

## Virtual 실행공동체의 진단 방법론 개발\*

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### Developing the Methodology for Diagnosing Virtual Community of Practice

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#### ■ Abstract ■

Much of knowledge that can retain a company's competitive advantage remains within the organization. However, identifying, finding and leveraging knowledge in an organization is still problematic [17]. Although knowledge is the key to success, it is simply too valuable to be left in an organization [59]. The CoP (Community of Practice) within an organization is a practical way to manage knowledge in an organization as systematically as other critical assets in order to deploy and share it [59]. However, research related with CoP, has focused on the value of CoP. Therefore, we developed not only a holistic and systematic method for understanding and assessing the current position of CoP but also a method for extracting the core strategies and CSFs of CoP based on performance evaluation.

We developed strategies, CSF (Critical Success Factor) and PM (Performance Measure)s of CoP based on BSC (Balanced Scorecard) process. Specifically, CSFs and strategies of CoP were extracted based on maturity model and type of CoP. According to the procedure from the methodology to evaluate the performance of CoP, three different industrial cases were adopted to validate the evaluation methodology.

Keywords : Community of Practice, Balanced Scorecard, Performance Evaluation, Performance Measure

논문접수일 : 2012년 01월 26일    논문수정일 : 2012년 02월 08일    논문게재확정일 : 2012년 02월 29일

\* This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government(NRF-2011-332-B00084).

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## 1. Introduction

Identifying, finding and leveraging that knowledge is still problematic [17]. Organizations should deploy, share, recreate and spread their knowledge to sustain a competitive advantage. Cultivating Communities of Practice (CoP) within an organization is a practical way to manage knowledge in an organization systematically as with other critical assets to deploy and share it [59].

The term CoP was coined by Lave and Wenger [57] to explain an activity system that includes individuals who are united in their actions and are aware of the meaning that the action has for them and for the larger collective. CoP involves groups of people who share a passion for something that they know how to do, and who interact regularly in order to learn how to do it better.

Completed research relating to a performance measures (PMs) of CoP, has been limited so far. The availability of the right information at the right time based on PMs has become critical [3]. It is essential to improve the management and planning of a firm's service based on PMs, because "what you measure is what you get" [1].

The PMs are tools for yielding information about the status of CoP [52]. The PMs are a way of learning what works and what does not. Furthermore, organizations focus on the critical points of CoP to sharing and creating knowledge based on PMs. PMs provide the manager of CoP with targets to serve and feedback on implementation, implementation success assessment, and the derivation of lessons for future implementation.

Therefore, we identified not only the method for extracting core strategies and CSF (Critical Success Factor)s of CoP but also the holistic and systematic PMs of CoP. Our research aims to identify

a critical strategy and CSFs for improving the performance of CoP based on our methodology. Furthermore, according to the CSFs and PMs for evaluating the performance of CoP, an industrial case is adapted to validate the evaluation methodology.

The remainder of this research is organized as follows. First, in section 2 we present a literature review of the PMs in CoP fields. The proposed methodology will be illustrated through sections 3. Then, the methodology is validated by applying it to a real industrial case study in section 4. Finally, we conclude our study with a look at emerging issues in CoP.

## 2. Literature Review

### 2.1 CoP

A CoP is defined as an informal structure of groups that share a common work environment [58]. By working together, members of a CoP share their concerns, problems or passion about specific topics to cultivate their knowledge and expertise. CoP activities facilitate mutual trust among CoP members based on social capital: connections, relationships and common context. Consequently, knowledge sharing activities in a CoP, create and sustain a competitive advantage for an organization.

As the importance of CoP activities increase, organizations align their CoP activity with organizational strategy and as a consequence, the need to assess the current status of CoP is also increasing. Several research groups have suggested general guidelines for CoP. These guidelines were proposed without assessing the current status of a CoP and are only useful when determining an organization's CoP philosophy.

CoP has played an important role in IBM, 3M,

Xerox, Cisco and Dell [14]. The value of CoP is as an organizational tool for stimulating innovation, sharing knowledge, promoting problem solving skills and accumulating organizational knowledge [14]. Research relating to the benefits of CoP has been carried out using various case study and analysis tools. Furthermore, many organizations have supported the research by opening off-line meetings, constructing on-line communities and completing other activities for cultivating CoPs [58].

## 2.2 Method for Identifying the Main CSFs

The research for identifying the main CSFs can be classified into several subject groups as shown <Table 1>. However, the methodologies for identifying the CSFs in the previous research do not consider the characteristics of CoP. Furthermore, the previous research did not suggest the detailed method to extract CSFs. Therefore, this research suggests the method for identifying CSFs of CoP based on the maturity model of CoP and the type of CoP.

## 2.3 PMS in CoP

There has been a lot of research carried out in the Knowledge Management (KM) field. In contrast, in the CoP field, little research for extracting PMS has been done.

Chu et al. [15, 16] used the non-additive fuzzy integral to develop a framework for CoP performance assessment. Cross et al. [19] identified information and knowledge flow in CoP based on social network analysis. Verburg and Andriessen [56] hypothesized that mutual trust and a common identity are crucial for creating the willingness to share knowledge and develop innovative ideas, and also that measurement of cognitive distance is effective for assessment of CoP. One of the most famous CoP experts, McDermott [40], tried to draw meaning from the PMS of CoP. Smits and Moor [63] outlined an approach to develop key performance indicators and metrics for KM in CoP. Jeon [26] suggested method for extracting PMS based on BSC. Jeon [26] developed perspectives of BSC models for assessing the performance of CoP. Yoo and Lee [64] sug-

<Table 1> Research on Method for Identifying the Main CSFs

Method	Tool	Research
CSFs Method	Extracting CSFs based on strategies	Brotherton and Shaw [7], Boynton and Zmud [5], Butler and Fitzgerald [9], Guynes and Vaneck [25], Raghunathan et al. [46], Repiso et al. [47], Rockart [48] Salmela and Spil [49], Xue et al. [60]
Balanced Score Card (BSC)	Cause and effect relationships	Bremser and White [6], Cebeci [11], Fuglseth and Grønhaug [20], Kaplan and Norton [32], Kim et al. [33], Martinsons et al. [37], Olve et al. [43], Papalexandris et al. [45], Sohn et al. [51]
Various Case Studies	Empirical study	Chen et al. [12], Gongla et al. [21], Jeon and Kim [26], McDermott [40], Verburg and Andriessen [56], Wenger [57], Wenger et al. [58]
Literature Review	Extracting CSFs based on perspectives	Chu et al. [15], Chen et al. [12], Cheng et al. [13], Chu et al. [16], Oh et al. [42], Teng et al. [54], Yüksela and Dagdeviren [61]
CSFs Method and BSC	Extracting CSFs based on strategies and validating CSFs based on cause and effect relationship	Bremser and White [6], Veen-Dirks and Wijn [55]

gested criteria for evaluating the performance of CoP. However, in these studies, only various methods for evaluating performance of CoP were only applied. They did not develop a specific method for extracting CSFs and PMs of CoP.

## 2.4 Usefulness of BSC

Kaplan and Norton [27] created the BSC to address some of these deficiencies and have expanded the tool to measure strategy. The BSC aims to predict future financial performance and track how effectively the corporate strategy is executed.

Until now, various methodologies for extracting PMs have been introduced to solve complicated

problems in many research and industrial areas, but each method has its own characteristics which are suited to a specific area. From the options available, the model which can be used to represent an entire organization can be selected using the comparisons shown in <Table 2>.

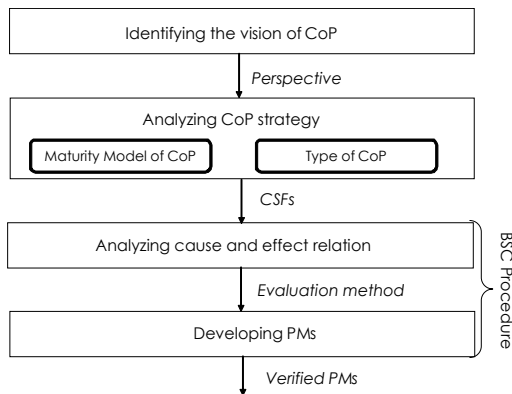
## 3. Methodology for extracting PMs of CoP

<Figure 1> illustrates the phases for extracting PMs from CoP. The strategies are identified according to the maturity model and type of CoP. PMs are extracted based on the BSC framework.

<Table 2> Comparison of Performance Measuring Systems (Oh et al. [42], Reconstructed)

Performance measurement system	Decomposition link expression	Performance expression nature
Strategic Measurement Analysis and Reporting Technique	Pyramid with three levels : corporate strategy, business unit, business operating system	Financial measures
Performance Measurement Matrix	Matrix with four dimensions : cost/non-cost internal/external	Physical measures
Results and Determinants Framework	Along six dimensions	Physical measures
Zulch framework	Along four dimensions : lead time, due date dependability, utilization, work in progress	Performance evaluations
Strathclyde's PMS model	Weighted criterion tree obtained from cognitive maps and AHP method	Performance evaluations
Integrated Dynamic Performance Measurement System	Along three functional areas : management, factory shop flow and process improvement teams	Physical measures and PMs
Cambridge Performance Measurement System Design Process	Criterion tree	Physical measures and PMs
European Network for Advanced Performance Studies (ENAPS)	Three-level criterion tree : enterprise level, process level and functional level	Physical measure and PMs
Process Performance Measurement System	Along five dimensions : financial, customer, employee, societal, innovation	PMs
Balanced Scorecards	By levels with criterion weights along four axis : finance, internal business, customer, innovation Lagging and driving indicator	Physical measures and PMs or evaluations

PMs taking into account the multidimensional aspect of CoP can be developed based on The methodology for extracting PMs shown above. First, we identify vision. Second, we analyze the CoP strategy based on the maturity model and the type of CoP on finding CSFs. Then, we analyze the cause and effect relationships among CoP initiatives and CSFs. The purpose of this phase is to ensure the internal consistency of the BSC model. Then, based on CSFs and the evaluation method, we develop PMs.



<Figure 1> The Methodology for Extracting PMs

### 3.1 Identifying the Vision of CoP

It is essential to identify the vision of a company appropriately, because the BSC is based on a shared comprehensive vision [27]. Since BSC will give the organization a stronger focus than before, a clear vision is extremely important. A vision is a challenging and imaginative picture of the future role and objectives of an organization [43]. We determine the vision of CoP, by relying on results from interviews and literature.

### 3.2 Analyzing CoP Strategy

The strategies for achieving the vision of CoP

are analyzed based on maturity models and classifications of CoP. Three or four CSFs were identified for each perspective [43].

To extract CSFs for consideration of various aspects and types of CoP, the maturity model and classification model of CoP are investigated. Based on the maturity model, CSFs of each stage are identified. Furthermore, specific CSFs are identified based on types of CoP. For performance evaluation, CSFs extracted based on maturity model are almost always used, and then specific CSFs extracted based on the classification of CoP are added by types of CoP in an organization.

#### 3.2.1 CSFs extracted based on maturity model

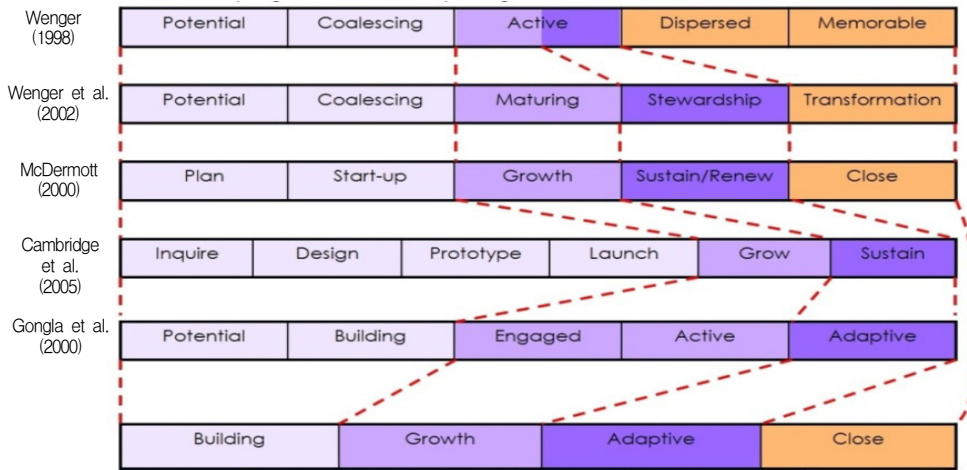
CoP operators need to understand the current strategy. In order to do this, they need visible and quantifiable CSFs for performance evaluation [50]. However, it is very difficult to extract strategies and CSFs of CoP, because the intangible nature of knowledge itself forced some practitioners to assume that the factors would also be intangible [2]. Therefore, strategies and CSFs are extracted based on the maturity model of CoP.

The CoPs maturity stages and characteristics are identified based on a literature review. The CoPs maturity stages can be deduced as shown in <Figure 2>. Five CoPs development models are synthesized and are re-categorized into a new model based on character similarities. In the new model, the four stages are defined and each one is explained in detail.

<Table 3> illustrates strategies and CSFs of CoP. Each strategies and CSFs extracted according to on the maturity model.

#### 3.2.2 Types of CoP

It is difficult to identify the correct types of CoP



<Figure 2> The CoPs Maturity Stages Model

<Table 3> Strategies and CSFs of CoP

Stage	Strategies	CSFs
Building	Creating initiative	Determining the primary intent of the community [10, 58] Defining the domain and identifying issues [58]
	Constructing organizing structure	Interviewing potential members and thought leaders [10, 39] Creating a preliminary design for the community [39, 58] Getting appropriate number of members [10]
	Making a rhythm for CoP	Building regular contacting (1-1 or in community events) [39] Engaging senior managers [39, 58]
Growth	Sharing knowledge actively [58]	Supporting tacit knowledge exchange [21] Developing and disseminating communications [21] Building knowledge repository [58]
	Strengthening individual capacity	Routinizing entry requirements and processes [39, 58] Applying knowledge of CoP to real case of organization [21]
	Consolidating membership	Create a mentorship program [39] Constructing systematic communication systems [21]
Adaptive	Activating knowledge creation	Developing best practices [39] Exchanging tacit knowledge according to off-line meeting [57]
	Extending human network	Recruiting actively new people to the core group [58] Developing new leadership [58] Seeking relationships and benchmarks outside the organization [58] Holding joint meetings with other communities [39] Using outside expert [57]
	Focusing innovation	Developing advanced boundary processes [21] Identifying new technology [10, 39] Creating innovative knowledge [57]
Close	Transforming	Turning into a social club [39, 58] Focusing slowly shifted from IT issues to organizational ones, and then to their personal lives [58] Splitting into distinct communities or merge with others [58] Becoming institutionalized or become actual departments in the organization [58]

because their characteristics of CoP differ according to culture, structure, types of business and scale of organization. Each organization in Korea has a specific structure, specific objective and different organizational support for CoP. All organizations have a particular CoP for achieving each goal of an organization through CoP. Therefore, based on interviews with directors managing CoP in organizations and a literature review most of suitable types of CoP can be identified.

CoP is classified into informal CoP, sponsored CoP or strategic CoP according to objective, membership, sponsorship, development process and organization support. In informal CoP, members in an organization participate in CoP by free will for by a shared common interest. However, in formal CoP, each member in an organization participates in a specific CoP as assigned. The goal of formal CoP is connected to the purpose of an organization. Therefore, in this case an organization strongly supports the use of CoP for solving organizational

problems or constructing knowledge and the ability of core competency in an organization. In strategic CoP, the employee becomes a member by application of CoP according to rules. A grid of the characteristics according to type of CoP is shown in <Table 4>.

The CSFs of CoP are differentiated according to their CoP types. Based on the literature review and interviews with a company director managing CoP, different CSFs according to CoP types can be generated.

### 3.3 Analyzing the Cause and Effect Relationship

It has been emphasized that we should seek a proper balance between performance drivers and outcome measures. In other words, we need a balance between strategy and CSFs which describe what we do and the effects achieved. The cause and effect relationship is easiest way to see whether

<Table 4> Types of CoP (Jeon and Kim [26] Reconstructed)

Characteristics	Informal CoP	Formal CoP	
		Sponsored CoP	Strategic CoP
Objective	Sharing common interest between members to do same work	Constructing knowledge and ability of core competency in organization	Solving organization problems by specialist and member of CoP
Membership	Participating by free will or invited by colleague	Participating by free will or invited by director	By director of CoP according to rule
Sponsorship	nothing	mostly manager	mostly CEO
Development process	naturally	Direction which sponsor and member agree	Organizational goal
Organization support	Friendly circumstance Information system	Providing sources need to activity of CoP Providing differential assistant tools for activation	Sufficient assistance as formal division Drawing up budget by business plan
Organization	GS Caltex, LG CNS	Samsung SDS, Samsung Life Insurance, KT	Daewoong Pharm., SK Energy, POSCO, Korea Financial Telecommunications and Clearings Institute

〈Table 5〉 CSFs of CoP According to CoP Types2

CoP Types	Strategies	CSFs
Informal CoP	Constructing learning organization	Organizational culture for sharing and creating knowledge [35] Making informal environments by assistance of knowledge, people, organizational process and infra system [39]
	Understanding importance of knowledge	Opening a dialogue between inside and outside perspectives [57] Understanding of knowledge in organization [57]
Sponsored CoP	Making event for sharing best practice	Knowledge sharing in CoPs to serve personal learning, finding experts or developing best practices for the company [56]
	Strategic support of IT	Using communication tools for exchanging knowledge [39] Providing learning method and created for achieving a specific work [57]
Strategic CoP	Being useful to understanding collaboration, knowledge application and cooperative learning	CEO will for cultivating CoP [8, 44]
	Connecting performance evaluation in organization and activities of CoP	CoPs supported and evaluated by organization [34, 53]
	Focusing operation of organization	Innovating process and constructing standardized process of operation [34] Studying and sharing standardized process of operation for effective situated learning [44]

the different perspectives naturally relate to each other. Therefore, we analyze the cause and effect relationship between perspectives and CSFs of CoP. The purpose of this phase is to ensure the internal consistency of the BSC model.

It is absolute that the knowledge creating in organization depends on knowledge sharing, CoP process and organizational culture. To share knowledge effectively, enough knowledge, supporting activity and trust of member is essential. Furthermore, culture of organization is the basis of all perspectives, because all operation is accomplished based on member of organization. To develop advanced standardized processes, the innovative knowledge and best practice must be developed. In view of knowledge management, exchanging tacit knowledge is based on mentorship program, off-line meeting and communications between members of CoP. Regular meeting in CoP is affected by

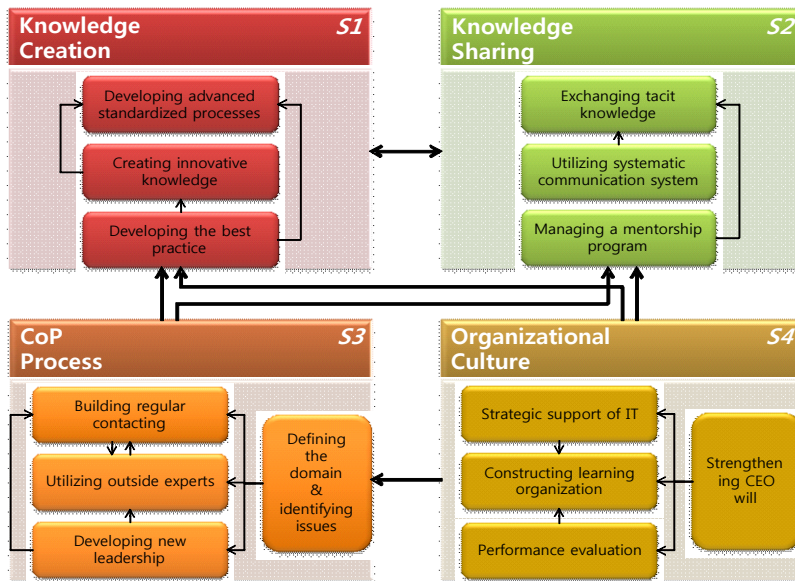
clearness of topic in CoP, inviting outside experts or recruiting new member. For constructing learning organization, IT support, CEO will and efforts to relate activities of CoP to performance evaluation are necessary. With influence among the perspectives and CSFs, the cause and effect relationship can be derived in <Figure 3>.

It is natural to consider changing the number of perspectives or areas of focus [43]. A traditional BSC has four perspectives : financial, customer, internal process, learning and growth. The traditional four perspectives are revised based on the cause and effect relationship to include CSFs and perspectives of CoP. As <Table 6> shows, we revise the BSC original perspectives.

### 3.4 Developing PMs

The BSC should be viewed as an instrument for





<Figure 3> Cause and Effect Relationship Diagram of CoP

<Table 6> The General BSC VS the BSC of CoP3

General BSC	Focus	BSC of CoP	Focus
Financial	Delivering value to our shareholders	Knowledge Assets	Creating knowledge in CoP
Customer	Delivering value to our customer	Knowledge Sharing	Improving knowledge sharing activity
Internal Process	Promoting efficiency and effectiveness in our business process	CoP Process	Cultivating activity of CoP
Learning and Growth	Sustaining our innovation and change capabilities	Organizational Culture	Supporting CoP process through continuous improvement

translating an abstract vision and strategy into specific measures and goals [29, 30]. The vision of CoP is translated into tangible terms of CSFs and strategy. In this phase, the PMs were developed based on the CSFs.

## 4. Case Study

The methodology of this paper is applied to the CoP management strategy of three different companies that are in different business areas to validate the flexibility of the proposed methodology. To

illustrate the applicability of this research, a survey was conducted on managers of CoPs in various companies according to the proposed methodology.

### 4.1 Case Study of Strategic CoP (Company P)

Company P is one of the most competitive companies in the steel industry. Company P produces various products such as hot rolled steel, cold rolled steel and steel plates. The sales revenue of Company P amounts to more than 21 billion and the number of employees exceeds 17,000. The strategic goal of this company is to become a global steel

leader ranked among the world's big 3.

In Company P, CoP consists of a CoP leader and participants. In general, Each CoP leader is a Black Belt or Master Black Belt and most of the CoP participants are Green Belts. Basically they don't lose the knowledge exchange function of CoP. Each CoP has their own list for Six Sigma projects such as waste from their process or ideas for process improvements. From this list, CoP members choose which options would be able to be the next Six Sigma project. After deciding on a Six Sigma project, they exchange their ideas for this project via an online CoP support system. Their knowledge exchange results are stored in the system and therefore every member can follow up on the progress of the project. The Six Sigma project cycle follows the DMAIC method. The CoP leader decides when to go to the next step, when the previous step has been sufficiently discussed. Company P simplifies the Six Sigma method although the DMAIC method remains in use. Instead, Company P employs the format of Six Sigma project reporting.

Furthermore, knowledge related with operation is discussed and stored by member of CoP. Mostly CEO or factory manager controlled strategic CoP in Company P for accomplishing knowledge management and QSS. The member of team for execute the alike operation should join the specific CoP recommended by senior manager. Almost CoPs in Company P are supported by organization and their purpose is almost related with organizational goal. Therefore, CoP in Company P is classified into strategic CoP in formal CoP. Because of strategic CoP, PMs in <Table 7> are utilized for evaluating the performance of CoP. Assessment express that the CSFs of 'Building regular contacting' should be concentrated. And CoP of company P has been op-

erated very well.

#### 4.2 Case Study of Strategic CoP (Company K)

Company K is an institution in charge of operating diversified easy-to-use payment services for bank's members and customers through the establishment of a payment system serving as the core infrastructure for the Korean financial industry.

The knowledge management system for Company K was constructed in 2002 and converted into a portal service system in 2004. CoPs activities were launched in 2006. It has a total of 196 CoPs, which consist of 127 job practice CoPs, 10 project CoPs, 32 learning and research CoPs and 27 special interest groups. They register about 57 cases on average per employee and per year. The purpose of some CoP is the construction of knowledge and development of the core competency of the organization. Participants mostly volunteer to join CoP when encouraged by their manager. The manager of CoP makes events to share best practice examples and supports on-line activities based on knowledge management systems and IT. All member of CoP understand that collaboration, knowledge application and cooperative learning are very useful to accomplish operation. Almost managers of CoP need to connect performance evaluation in organization and activities of CoP. The purpose of about 2/3 CoP is solving organization problems by specialist and member of CoP. The member of specific CoP is almost specific team member authorized by manager of team. Therefore, Company K is classified into strategic CoP. Because of strategic CoP, PMs in <Table 7> are utilized for evaluating the performance of CoP. According to assessment of Company K, the CSFs of 'CEO will for cultivating CoP' and 'Utilizing systematic communication systems' should

〈Table 7〉 Perspective, CSFs and PMs of CoP 4

Perspectives	CSFs	PMs
Knowledge creation	Developing advanced standardized processes	Number of advanced standardized process in KMS per a month Number of process innovation suggested by CoP member per a month
	Creating innovative knowledge	Number of innovative knowledge in knowledge base Satisfaction level about innovative knowledge registered in KMS
	Developing best practices	Number of best practices in knowledge base Satisfaction level of best practice
Knowledge sharing	Exchanging tacit knowledge in off-line meeting	Number of off-line meeting per a month Satisfaction Level of knowledge sharing in off-line meeting
	Managing a mentorship program	Level of knowledge sharing between beginner and senior manager Number of beginner/Number of senior manager in CoP Level of improving individual capacity
	Utilizing systematic communication systems	Average number of login in on-line CoP per a week Average hours to on-line CoP per a week
CoP Process	Defining the domain and identifying issues	Clearness level of the primary purpose of CoP Number of members
	Building regular contacting (1-1 or in community events)	Average number of event per a year A mount of money for supporting activities of CoP
	Developing new leadership	Number of member that recruited to CoP
	Utilizing outside expert	Number of outside expert Number of meeting outside experts Cost of systematic support for outside communication
Organizational culture	Strengthening CEO will for cultivating CoP	A mount of money for incentive Engagement level of senior managers
	Constructing learning organization	Satisfaction level of facilitator Trust level about another member in CoP Motivation index
	Strategic support of IT	Supporting level of on-line system Satisfaction level about communication tool and KMS
	Performance evaluation	Level of reflecting activities of CoP in performance evaluation

be focused for cultivating CoP activities.

#### 4.3 Case Study of Sponsored CoP (Company O)

Company O, the biggest traditional telecom company in Korea, has prepared a wireless broadband service called WIBRO which was recently launched to market, and a new converged network BeN that can put merge wireless and wired networks.

Company O constructed KMS in 1999, and KMS had been utilized marketing and R&D fields. Since 2002, Company O implement master plan, operation standard, manual of individual operation for creating and sharing knowledge effectively. The objectives of CoP in Company O are sharing the knowledge in entire organization and encouraging communication between member of employee. For achieving these objevises, Company O constructed 54 study groups having 1873 members, 316 knowl-

edge sharing conference having 25695 members and 2 K-Café having 4856. Master of each CoP is almost senior manager or master of knowledge evaluation. Company O made the best member of CoP and the best practice, and then these knowledge was shared by CoP. IT support for on-line communication and finding expert is constructed for finding knowledge and member having specific knowledge.

The objectives of CoP in Company O is managing knowledge and ability of core competency in Company O. The member of CoP can participate any CoP freely and sometimes director of CoP invites member. The managers of CoP is almost senior manager or facilitators. To cultivate CoP, or-

ganization provide sources need to activity of CoP and differential assistant tools for activation. Therefore, Company O is classified into sponsored CoP. Because of sponsored CoP, PMs in <Table 8> are utilized for evaluating the performance of CoP. The CoP of Company O has been not focused. Therefore, assessment informs that CoP activities have been not controlled for five years. So, managers should make new policies for cultivating CoP.

### 5. Conclusions and Future Research

The CoP within an organization is a practical way to manage knowledge in an organization as

<Table 8> Perspective, CSFs and PMs of CoP

Perspectives	CSFs	PMs
Knowledge creation	Creating innovative knowledge	Number of innovative knowledge in knowledge base Satisfaction level about innovative knowledge registered in KMS
	Developing best practices	Number of best practices in knowledge base Satisfaction level of best practice
	Exchanging tacit knowledge in off-line meeting	Number of off-line meeting per a month Satisfaction Level of knowledge sharing in off-line meeting
Knowledge sharing	Managing a mentorship program	Level of knowledge sharing between beginner and senior manager Number of beginner /Number of senior manger in CoP Level of improving individual capacity
	Utilizing systematic communication systems	Average number of login in on-line CoP per a week Average hours to on-line CoP per a week
	Defining the domain and identifying issues	Clearness level of the primary purpose of CoP Number of members
CoP Process	Building regular contacting (1-1 or in community events)	Average number of event per a year A mount of money for supporting activities of CoP
	Developing new leadership	Number of member that recruited to CoP
	Utilizing outside expert	Number of outside expert Number of meeting outside experts Cost of systematic support for outside communication
Organizational culture	Constructing learning organization	Satisfaction level of facilitator Trust level about another member in CoP Motivation index
	Strategic support of IT	Supporting level of on-line system Satisfaction level about communication tool and KMS

systematically as other critical assets in order to deploy and share it [59]. However, research related with CoP, has focused on the value of CoP. Therefore, we developed not only a holistic and systematic method for understanding and assessing the current position of CoP but also a method for extracting the core strategies and CSFs of CoP based on performance evaluation.

We developed strategies, CSF and PMs of CoP based on BSC process. Specifically, CSFs and strategies of CoP were extracted based on maturity model and type of CoP. Based on an interview with the director managing CoP in 7 organizations and a literature review, almost all of the suitable types of CoP were determined.

According to the procedure from the methodology to evaluate the performance of CoP, an industrial case was adopted to validate the evaluation methodology. Data of each phase in the methodology was collected based on three steps : literature review, interview with an industrial a CoP field manager and a questionnaire.

This research delivered holistic, logical, and comprehensive CSFs and PMs for cultivating CoPs. To extract CSFs for consideration of various aspects and types of CoP, the maturity model and classification model of CoP are investigated. Based on the maturity model, CSFs of each stage are identified. Furthermore, specific CSFs are identified based on types of CoP. And then specific CSFs extracted based on the classification of CoP are added by types of CoP in an organization. These CSFs delivers the milestones for cultivating the CoP according to the type of CoP. An Organizations focus on the critical points of CoP to sharing and creating knowledge based on PMs. PMs provide the manager of CoP with targets to serve and feedback on implementation, implementation success assess-

ment, and the derivation of lessons for future implementation. Furthermore, The PMs for evaluating CSFs of CoP are tools for yielding information about the status of CoP [52]. The PMs are a way of learning what works and what does not.

However, the feasibility of the proposed methodology is be verified by adaption of CoPs of more organization in different fields.

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