Mean	Std. Deviation	N
overall innovation	133.63	25.99	40
total challenge	8.90	1.82	40
total conflict	9.20	1.87	40
total debate	4.85	2.79	40
total freedom	7.18	2.55	40
total idea supp.	8.68	2.29	40
total idea time	6.50	2.15	40
total liveliness	7.60	2.56	40
total playfulness	8.18	2.83	40
total risk	7.70	2.34	40
total trust	6.88	2.58	40

TABLE 5
Model summary of the multiple regression analysis of the organizational climatic factors with innovation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.745	.556	.402	20.09

a Predictors: (Constant), total trust, total debate, total idea supp., total risk, total challenge, total freedom, total liveliness, total playfulness, total idea time, total conflict
b Dependent Variable: overall innovation

TABLE 6
ANOVA- Organizational climate for creativity factors with innovation

Model		Sum of Squares	df	Mean Square	F	Sig.
OCC factors	Regression	14635.444	10	1463.544	3.627	.003
	Residual	11701.931	29	403.515		
Total		26337.375	39			

a Predictors: (Constant), total trust, total debate, total idea supp., total risk, total challenge, total freedom, total liveliness, total playfulness, total idea time, total conflict
b Dependent Variable: overall innovation

TABLE 7
Coefficients of relationships between organizational creative climate (OCC) factors and innovation

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
OCC	(Constant)	65.374	21.615		3.024	.005		
	total challenge	3.270	3.475	.229	.941	.354	.258	3.879
	total conflict	-4.786	4.416	-.344	-1.084	.287	.152	6.593
	total debate	.560	1.333	.060	.420	.678	.750	1.334
	total freedom	3.324	2.080	.326	1.598	.121	.368	2.720
	total idea supp.	1.775	2.095	.157	.847	.404	.449	2.228
	total idea time	-.616	3.218	-.051	-.191	.850	.216	4.619
	total liveliness	2.998	2.098	.295	1.429	.164	.359	2.788
	total playfulness	2.054	2.470	.224	.832	.412	.212	4.713
	total risk	9.432E-02	2.108	.009	.045	.965	.424	2.361
	total trust	.714	2.891	.071	.247	.807	.185	5.392

a Dependent Variable: overall innovation

(r=.673) and significant at (P<.01). Table 8 shows the detailed correlation of each factor with innovation. Table 9 reflects the amount of collinearity present among the factors of the organizational creative climate. The condition index was very much less than 30.0 (threshold value) which means the two CCQ factors have a low degree of collinearity with each other. In addition, results from Table 7 show that the VIF values of the factors are much less than 10.0 which indicated low collinearity among the factors.

In answering research question 2, a stepwise regression was conducted to determine which factor/s is/are having high predictive power on the dependent variable, innovation. There were two factors of such nature, namely, 'Freedom' and 'Liveliness/dynamism' as shown in Table 10 and Table 11 where the values of t were significant (P<.05) for both factors, at 2.767 and 2.641 respectively.

In answering research question 3, the multiple regression analysis was again conducted involving the seven dimensions of the learning

TABLE 8
Correlations of the organizational creative climate factors with innovation construct

CCQ	Correlations index (r)	P
Climate of Challenge/motivation	.738**	.000
Climate of conflicts	.726**	.000
Climate of debates	.239	.137
Climate of freedom	.773**	.000
Climate of idea time	.833**	.000
Climate of idea support	.521**	.001
Climate of liveliness/dynamism	.766**	.000
Climate of playfulness/humor	.786**	.000
Climate of risk taking	.549**	.000
Climate of trust	.824**	.000

** Correlation is significant at the .01 level (2-tailed)

TABLE 9
Collinearity diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	total freedom	total liveliness
1	1	1.944	1.000	.03	.03	
	2	5.645E-02	5.868	.97	.97	
2	1	2.901	1.000	.01	.01	.01
	2	5.865E-02	7.033	.95	.32	.08
	3	4.019E-02	8.496	.04	.67	.91

a Dependent Variable: overall innovation

TABLE 10
ANOVA: Organizational creative climate with innovation

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10827.389	1	10827.389	26.527	.000
	Residual	15509.986	38	408.158		
	Total	26337.375	39			
2	Regression	13287.843	2	6643.921	18.838	.000
	Residual	13049.532	37	352.690		
	Total	26337.375	39			

a Predictors: (Constant), total freedom
b Predictors: (Constant), total freedom, total liveliness
c Dependent Variable: overall innovation

organization with the innovation construct. The findings revealed that the learning organization dimensions did explain significantly observed variances of the members' perceptions on innovation as much as 73.0% as seen from Tables 12, 13, 14 respectively. The dimension 'Dialogue and Inquiry' (total dialogue) seemed to be having significant relationship (P<.05) as seen from coefficients values (t= 2.222) in Table 15 below. This meant that 'Dialogue and Inquiry' could be the dimension which has a high predictive power on innovation. To confirm this assumption, the model was tested once more using the stepwise method.

TABLE 11
Coefficients of the relationship between the organizational creative climate factors and innovation (stepwise)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	86.759	9.644		8.996	.000		
	total freedom	6.532	1.268	.641	5.150	.000	1.000	1.000
2	(Constant)	74.228	10.143		7.318	.000		
	total freedom	4.124	1.490	.405	2.767	.009	.626	1.598
	total liveliness	3.922	1.485	.386	2.641	.012	.626	1.598

a Dependent Variable: overall innovation

TABLE 12
Descriptives: Innovation construct and the dimensions of learning organization

	Mean	Std. Deviation	N
overall innovation	133.63	25.99	40
total continuous learn	7.83	2.61	40
total dialogue	26.15	5.48	40
total embedded sys	23.23	4.92	40
total empowerment	22.03	5.38	40
total leader	21.43	5.74	40
total system conn	20.35	5.48	40
total team learning	23.20	5.18	40

TABLE 13
Model summary of the multiple regression analysis of the learning organization dimensions with innovation construct

Model Summary Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.854	.730	.671	14.91

a Predictors: (Constant), total team learning, total continuous learn, total empowerment, total dialogue, total embedded sys, total system conn., total leader
b Dependent Variable: overall innovation

TABLE 14
ANOVA- Dimensions of the learning organization with innovation construct

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19222.933	7	2746.133	12.352	.000
	Residual	7114.442	32	222.326		
	Total	26337.375	39			

a Predictors: (Constant), total team learning, total continuous learn, total empowerment, total dialogue, total embedded sys. total system conn., total leader
b Dependent Variable: overall innovation

TABLE 15
Coefficients of relationship between learning dimensions and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
DLOQ factors	(Constant)	44.370	13.198	3.362	.002			
	total continuous learn	.435	1.439	.044	.302	.765	.404	2.476
	total dialogue	-1.811	.815	-.382	-2.222	.034	.286	3.499
	total embedded sys	1.845	.983	.349	1.877	.070	.244	4.106
	total empowerment	.598	.930	.124	.643	.525	.228	4.384
	total leader	1.839	1.002	.406	1.835	.076	.172	5.802
	total system conn	1.062	.931	.224	1.141	.262	.219	4.575
	total team learning	.697	.869	.139	.802	.429	.281	3.560

a Dependent Variable: overall innovation

TABLE 16
Correlations of DLOQ dimensions with innovation construct

DLOQ	Correlation index (r)	P
Continuous learning	.420**	.003
Dialogue & inquiry	.511**	.000
Embedded systems	.700**	.000
Empowerment	.696**	.000
Leadership	.798**	.000
Systems connection	.722**	.000
Team learning	.647**	.000

** Correlations significant at the .01 level (2-tailed)

The results from Table 13 revealed that the seven dimensions of the learning organization significantly explained 73.0% of the variances in innovation (P<.05). In addition, the Pearson-Correlation coefficients for six of the seven dimensions against innovation are significantly high at r>0.5 (Table 16) with the highest being Strategic Leadership (r=.798). The values of VIF in Table 15 were less than 10.0, the threshold value which indicated the collinearity among the seven dimensions of the DLOQ were low.

In answering question 4, the model was tested again to determine which of the seven dimensions of the learning culture is/are highly predictive of the variance in innovation. In the stepwise method, the results of the analysis were presented in Table 17 and Table 18. The single dimension providing 'Strategic Leadership' (total leader) was seen as uniquely contributing significantly to the variance in innovation with the t value larger than 2 (8.159) from Table 18.

TABLE 17
ANOVA: Learning dimensions with innovation

Model		Sum of Squares	df	Mean Square	F	Sig.
DLOQ factors	Regression	16766.022	1	16766.022	66.564	.000
	Residual	9571.353	38	251.878		
	Total	26337.375	39			

a Predictors: (Constant), total leader
b Dependent Variable: overall innovation

TABLE 18
Coefficients of relationship between learning dimensions and innovation

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
DLOQ factor	(Constant)	56.198	9.816		5.725	.000		
	total leader	3.614	.443	.798	8.159	.000	1.000	1.000

a Dependent Variable: overall innovation

In answering research question 5, a multiple regression analysis was undertaken with both sets of independent variables. The results were shown in Tables 19, 20, and 21 respectively. The findings revealed that both sets of variables together explained 80.4% of the variance in innovation.

From the tables above, it was observed that both sets of the independent variables together significantly explained 80.4% of the variance in the innovation construct, a higher value than either of the separate variables alone. Recall that organizational creative climate factors did contribute significantly (55.6%) to the explanation of the variance in innovation and the learning organization dimensions on its own contributed 73.0% of the variance in innovation. But when both variables were taken into consideration together, an increase in the explanation of the variance in innovation was recorded. In the full model the learning organization dimension, 'Dialogue and Inquiry' was seen as having a significantly high predictive power on the dependent variable (Table 21) with absolute t value of 2.709. To confirm whether the learning dimension of 'Dialogue and Inquiry' was the one having the highest predictive power of the variance in innovation based on the full model, a stepwise regression was conducted. From this model a regression equation was obtained. The results of the analysis results are shown in Tables 22, Table 23 and Table 24 below.

From Table 22 and Table 23 and the coefficient of Table 24, 'Strategic Leadership' (total leader) was the single predictor factor of the full model which seemed to uniquely contribute to the variance in innovation. Thus the full regression model equation obtained which could be used to predict the dependent variable given the values of the independent variables within this case organization is:

Innovation = 56.198 + .798 (strategic leadership)

TABLE 19
Model summary of the multiple regression analysis using both sets of independent variables

Model	R	Square	Adjusted R Square	Std. Error of the Estimate
1	.897	.804	.653	15.31

TABLE 20
ANOVA: Organizational creative climate factors, learning organization dimensions with innovation construct

Model		Sum of Squares	df	Mean Square	F	Sig.
OCC with DLOQ factors	Regression	21178.252	17	1245.780	5.312	.000
	Residual	5159.123	22	234.506		
	Total	26337.375	39			

a Predictors: (Constant), team, overall conflict, overall dynamism, system connection, overall risk taking, overall humour, overall trust, overall freedom, overall idea support, embedded system, overall time, continuous learning, overall challenge, overall debates, leadership, dialogue, empowerment

b Dependent Variable: overall innovation

TABLE 21
Coefficients: Relationship between creative climate factors, learning dimensions with innovation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
OCC With DLOQ factors	(Constant)	48.463	18.512		2.618	.016		
	total continuous learn	.519	1.816	.052	.286	.778	.268	3.736
	total dialogue	-2.986	1.102	-.630	-2.709	.013	.165	6.065
	total embedded sys	2.301	1.146	.436	2.008	.057	.189	5.289
	total empowerment	.575	1.182	.119	.487	.631	.149	6.710
	total leader	1.910	1.304	.422	1.464	.157	.107	9.316
	total team learning	1.060	1.057	.212	1.002	.327	.200	4.999
	total system conn	1.192	1.096	.252	1.088	.289	.166	6.011
	total challenge	3.448	2.946	.242	1.171	.254	.209	4.796
	total conflict	-4.943	3.547	-.356	-1.394	.177	.137	7.319
	total debate	1.046	1.276	.112	.820	.421	.475	2.103
	total freedom	2.835	1.843	.278	1.538	.138	.272	3.677
	total idea supp.	2.471	1.863	.218	1.326	.198	.330	3.032
	total idea time	-5.733	2.884	-.474	-1.988	.059	.157	6.386
	total liveliness	-.136	1.932	-.013	-.071	.944	.246	4.068
	total playfulness	1.986	1.957	.216	1.015	.321	.196	5.094
	total risk	-1.827	1.916	-.165	-.953	.351	.298	3.357
	total trust	1.072	2.598	.107	.413	.684	.133	7.493

a Dependent Variable: overall innovation

TABLE 22
Model summary of the multiple regression analysis using both sets of independent variables (Stepwise)

Model	R	Square	Adjusted R Square	Std. Error of the Estimate
1	.798	.637	.627	15.87

Predictors: (Constant), total leader
Dependent variable: overall innovation

TABLE 23
ANOVA: Two sets of independent variables with innovation

Model		Sum of Squares	df	Mean Square	F	Sig.
OCC with DLOQ factors	Regression	16766.022	1	16766.022	66.564	.000
	Residual	9571.353	38	251.878		
	Total	26337.375	39			

a Predictors: (Constant), total leader
b Dependent Variable: overall innovation

This means that the innovation occurring in the case organization is a function of the single learning factor of 'strategic leadership'. Innovation in this organization is more influenced by the strategic leadership more than the rest of the other learning factors or creative climate factors; which indicates that the leadership of the top and maybe the middle management is the driving force behind any innovative activities occurring within the organization.

TABLE 24
Coefficients of relationship between two sets of independent variables and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
OCC With DLOQ	(Constant)	56.198	9.816		5.725	.000		
	total leader	3.614	.443	.798	8.159	.000	1.000	1.000

a Dependent Variable: overall innovation

The results from Table 24 also show that the learning dimension Total Leader (Beta=.798) alone has a significantly high predictive power on innovation construct which answered research question 6.

In answering research question 7, the respondents were grouped into different job hierarchical levels. Group 1 consisted of top/ senior management levels in the organization. Group 2 comprised the middle/lower managers and supervisors and group 3 was the support/ administrative staff who were non-executives all of whom have at least 'A' level academic qualification or equivalent. The analysis used one-way analysis of variance (one-way ANOVA) to determine whether there existed significant difference on perceptions towards innovation. The results were shown in Tables 25 and 26.

From the results above it could be deduced that there was no statistically significant difference in perceptions towards innovation by the three different groups (P>.05).

From the results of ANOVA in Table 26, it can be deduced that the perceptions on organizational creative climate in the organization by the three different groups were not significantly different.

The results from ANOVA analysis in Table 27 revealed that there is no statistically significant difference on the perceptions on organizational learning from the three groups of employees. For the three different ANOVA analyses above, the Levene's test of homogeneity of variance was met.

TABLE 25
ANOVA overall innovation

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		1408.504	2	704.252	1.045	.362
	Linear Term	Unweighted	940.900	1	940.900	1.397	.245
		Weighted	1139.613	1	1139.613	1.691	.201
		Deviation	268.891	1	268.891	.399	.531
Within Groups			24928.871	37	673.753		
Total			26337.375	39			

TABLE 26
ANOVA - overall climate

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		251.174	2	125.587	.469	.630
	Linear Term	Unweighted	5.136	1	5.136	.019	.891
		Weighted	8.485E-02	1	8.485E-02	.000	.986
		Deviation	251.089	1	251.089	.937	.339
Within Groups			9916.426	37	268.012		
Total			10167.600	39			

TABLE 27
ANOVA- overall learning

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		165.803	2	82.901	.279	.758
	Linear Term	Unweighted	36.736	1	36.736	.124	.727
		Weighted	61.039	1	61.039	.206	.653
		Deviation	104.764	1	104.764	.353	.556
Within Groups			10985.972	37	296.918		
Total			11151.775	39			

In answering research question 8, ANOVA and independent sample T-Test were used again. All the analyses revealed no significant differences of the factors on those three perceptions.

DISCUSSIONS AND CONCLUSION

The rapid changes in the global environment is likely to force organizations to constantly innovate by Organizational Development (OD) theory so as to gain sustainable competitive advantage (Hitt *et al.* 1999; Porter 1985; Zheng and Das 2000).To innovate, organizations have to change in various ways and this needs to be done by having certain creative climates to help foster organizational members in facilitating the change efforts (Amabile 1999; Axtel *et al.* 2000; Ekvall *et al.* 1983; Zain and Rickards 1995). To innovate, organization members must also be committed to learning at a faster rate in order to succeed over their competitors in the change process (Argyris and Schon 1978; Drucker 1988; Garvin 1993; Nonaka and Takeuchi 1995; Senge 1990; Watkins and Marsick 1996a). The success of the learning depends on the structure and strategies (Donellon 1996) present in the organizational system which the seven dimensions of a learning organization can cater for.

The findings from the analysis were crucial for exploring the relationship between organizational climates for creativity and learning culture on innovation constructs. Various numbers of practical implications could be drawn from the findings which could be of use for the case organization. For example, one of the findings revealed that the organizational creative climate in this case organization did significantly contribute to predicting innovation among employees with the factors 'Freedom' and 'Liveliness/dynamism' as being good predictors; but the learning culture, particularly one which was related to 'Strategic Leadership' being practised within and outside the case organization concerned, on the other hand, contributed tremendously to the innovation as perceived by the employees of various levels. This could indicate that this case organization when it came to innovation was primarily motivated by the top management more than by the employees down the line.

The findings also implied that other factors from the organizational creative climate with the exception of climate of freedom and a climate liveliness/dynamism should be given more emphasis in future to precipitate the innovation to occur. In addition, the other six learning factors besides "Strategic Leadership" should also be given more attention for similar reasons.

In summary, it can be concluded that for this particular organization, the learning organization dimension of 'Strategic Leadership' had a high predictive power on innovation activities occurring within the organization as compared to the organizational creative climate factors. It could be concluded also that the case organization did to a certain extent inculcate significantly a climate of creativity for the members to innovate and did to a larger extent inculcate a culture of learning among the members.

Further analyses also showed that there were no significant differences in members' perceptions on innovation, creative climate or learning culture from the three job levels: top management, middle management and the staff down the line. This meant that almost all members have the same perception on those ideas.

RECOMMENDATIONS

For innovation to occur at a faster and continuous rate, the presence of creative climate and a learning culture should be encouraged. In

this regard, the organization should be looking into ways of improving its creative climate by: (1) making the climate at work more challenging/motivating which meant getting emotional involvement of the members in the organization's operations and goals; (2) making the climate more open and trustworthy through the presence of emotional safety in relationships; (3) the management giving more time for members to elaborate on new ideas; (4) the members displaying more spontaneity and ease in actions; (5) reducing the presence of emotional tensions (conflicts) during interactions; (6) having the management give more support to new ideas brought up; (7) debating on viewpoints and on ideas forwarded; (8) encouraging members to take risks on opportunities.

Although the learning culture seemed to be contributing substantially towards the innovation in the case organization, the case organization should improve its learning on these areas as well as provide a strong strategic leadership. The areas are (1) giving more emphasis to individual learning so that learning can occur at a continuous basis; (2) by giving emphasis on team learning; (3) by giving emphasis on organizational learning (embedded systems and systems connection) through environment scanning and networking, and capturing learning on the organization systems; (4) by empowering its members; and (5) by encouraging dialogue and inquiry to occur among them.

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APPENDIX 1

Results of POST HOC factor analysis of the innovation construct

	Technological innovation		Organizational innovation
Items	Factor 1	Factor 2	Factor 3
Technological transfer (assimilation)			
1. Absorpcap5	**.790**	.204	.230
2. Absorpcap6	**.728**	.265	.358
3. Absorpcap4	**.727**	.377	.109
4. Absorpcap9	**.723**	.396	.197
5. Absorpcap2	**.722**	.250	.347
6. Absorpcap8	**.715**	9.207E-02	.301
7. Absorpcap10	**.701**	.392	.160
8. Absorpcap3	**.678**	.184	.387
9. Absorpcap7	**.677**	.311	.325
10. Absorpcap14	**.669**	.285	.322
11. Absorpcap11	**.666**	.280	.256
12. Absorpcap1	**.653**	9.702E-02	.416
13. Absorpcap13	**.577**	.486	.323
Diffusion of innovation			
14. Diffussion3	.259	**.786**	.170
15. Diffussion2	3.683E-02	**.780**	9.114E-02
16. Absorpcap17	.136	**.751**	.242
17. Diffussion1	.279	**.744**	.239
18. Absorpcap19	.338	**.642**	.294
19. Absorpcap16	.200	**.624**	.192
20. Diffussion5	.406	**.614**	.346
21. Absorpcap18	.392	**.607**	.238
22. Diffussion4	.379	**.585**	.363
23. Absorpcap12	.402	**.566**	.225
24. Absorpcap15	.436	**.548**	.255
Organizational innovation			
25. ISO2	.284	.264	**.823**
26. ISO3	.308	.216	**.819**
27. ISO1	.283	.305	**.794**
28. ISO7	.271	.209	**.791**
29. ISO6	.384	.201	**.776**
30. ISO8	.317	.277	**.759**
31. ISO4	.277	.349	**.749**
32. ISO5	.333	.437	**.520**
Eigenvalue	17.121	2.284	1.978
Cumulative percent variance	53.502	7.139	6.182

N = 259
Extraction method: Principal component analysis.
Rotation method: Varimax with Kaiser Normalization