The Process, Capability and Mechanism of Knowledge Integration

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Abstract. Knowledge integration is the ability for firms to analyze, integrate and reconstruct existing knowledge, external technology and customer knowledge through systematic and social mechanisms. Dominant research mainly examines the process, capability and mechanism of knowledge integration. Knowledge integration process includes knowledge mining, knowledge transfer and knowledge fusion. Knowledge integration capability can be measured by systematic ability, cooperation ability and socialization ability. Knowledge integration mechanism includes such four mechanisms as rules and instructions, sorting, organizational routine, team problem-solving and decision-making.

Introduction

Knowledge integration is a complex process, which needs to identify, absorb, merge, reorganize and apply knowledge. Knowledge integration involves a large number of practice models, needing to integrate a lot of routines and institutions, such as information sharing meetings, project analysis, project review, external expert advice. The essence of knowledge integration is not a simple accumulation or merger of knowledge stock, but through the exchange of members of the organization interaction, processing and restructuring produce qualitative change, the creation of new knowledge or the formation of knowledge systems. Therefore, this study defines knowledge integration as the ability to analyze, integrate and reconstruct existing knowledge, external technology and customer knowledge through systematic and social mechanisms.

Knowledge Integration Process

Huang and Newell [1] studied the process and dynamic characteristics of knowledge integration in the implementation of cross-functional team projects, and concluded that knowledge integration is not only the treatment of knowledge, but also the process of team coordination and value reconstruction. Its essence is that the members of the organization continue to build, express, re-define the collective belief in the process of collaboration and interaction. The level of communication and coordination affects the efficiency and scope of knowledge integration. The previous integration experience and social capital play a key role in the level of communication and coordination.

Wei et al. [2] studied the process of knowledge integration in independent technological innovation, and divided knowledge integration into five processes: ignorance, perception and description, control and interpretation, omniscience, diffusion. At the ignorance stage, R & D personnel are basically in the beginning of the state of ignorance for the new development of a given task. R & D organizations and personnel often use a variety of channels to collect a large amount of information, especially professional knowledge, as much as possible to expand the knowledge contact surface to prepare for the next phase of integration. At the perception and description stage, through the collection of relevant information and knowledge contact, R & D staff has a certain understanding of R & D tasks and idea, began to use a series of symbols, numbers and text to describe and express each point innovative ideas and insights. This is a process of unknowing transition to knowledge and description and exploration, and the result is a direct increase in organizational knowledge. In the process, such
things will happen as converting tacit knowledge into explicit knowledge, the tacit knowledge transfer among the R & D personnel and so on.

At the control and interpretation stage, on the basis of perception and description, R & D personnel begins to experiment and test, trying to change and control the development of the project or product. R & D personnel not only know the correlation and change of each factor, but also know the influencing factors of each factor, explain the different data and results, and analyze the data, results and parameters of these records. Except that, they need to find the theoretical basis for the explanation, with theoretical knowledge to guide the next step. At the omniscient stage, this phase refers to the state that R & D personnel have mastered all the relevant causal relationship, can be very comprehensive to predict and control the development process and results. At the diffusion phase, after omniscient stage, new products, new technologies are launched for the first time into the market, then innovation results are applied and spread to the market.

Rui and Liu [3] argue that the knowledge integration process of network-like industrial chain includes knowledge conflict, knowledge mining, knowledge collation, knowledge fusion. Knowledge conflict is the starting point of the whole industry chain SECI process, which means there is an opportunity for knowledge innovation. This kind of conflict generally exists in the interior of helmsman enterprise or module enterprise. Through the solution common question, the helmsman and the module enterprise realizes the vague knowledge sharing, and has reached consensus about the knowledge subject, and excavates the system knowledge which needs around certain subject, and discarded the unrelated knowledge topic. Through the direct communication between organizations, enterprises gradually clear the hidden knowledge, clearly define the problem.

Ji et al.[4] put forward the knowledge integration value chain of M & A, which includes knowledge integration management activities and auxiliary integration activities. The knowledge integration management activities include knowledge conflict, knowledge identification, knowledge transfer, knowledge fusion and so on. There is no very clear sequence, they may be cross-cutting in the process of knowledge integration, together determine the integration performance of mergers and acquisitions. After mergers and acquisitions, enterprises should recognize the potential conflicts caused by knowledge heterogeneity and cultural differences, identify the knowledge of the two sides and eliminate useless or less valuable knowledge, and re-classify, organize, clear up and improve knowledge transfer scenarios according to their importance, and finally fully integrate existing knowledge into new knowledge transferred. In the process of knowledge integration, knowledge transfer and knowledge fusion are the prerequisites for the realization of M & A knowledge synergies, and also the core of knowledge integration value chain. Therefore, how to minimize the knowledge conflict and improve the efficiency of knowledge identification, knowledge transfer and knowledge fusion is an important condition to ensure the success of knowledge integration.

From the perspective of the process of knowledge integration, Hui and Zou [5] argue that the knowledge integration of research cooperation includes knowledge mining, knowledge transfer and knowledge fusion. Knowledge mining is the process of extracting trustworthy, novel, potentially useful, understandable information, patterns, and knowledge from large, incomplete, noisy, and obscure data. Its value is mainly reflected in the discovery, collection, analysis and filtering of external knowledge by enterprises, realizing the transformation from tacit knowledge to explicit knowledge, forming orderly, hierarchical and easy to understand knowledge. Knowledge transfer is the process through which the staff or the team obtaining external knowledge organizes the knowledge and pass it for the enterprise to absorb and thus become the organization’s knowledge. Knowledge fusion is to refine and collate the knowledge so that it has a strong flexibility, rationality, systematic, when necessary to reconstruct the original knowledge system, and to form a new core knowledge system.

Cao et al. [6] analyzed the mechanism of knowledge integration in the view of network, and concluded that the process of knowledge integration includes knowledge selection and knowledge fusion. Knowledge integration is the integration of the old knowledge through the extraction of available content, the process of filtering out the old knowledge, to get the knowledge needed to
organize the elements, which is the choice of knowledge. Knowledge selection process can be roughly divided into two steps of knowledge inventory and knowledge filtering. Knowledge inventory is mainly to have a clear knowledge of the stock, that is, the organization has a clear knowledge of knowledge stock, knowledge structure, the old and new degrees knowledge of and so on through the inventory of existing knowledge organizations. Knowledge filtering refers to the clear understanding of the stock of knowledge based on the organization to select the available knowledge to add to the new knowledge base. Knowledge fusion is to find suitable knowledge for internal and external knowledge of individuals and organizations in accordance with the principle of complementarity to find the knowledge to match each other fusion. It is the further expansion of the original knowledge base, and the knowledge structure of the organization is improved by knowledge fusion, which reflects the diffusion effect and synergy effect of the knowledge.

**Knowledge Integration Capability**

Grant \(^7\) argues that the knowledge itself can’t bring sustained competitive advantage for enterprises, and it is the knowledge integration capability which brings competitive advantage to the enterprise. Knowledge integration capability can be measured from three aspects: integration efficiency, integration scope, integration flexibility. The higher the integration efficiency, the broader the integration scope, the more flexible the integration flexibility, the stronger the knowledge integration capability. Integration efficiency refers to the ability that firms access to and use organizational members’ specialized knowledge. The efficiency of enterprise knowledge integration is affected by three factors: the level of common knowledge (including common language, shared behavioral standards, organizational culture), task performance frequency and variability (integration efficiency depends on the efficiency of communication, if the organization needs to adjust organizational routines to cope with changing situation, then the lower the efficiency of integration), organizational structure (firms should design a reasonable organizational structure to reduce the level of internal communication and intensity, thereby improving the efficiency of integration). Integration range refers to the knowledge width that organization can use. The wider the scope of integration, the wider the knowledge to be used, the richer and more complex the knowledge content of products produced or services rendered, and hence the more difficult to imitate by competitors.

Integration flexibility refers to the ability that firms access to additional knowledge and reorganize existing knowledge. In the ultra-competitive environment, the competitiveness of enterprises can easily beimitated and replaced by competitors, it is necessary to continuously update the competitiveness of enterprises, including a total of two ways: integrate new knowledge into existing capacity, and reorganize existing knowledge through new integration model. Kenney and Gudergan\(^8\) argue that knowledge integration capability can be measured by integration efficiency, integration scope and integration flexibility, and empirically test the impact mechanism of organizational form and composition ability on knowledge integration ability.

De Boer et al. \(^9\) propose that knowledge integration capabilities include three aspects: systematic ability, cooperation ability and socialization ability. Systematic ability is the ability to create new architectural knowledge through formal systems, such as code, plans, directives, policies, procedures, and manuals. Cooperation ability is the ability to promote the integration of knowledge through the relationship between team members. Through training, job rotation, liaison equipment and sharing, etc., cooperation capacity will continue to improve. Socialization ability refers to the ability to produce common ideas, beliefs and values internally through promoting the knowledge integration. The socialization ability comes from the construction of corporate culture.

Iansiti and Clark \(^10\) divide knowledge integration capabilities into external integration and internal integration. Internal integration includes cross-functional integration and integrated problem-solving model. External integration is divided into customer knowledge integration and technical knowledge integration under the environment of technical uncertainty and market uncertainty. According to Iansiti and Clark \(^10\), Zhou et al. \(^11\) designed a measurement scale of
external knowledge integration ability and internal knowledge integration ability. Pan[12] measures
the internal knowledge integration ability from the three aspects of internal systematization ability, internal coordination ability and internal socialization ability, and measures the outside from three
aspects of external systematization ability, external coordination ability and external socialization
ability.

**Knowledge Integration Mechanism**

Grant[7] argues that explicit knowledge does not involve too much integration, and because
explicit knowledge can be easily encoded, communicated, digested, stored and retrieved, the rapid
development of information technology has solved explicit knowledge. But the integration of tacit
knowledge is a very complex problem, and it requires enterprises to use two knowledge integration
mechanisms, such as the instruction and organizational practice. Directive is a major knowledge
integration mechanism, which means that the organization codifies tacit knowledge into explicit rules
and instructions through which knowledge can be distributed at low cost to experts and
non-specialists as well as to other domain experts. For example, in order to optimize McDonald’s
operations, it is necessary to plan an operational manual covering all aspects of internal management,
rather than for internal managers in the areas of cooking, nutrition management, engineering,
marketing, production management, human resources management, finance and accounting. The
more complex an activity is, the more replication is needed at multiple locations, and the more reliant
on instruction integration. Because tacit knowledge lost some information in the process of
transforming into explicit knowledge, it is necessary to use organizational coordination mechanism to
integrate knowledge. Organizational convention provides a coordination mechanism that does not
need knowledge to be explicit, and the members form a familiar interaction mode, and knowledge can
be integrated without knowledge communication. These coordination, however, are highly dependent
on some of the more widely accepted and recognized informal procedures established through regular
training and repetitive activities.

Grant[13] proposed four mechanisms of knowledge integration: (1) rules and instructions, relying
on planning, forecasting, rules, policies, standardized information and communication systems to
manage knowledge integration, draw the cost of communication between experts and members down
to the lowest. (2) Sorting, dividing the firm’s productive activities into discrete stages, with each stage
requiring different input of expert knowledge, so that the effective integration of professional
knowledge and communication and coordination costs can be minimized. However, this integration
mechanism is affected by product characteristics, material inputs, production technology, such as a
continuous process compared to a product produced by a variety of product components, (3)
organizational routine, is a relatively complex behavior patterns, which allows experts to be able to
effectively integrate the knowledge without the need for extensive communication or expensive
cross-learning to adjust; (4) team problem-solving and decision-making, which need organize staff to
communicate frequently to solve important and complex problems. The first three integration
mechanisms are designed to increase integration efficiencies by reducing communication and
learning costs. However, when the complexity and uncertainty of the task are high or in crisis, it is
necessary to use high interactive, non-standardized coordination mechanism.

De Boeq et al. [9] argue that knowledge integration is achieved by a corresponding knowledge
integration mechanism, which divides the knowledge integration mechanism into a systematic,
cooperative and social mechanism. The systematization mechanism mainly refers to the formal
system, such as code, plan, instruction, policy, procedure and the handbook and so on. The
cooperation mechanism is the mechanism promoting the relations establishment among organization
member, such as training, work rotation, liaison equipment. The mechanism is to promote the
establishment of common beliefs and values among members of the organization.
Conclusion

Grant [7] argues that the knowledge itself can’t bring sustained competitive advantage for enterprises, and it is the knowledge integration capability which brings competitive advantage to the enterprise. Knowledge integration is the ability for firms to analyze, integrate and reconstruct existing knowledge, external technology and customer knowledge through systematic and social mechanisms. Dominant research mainly examines the process, capability and mechanism of knowledge integration. Knowledge integration process includes knowledge mining, knowledge transfer and knowledge fusion. Knowledge integration capability can be measured by systematic ability, cooperation ability and socialization ability. Knowledge integration mechanism includes four such mechanisms as rules and instructions, sorting, organizational routine, team problem-solving and decision-making.

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References