Role of Environmental Analysis in Managing Knowledge in Small-and-Medium Sized Enterprises

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***Abstract*—Effectively managing knowledge has become a vital weapon for businesses to survive or to succeed in the increasingly competitive market. But do they perform environmental analysis when managing knowledge? If yes, how is the level and significance? This paper established a conceptual framework covering the basic knowledge management activities (KMA) to examine their contribution towards organizational performance (OP). Environmental analysis (EA) was then investigated from both internal and external aspects, to identify its effects on that contribution. Data was collected from 400 Chinese SMEs by questionnaires. Cronbach's α and factor analysis were conducted. Regression results show that the external analysis presents higher level than internal analysis. However, the internal analysis mediates the effects of external analysis on the KMA-OP relation and plays a more significant role in the relation comparing with the external analysis. Thus, firms shall improve environmental analysis especially the internal analysis to enhance their KM practices.**

***Index Terms*—Knowledge management, environmental analysis, mediating, small and medium sized enterprises.**

I. Introduction

Knowledge is defined as a valuable and potential source of organizational capabilities and competencies for innovations and new product development [1]. Knowledge management (KM) is regarded as a strong enabler for organizations to transform knowledge into business competitive advantage. So far, many studies have empirically proved that KM has significantly influenced organizational performance [2]. And the involved critical factors of KM have also been clearly identified [3]. However, some exogenous factors which beyond KM scope but latent to KM effects are lack of sufficient attention [4].

The latest research from [5] explored the role of knowledge infrastructure capabilities in knowledge management in a single case study "a medium-sized, global Indian IT solutions company". From a qualitative perspective, they found the relevance of knowledge infrastructure capability, a knowledge-sharing culture as well as organizational structure in KM excellence. Azmawani *et al*. [6] through a quantitative research by using questionnaire concluded that individual/managerial skills training and process skills training interact with knowledge management in improving organizational effectiveness.

To distinguish from previous researches, this paper extended KM into a strategic business management atmosphere by absorbing the environmental analysis to investigate the influence of KM on organization performance (OP) through hierarchical multiple regressions (HMR). HMR is conducted by entering variables into the regression equation one by one. Thus, by observing the changing processes and comparing the different induced results, it could initially discover any strengthening or weakening outcomes or latent mechanisms behind the general relationships.

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II. Conceptual Framework and Research Hypothesis

The conceptual base of this study is upon the sense making modules of knowledge management [7]. According to them, the enterprises start business operation by scanning what is currently happening in their organizational environments in order to share a meaningful interpretation that serves as a context. Then, the enterprises practice KM activities through the four modes of intra-subjective, extra-subjective, inter-subjective and generic-subjective [8].

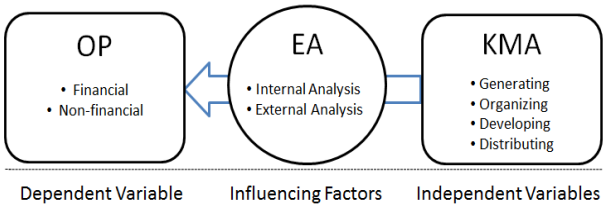

Fig. 1. the Conceptual framework.

The conceptual framework is depicted as in Fig. 1, where the independent variable (IV) is the knowledge management activities (KMA), the dependent variable (DV) is the organization performance (OP) and the environmental analysis (EA) is initial set as an influencing factor.

EA is investigated both externally and internally. External analysis covers globalization, competitor and cooperator; and internal analysis consists of culture, technology and infrastructure. KMA is investigated from knowledge generating process, knowledge organizing process, knowledge developing process and knowledge distributing process. OP is measured from both financial and non-financial aspects, including financial strength, innovation, decision making and customer satisfaction, etc. Accordingly, the research hypothesizes are formulated as follows.

RH1: there is a significant relationship between KMA and OP;

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RH2: there is a significant relationship between EA and OP;

RH3: There is a difference between the effects of KMA on OP and the effects of KMA and EA on OP.

III. Data Collection and Verification

A total of 400 completed questionnaires were collected from invited Chinese SMEs during three-month period. Table I provides the demographic characteristics of all the effective responding samples in terms of the involved industry company ownership, KM working experience and educational level, *etc.*

TABLE I: Profile of Respondents (*N*=400)

	Freq.	Valid(%)
Industry		
Manufacturing	138	34.5
Construction	89	22.2
Service	173	43.3
Total:	400	100
Ownership		
State-owned	23	5.8
Local private	253	63.2
J.V.	89	22.3
Foreign owned	35	8.7
Total:	400	100
Years working in KM		
≤ 2 y	74	18.4
2-≤5 y	272	67.9
5-≤10 y	29	7.3
>10 y	25	6.4
Total:	400	100
Educational Level		
Diploma.	59	14.7
Bachelor	174	43.5
Master	154	38.6
PhD.	13	3.2
Total:	400	100

For those collected data, the sampling adequacy was tested from the Kaiser-Meyer-Olkin (KMO) Measure which indicates the proportion of variance in the variables be caused by underlying factors and the high value of 0.887 (Table II) shows it is good [9]. Meanwhile, the Bartlett's test of sphericity (sig. value 0.00 less than 0.05) also proves that the analysis is significant (Table II).

TABLE II: KMO and Bartlett's Test (*N*=400)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.887
Bartlett's Test of Sphericity	Approx. Chi-Square	2943.387
	df	45.000
	Sig.	.000

In factor analysis, principal component analysis was processed as the extraction method to identify the valid constructs (components) of EA and KMA. Varimax with Kaiser Normalization Rotation that can explain the item's variance was chosen to summarize and reduce data in which redundant items were combined and inappropriate items were extracted if the Varimax value is less than 0.4 [10]. Then, Cronbach's α (alpha) was used to assess the internal consistency or reliability of the constructs of the system [11]. Items with Cronbach's α value greater than 0.7, indicate that internal consistency is guaranteed for the measurement index.

The judgment scores for the importance/preference of criteria of this study are based on Likert scale, with the rating from 1,2,3,4 to 5. Table III summarized the factor structure of the involved variables, where reliability is significant because Cronbach's alpha value of each variable is greater than 0.70, and Varimax values of all constructs are greater than 0.4. Additionally, the mean of External Analysis (3.08) is higher than that of Internal Analysis (2.95), which suggests that the SMEs perform external analysis better than internal analysis.

TABLE III: Factor Structure of Independent Variables (*N*=400)

IV	Cron. α	mean	Item	VarMax Value	Item No.
			I1: Glo.	0.955	2
Ext.A	0.715	3.08	I2: Cmp.	0.632	2
			I3: Cop.	0.792	5
			I4: Cul.	0.849	3
Int.A	0.915	2.95	I5: Tech.	0.829	3
			I6: Infra.	0.650	4
			I7: Gen.	0.801	4
KMA	0.936	2.54	I8: OD.	0.855	3
			I9: Dstr.	0.849	3

IV. Results and Discussion

A. Pearson's Correlation

TABLE IV: Correlations between the Involved Variables

		KMA	OP
External Analysis	Pearson Correlation	.663**	.605**
	Sig. (2-tailed)	.000	.000
	N	400	400
Internal Analysis	Pearson Correlation	.848**	.753**
	Sig. (2-tailed)	.000	.000
	N	400	400
EA	Pearson Correlation	.802**	.721**
	Sig. (2-tailed)	.000	.000
	N	400	400
KMA	Pearson Correlation		.738**
	Sig. (2-tailed)		.000
	N		400

*significant level of 95% ** significant level of 99%

The correlation results are shown in Table IV. Between IV and DV, the Pearson's correlation coefficients of External Analysis and OP (.605), Internal Analysis and OP (.753), EA and OP (.721) and KMA and OP (.738) are all within the

practically acceptable association range of 0.3-0.8. Moreover, it can be seen that each of two variables are highly significantly related (at a 99% level). Within the independent variables, the correlations between External analysis and KMA (.663) and between EA and KMA (.802) are also within or around the range; only the correlation between Internal analysis and KMA (.848) is a little far beyond the range, which sheds a shadow of higher probability of multicollinearity (clarified later). And fortunately, all these coefficients are also highly significantly related at a level of 99%.

B. Regression of EA, KMA and OP

A series of regression analysis was conducted to verify the afore-formulated hypothesis. Table V summarizes the regression results on OP from EA and KMA. In Model No.1, KMA is set as the independent variable. R-squared is 0.544, which means nearly 55% of the variance of the OP is explained by the independent variables and Sig F. Change .000 shows that under the significant level of 0.01, the regression result of the Model No. 1 is robust. Thus, KMA could be regarded as the Granger Causality towards OP. Moreover, the coefficient of KMA (.508) is positive and highly significant (Sig.= .000) which means KMA and OP are positively and significantly related. Thus, RH1 is verified.

TABLE V: RELATIONSHIPS OF EA, KMA AND OP

Model		Coefficients[a]				Fitness		
		B	Std. Error	t	Sig.	R2	Sig. F. Change	Durbin-Watson
1	(Constant)	1.569	.061	25.645	.000	.544	.000	1.908
	KMA	.508	.023	21.811	.000			
2	(Constant)	1.234	.080	15.428	.000	.519	.000	1.786
	EA	.539	.026	20.734	.000			
3	(Constant)	1.261	.074	17.057	.000	.591	.000	1.864
	KMA	.309	.037	8.347	.000			
	EA	.270	.040	6.722	.000			

In Model No.2, EA is set as the independent variable, which explains nearly 52% (R-squared .519) of the variance of the OP and the regression is also robust wigh Sig F. Change .000. Thus, EA could be regarded as the Granger Causality towards OP. Similar to Model No. 1 case, the coefficient of EA (.539) is positive and highly significant (Sig.= .000). Thus, EA and OP are positively and significantly related, which verifies RH2.

In Model No.3, both EA and KMA are set as the independent variables and the regression result is robust (Sig F. Change .000). Comparing with Model No. 1, R-squared 0.591 is somewhat higher, which means there is a difference between the effects of KMA on OP and the effects of KMA and EA on OP. Thus, RH3 is verified. Furthermore, the coefficients of both EA (.270) and KMA (.309) are significant and both positively contribute to OP with a higher strength from KMA (.309 > .270).

C. Regression of External Analysis, Internal Analysis, KMA and OP

To explore the different functions of External Analysis and Internal Analysis, another series of regression analysis was conducted with results demonstrated in Table VI. In Model No.4, OP was regressed from both KMA and Internal Analysis. Model No.5 replaced Internal Analysis with External Analysis, together with KMA as Independent variables. Model No. 6 included both External and internal analysis as independent variables besides KMA. If comparing the obtained three R-squared, it is shown that Model No. 5 (.568) has the lowest fitness while Model No. 4 (.602) and Model No.6 (.603) are similar in fitness level. In Model No.4 and No.5 respectively, the coefficients of internal analysis (.301) and external analysis (.157) are significant; while in Model No.6, the coefficient of internal analysis (.285) is significant but the coefficient of external analysis (.022) is insignificant at all. It indicates that the effects of external analysis on OP are fully mediated by internal analysis. In other words, external analysis contributes to OP through the functioning of internal analysis. Additionally, in Model No.4, both KMA (.243) and Internal analysis (.301) significantly and positively contribute to OP with different strengths which clarifies the doubt of multicollinearity.

TABLE VI: RELATIONSHIPS OF EXTERNAL ANALYSIS, INTERNAL ANALYSIS, KMA AND OP

Model		Coefficients[a]				Fitness		
		B	Std. Error	t	Sig.	R2	Sig. F. Change	Durbin-Watson
4	(Constant)	1.355	.064	21.236	.000	.602	.000	1.817
	KMA	.243	.041	5.921	.000			
	Internal A	.301	.040	7.605	.000			
5	(Constant)	1.326	.079	16.798	.000	.568	.000	1.902
	KMA	.413	.030	13.642	.000			
	External A	.157	.033	4.701	.000			
6	(Constant)	1.332	.076	17.560	.000	.603	.000	1.821
	KMA	.244	.041	5.930	.000			
	Internal A	.285	.049	5.841	.000			
	External A	.022	.039	.561	.575			

V. CONCLUSION

To sum up, this paper attempted to identify the role of environmental analysis in managing knowledge during SMEs' business operation. The empirical results proved that analyzing environment before operating knowledge management activities is beneficial to the organization's performance. Comparing with external analysis although which is conducted better, the internal analysis mediates the effects of external analysis on the KM-OP relation and plays a more significant role in the KMA-OP relation. It suggests firms to improve environmental analysis especially the internal analysis to enhance their KM practices and organizational performance.

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