

# Introduction of a New Model of R&D Projects Knowledge Management in the R&D Centers

Golamali Tabarsa\*, Rouhollah Bagheri\*, Mohammad Yarjanli\*\* and Neda Mahdinasab\*\*

**Abstract:** The purpose of this paper is to introduce a new viewpoint on knowledge management – the Compound Approach – to enable the integration of KM into existing management approaches. The empirical research in this paper consists of a qualitative proposal based on one case study in R&D center of a high technology organization involving knowledge management of R&D projects. It was presented that the Compound Approach is including of the Process Oriented knowledge management of under study organization has been used as a concept to define knowledge management requirements on the basis of business needs and the Technical Oriented Approach has been introduced to implement the knowledge management system on basis of the Processes Oriented knowledge management. Scientific research on knowledge management has focused on the process oriented and technology oriented separately, but has devoted little attention to the compound oriented. In this paper we focused on application of process and technology oriented together.

**Keywords:** Compound approach, Document management systems, High technology organization, Knowledge management

## 1. INTRODUCTION

The importance of knowledge in human societies in general and in organizations in particular. Get involved topast, such an idea can be traced in Greek philosophy of Heraclius, Socrates, etc. This section will discuss on the history of knowledge management briefly.

In an era of rapid changes, the organizations are successful that regularly produce new knowledge, and it spread across the organization and use it with high speed in their products and services. Therefore and based on the Above facts, In the early 1990s and with Processes Reengineering Theory Development, The first steps was removed to create mechanism of storage and use of knowledge in organizations and then, these activities were call as knowledge management. So, the concept of knowledge management (KM) can be considered to describe the processes which through the organizations be done to identify, collect, organize, store and knowledge sharing to create value and to achieve competitive advantage.

KM researchers have attempted to extend this concept that mainly based on improving Of the efficiency of knowledge processes as production, development, dissemination, knowledge sharing and protection have been developed (Davenport and Prusak, 2000; Davenport and Prusak, 1998).

Knowledge management has known as a method to control and to guide tangible and intangible knowledge assets of organization, as with applying knowledge of inside and outside the organization, will facilitate knowledge product, value creation, innovation and improvement in the organization (Wunram, 2000). Also, knowledge management by creating a new working environment will facilitates knowledge sharing (Shaw and David, 2003).

\* Faculty of Management and Accounting, Shahid Beheshti University, Tehran, Iran

\*\* Faculty of Management and Science and Technology, Amirkabir University, Tehran, Iran

Figure 1 shows R&D projects management in an environment without knowledge management concepts.

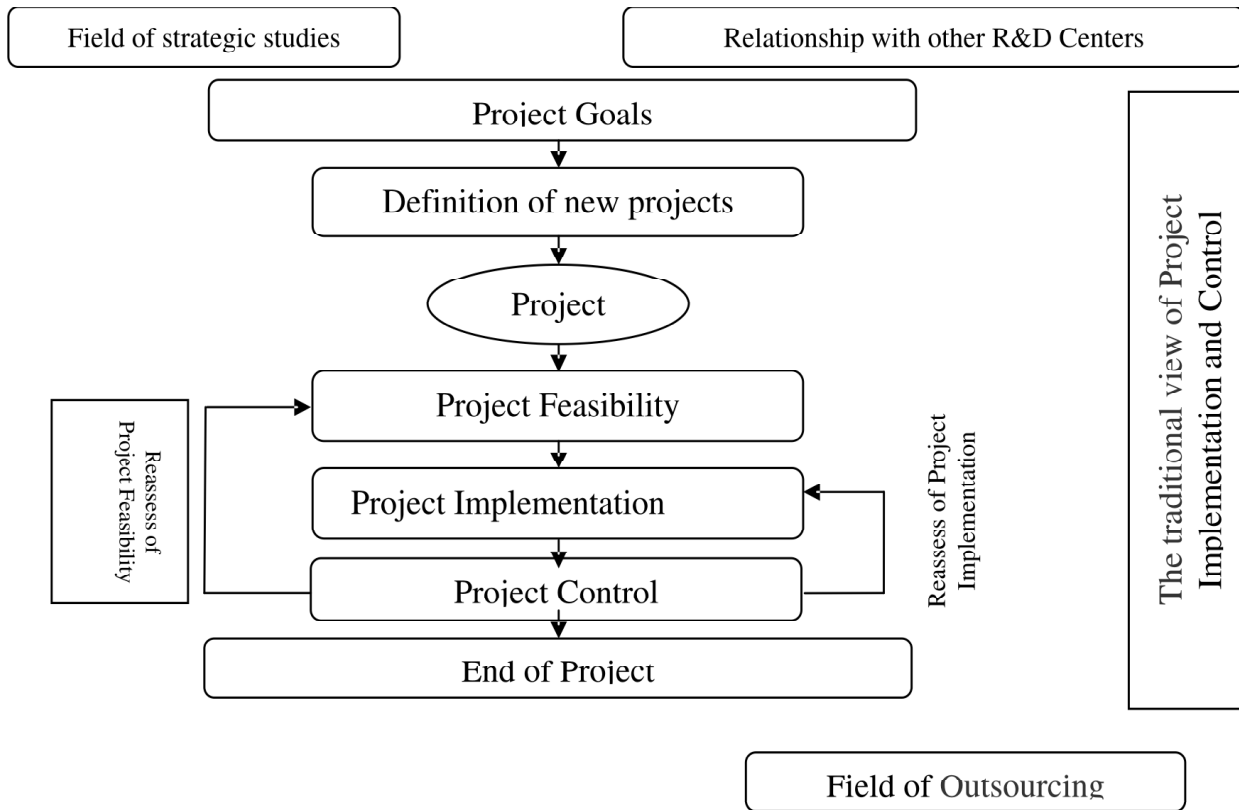


Figure 1: The environment of project management without the knowledge management concept

## 2. THE FORMATION OF R&D PROJECTS KNOWLEDGE MANAGEMENT TEAM

In the first of designing and implementation of knowledge management related to R&D projects in the under study organization, knowledge management teams consisting of various specialties were formed. These expertise's includes:

- ✓ Chief knowledge officer (CKO) ( Engle and Engle, 2010)
- ✓ Knowledge administrator
- ✓ Each of the managers of R&D projects.
- ✓ R&D projects knowledge base administrator (Lorie, 2008) (information technology experts in the under study organization )
- ✓ Director of training
- ✓ Director of strategic studies
- ✓ Director of sale

Each of these used specializations in the composition of the knowledge management team of the under study organization are described briefly following:

### Chief Knowledge Officer

The highest ranked role in knowledge management is called the chief knowledge officer (CKO). Other terms used to describe a similar role to the one held by a CKO are knowledge manager (McKeen and

Staples, 2003), knowledge strategist (Ruggles, 1998), knowledge asset manager or intellectual asset manager (Davenport and Prusak, 1998).

Chief Knowledge Officer also monitor the activities directly related R&D projects knowledge management such as defining the organization's knowledge strategy, pilot implementation of knowledge management programs and moving toward processes to implement more successful knowledge management programs.

The term CKO has been in use to denote the head of knowledge management for quite a while, even though in the beginning it was more connected to AI and expert systems and its relation to executives (Hertz, 1988). Today, in many organizations, the terms "CKO" and "knowledge manager" refer to the same position.

### **Knowledge Administrator**

Knowledge administrators (Apostolou and Mentzas, 1998) are also called knowledge engineers or knowledge editors. As opposed to subject matter specialists who are responsible for one specific domain or topic, knowledge administrators are responsible to help authors capture, store and maintain knowledge independent of the domain in which they are working.

### **Each of the managers of R&D projects**

Managers of each project teams are responsible for coordination between R&D project teams members and knowledge management team members of the under study organization.

### **Knowledge base administrator**

In analogy to data base administrators, knowledge base administrators are responsible for the development and maintenance of the technological infrastructure of the knowledge management systems (KMS). At Accenture, there are three different roles responsible for the administration of their KMS Knowledge exchange, knowledge base sponsors, knowledge base integrators and knowledge base developers (Baubin and Wirtz, 1996). The knowledge base sponsor develops policies, standards and procedures for the KMS and develops the KMS architecture. The knowledge base integrator provides overall coordination of structure and content for one knowledge base and ensures that security and ownership specifications are implemented. The knowledge base developer finally develops, supports and maintains the technical implementations of the knowledge base, ensures that it conforms with general IT standards executes and administers the security and ownership specifications and implements modifications to a knowledge base structure.

### **Director of Training**

Director of Training in knowledge management team is responsible for updating the required training courses in the under study organization based on knowledge areas of R&D projects. Director of Training at any specified time interval is extracting the educational needs of the existing knowledge areas in knowledge map (Hongjun and Dai, 2011) of the under study organization.

### **Director of Strategic Studies**

Director of strategic studies performs the required surveys and supervision to be aligned objectives and strategies of knowledge management team and the under study organization long-term goals.

### **Director of Sale**

Director of Sale will always follow-up the market knowledge needs of the under study organization and considered the customers preferences and will guide organization knowledge policies, based on these needs.

### 3. KEY QUESTIONS IN APPLYING THE NEW MODEL OF R&D PROJECTS KNOWLEDGE MANAGEMENT

For implementation the new model of R&D projects knowledge management in the under study organization, implementation team should consider the following:

- What should be our strategy?
- What should be our organizational culture?
- Which managerial style we should use?
- What should be have the competences of staff?
- What is behavior patterns that we expect in the organizational structure?
- What roles and responsibilities need to do?
- What technical systems should be installed?

### 4. WHAT SHOULD WE DO?

To answer the above questions, the under study organization were examined in distinct Eight components that these component are:

- Strategy
- Organizational culture
- Management style
- Compensation system
- Organizational structure
- Systems
- Identifying and mapping of knowledge
- Organizing of knowledge documents

According to Figure 2, each of these components are arranged in separate programs.

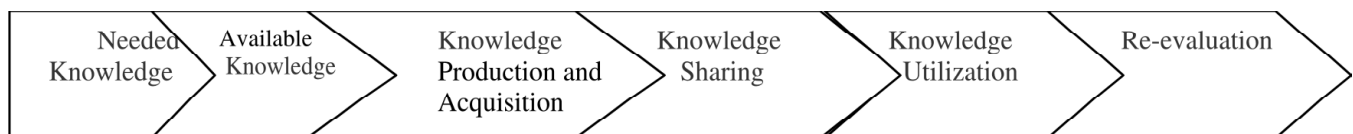


Figure 2: Knowledge Cycle in R&D projects management of under study organization

### 5. DESCRIBING OF DISTINCT EIGHT COMPONENTS WITH USING OF THE NEW MODEL OF R&D PROJECTS KNOWLEDGE MANAGEMENT

#### First component: Strategy

- ✓ Identifying of all knowledge and wisdom according the organization strategies
- ✓ Producing of the needed knowledge with applying of experts and elites, creating of motivation for the researchers and knowledge workers (Ronald and Ulrich, 2003) to achieve organization periodic strategies
- ✓ Identifying of all existing knowledge for achieving organization periodic strategies
- ✓ Periodic evaluation of knowledge management activities based on defined strategies in the coming years

- ✓ Applying all of new tools of knowledge sharing that to achieve the organization periodic strategies are optimal.
- ✓ Preparing for the applying of all of the produced knowledge by researchers to achieve the organization periodic strategies

### **Second component: organizational culture**

- ✓ Promoting of the values and norms of knowledge in order to perform the above activities
- ✓ Creating a professional culture of knowledge management (knowledge management training to knowledge management project team members of the under study organization ) in order to perform the above activities
- ✓ creating a general culture of knowledge management (knowledge management training to senior managers, research managers and involved personnel in projects) in order to facilitate the above activities
- ✓ Using of organization Experts Association in providing solutions to the project challenges (in Virtual Spaces).
- ✓ Using of communicational control points between project management and knowledge management to the knowledge base growth and required knowledge from project documents.

### **Third component: management style**

- ✓ Strong support of the organization leadership in relation of knowledge management programs
- ✓ Encouraging of the different parts of the under study organization to create value-added of their knowledge management
- ✓ Management practices with network-based approach (removal of a hierarchical system) and based on leadership style of coachism.
- ✓ Developing of how to interact knowledge management with project management as the main pillar of organization to get knowledge from of project and convert to organizational knowledge.
- ✓ Developing of how to interact IT with KM in order to align each other in deploying of knowledge management Software's in organization levels.
- ✓ Developing of communicational procedure of knowledge management and strategic studies management.
- ✓ Developing of communicational procedure of knowledge management and training management

### **Forth component: compensation system**

- ✓ Creating of the reward system for periodic evaluation of management activities
- ✓ Creating of the reward system for knowledge sharing in organizations
- ✓ Creating of the reward system for applying of all of the produced knowledge
- ✓ Creating of the reward and improve system to produce of the knowledge related to knowledge bottlenecks

### **Fifth component: organizational structure**

- ✓ Determination of knowledge management agent in the organizational micro-level units and creating of knowledge management unit in macro-organizational structure
- ✓ Developing of needed procedures for the creation and formation of experts associations

- ✓ Developing of needed procedures in relation of how to get knowledge from done projects.
- ✓ Entering to projects areas with approval a knowledge management and to institutionalizethis subject

### **Sixth component: software systems**

- ✓ Organization knowledge base architecture
- ✓ Expert Database
- ✓ Projects Database
- ✓ articles, books, magazines, experiences, Films ...

#### Database; File Servers

- ✓ Implementing of Organization knowledge portals (knowledge storage+ knowledge sharing)
- ✓ Office Programs,graphics andaudio-visual software and,
- ✓ E-mail, electronic discussion groups, File Sharing and electronic meetings.
- ✓ community management, groupblogs
- ✓ Supplying of staff requirements in relation ofprojects knowledge
- ✓ Designing and implementing of expert systems
- ✓ Using of artificial intelligence in designing of new products

### **Seventh component: identifying and mapping of knowledge**

- ✓ Clarifying of the knowledge macro-areas
- ✓ Identification of existing knowledge
- ✓ classification of the collected knowledge
- ✓ validation of the knowledge map
- ✓ Understanding of the organizational knowledge (needed knowledge, existing knowledge)
- ✓ Extraction of knowledge and technology bottlenecks (identify knowledge and ignorance)
- ✓ Knowledge acquisition program (planning to produce and acquisition of knowledge and applying ofknowledge)

### **Eighth component: Organizing of Knowledge Documents**

- ✓ To electronic of knowledge resources (storage and sharing)
- ✓ Preparing to participateof organization researchers in festivals, seminars, conferences and technical and scientific workshops (identifying of knowledge, acquisition and application of knowledge and re-evaluate the existing level of organization knowledge in terms ofscientific with domestic and international environment)
- ✓ Identifying ofinventions with respect to the organization's mission (identifying ofexisting knowledge, sharing and applying knowledge and move toward for reverence of the organization inventors and innovators.
- ✓ To establish of requirements and procedures of the book production (existing knowledge + production + sharing and applying knowledge)

- ✓ To establish of requirements for organizing of documents (existing knowledge +production+ sharing and applying knowledge)
- ✓ To establish of registration procedure (existing knowledge + production + sharing and applying knowledge)
- ✓ To establish of requirements related publishing of papers and (existing knowledge + production + sharing and applying knowledge)
- ✓ To establish of information exchange procedure between organizations

At the end of these eight components should be noted that without Existence the right and codified organizational solution, knowledge management at best condition is meaningless and at worst is being dangerous.

## 6. MIXED APPROACH OF KNOWLEDGE MANAGEMENT IN THE NEW MODEL OF R&D PROJECT MANAGEMENT

The current status of knowledge management in some of the organizations focus on managerial considerations related knowledge management and be ignored from viewpoints of tools and technical or conversely some of the organizations seek knowledge management in the implementation of software systems, managerial considerations related knowledge management are less stressed. Given what was said two dominant perspectives in knowledge management can be reached. The first approach is based on tools and is technology-oriented (Veda and Robert, 1993) and in this approach which scientists of information technology emphasize knowledge management be viewed in the discussion of ICT and systems that in its various levels is shown in Figure 3.

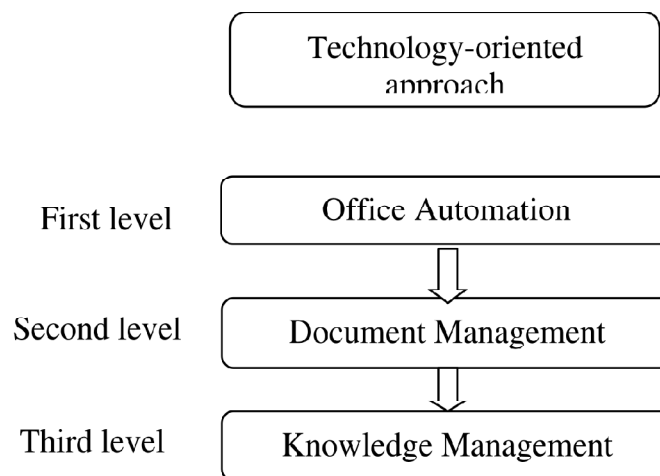


Figure 3: Technology-oriented approach (Lorie, 2008) in knowledge management

Another approach is Process -oriented approach that relies on administrative, process, human and cultural dimensions in knowledge management Which is shown in Figure 4.

Today challenge of knowledge management researches not only integration of knowledge management from managerial viewpoint but also is from a technical viewpoint.

Thus, a third viewpoint emergence between these two perspectives that in R&D projects knowledge management in the under study organization to be used.

The task of this third approach is link managerial perspective of knowledge management with technical viewpoint. This new approach is named mixed approach and exactly its implementation details expressed in this paper and based on the presented model of each of the six components of figure 5 offers a program.

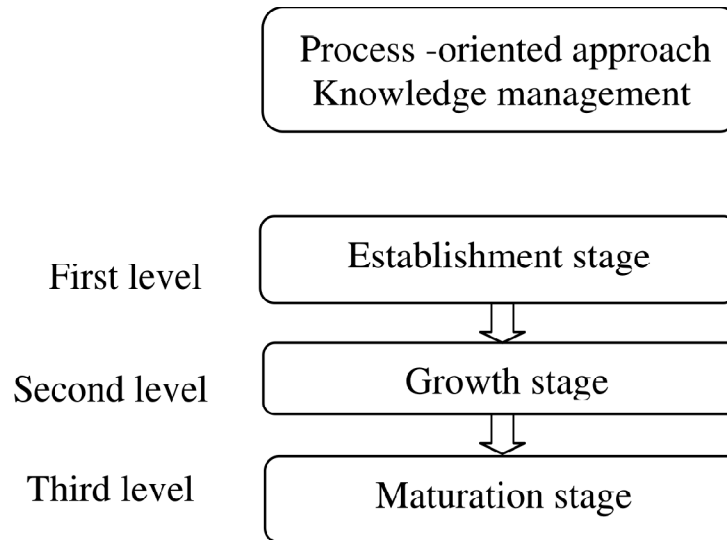


Figure 4: Process-oriented approach (Ronald and Ulrich, 2003) in knowledge management

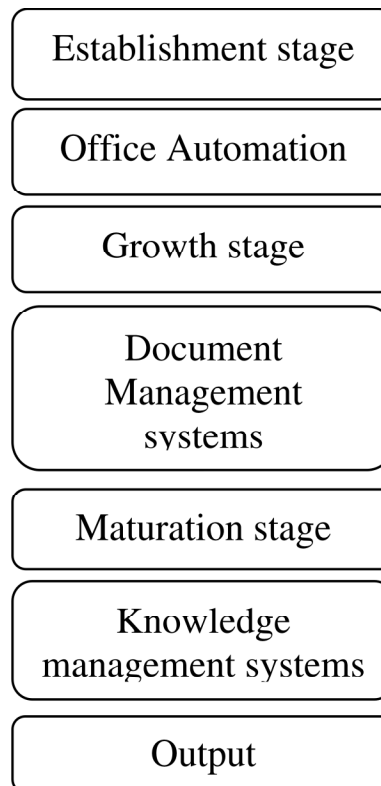


Figure 5: Mixed approach

Based on eight described components, space of R&D project management with knowledge management model and based on the knowledge cycle and with mixed approach is shown in Figure 6 till mixed approach become to a goal to be implemented from program type.

Executive Order of program with respect to stages of Figure 5 as follows

#### **Establishment Stage (process-oriented approach)**

- Senior management support of organizations and institute of KM programs
- Creating of knowledge management culture with holding of training courses



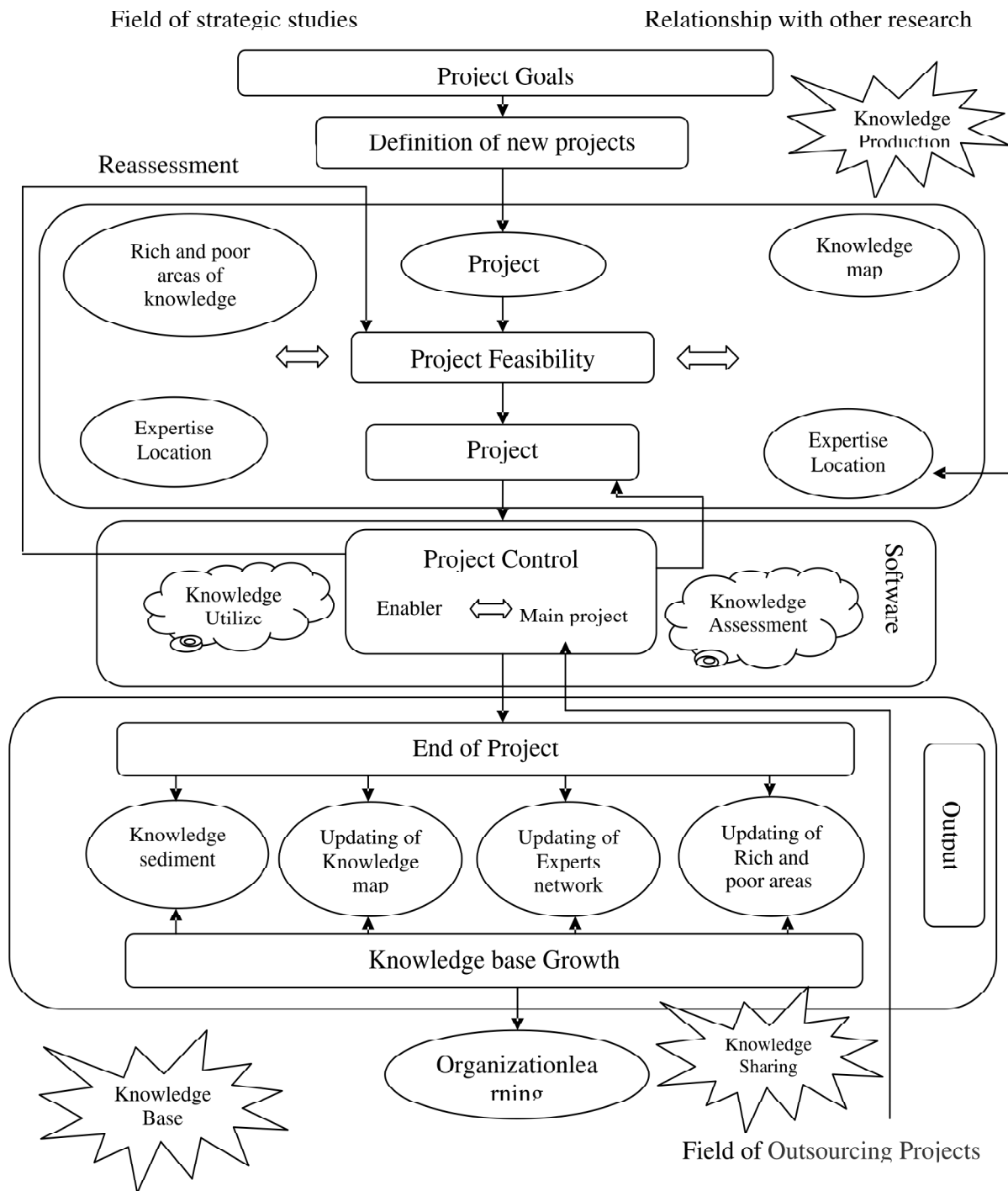


Figure 6: Presence of Knowledge management in R&D projects management

- Preparing and developing of employees motivating systems in KM
- Formation of experts board
- Developing of how to interact knowledge management with project management as important pillar for the get Sedimentof knowledge relateddesigning and researches projects
- Developing of how to interact IT with KM to align each other in order Establishmentof knowledge managementsoftware in organization levels
- Providing of knowledge map

- Understanding of the organizational knowledge
- Extraction of knowledge and technology profile
- Knowledge acquisition program
- Extraction of knowledge bottlenecks
- Developing of communicational procedure of knowledgemanagement and strategic studies management
- Clarifying of the knowledge macro-areas
- Group Knowledge base architecture
- Organization Knowledge base architecture
- Experts Database
- Projects Database
- Articles, books, magazines, experiences, Films ...
- Human capitaldevelopment
- Training of applicants of industries knowledge management.
- Training of how to creating of training documentation (based on the organization standard) to employees
- Development of and Communicational procedure ofknowledge management and training management
- Preparation for holding of training seminars of project achievements, lesson learned and after action review

#### **Office Automation stage (Technology-oriented approach)**

- Database; File Servers
- Office Programs,graphics andaudio-visual software and,
- Portals, e-mail, electronic discussion groups, File Sharing and electronic meetings
- community management, groupblogs

#### **Growth stage (process - oriented approach)**

- To establish of communicational mechanisms with strategic management to determine of knowledge management path at the group level
- To establish of organizing procedures of projects scientific and technical Document with model of knowledge management
- To establish and developof ranking system procedures of researchers with the new structure and consistentorganizational culture of the under study organization
- Using of communicational control points between project management and knowledgemanagement, for knowledge base growth and get knowledge sedimentation of project documents
- Using of the experts association in providing of solutions to the projects challenges (virtual environment)

#### **R&D Documents management stage (Technology-oriented approach)**

Based on any of the eight components of the under study organization and presented program of any component inthe mixed model of the local model of R&D projects knowledge management,R&D projects documents management system (the fourth level of the mixed model) appears in Figure 7.

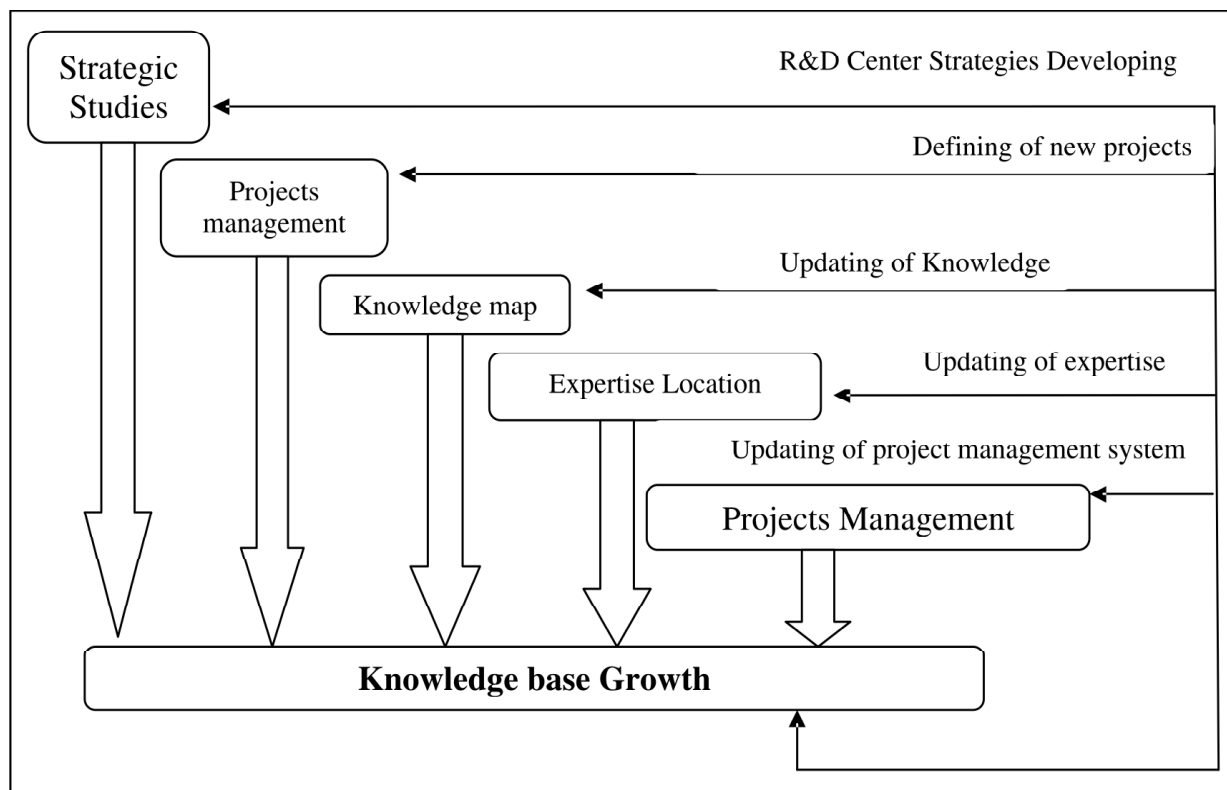


Figure 7: R&D documents management systems

### Maturation stage of knowledge management in organization level

In final stage that be deployed suitable knowledge management structures of R&D projects in the under study organization, this organization is able to design and implement of artificial intelligence projects and consistent with the model of knowledge management. For example, can pointed to design and implement of expert system of final product designing of the under study organization that experts and researchers can use the system to designing of various components of separate products and if based on used algorithm in the under study organization, each parts of the final product be destroyed in term of technical or logical,

This system is able to detect errors and required warnings offer to researchers to improve of design parameters. In total of this stage that organization reaches a maturity, are included the following:

- ✓ To change the vertical structure to the network structure completely
- ✓ Cooperation of knowledge management to determine of the projects knowledge requirements
- ✓ Design and implementation of expert systems
- ✓ Using of artificial intelligence to design new products

## 7. HOW TO INTERACT KNOWLEDGE MANAGEMENT AND PROJECT MANAGEMENT IN THE UNDER STUDY ORGANIZATION

As you can see in figure 8, knowledge management in project teams in the under study organization has distributed till be get knowledge from each knowledge project and in considered path be distributed between knowledge worker and to be used for developing of new technology in other projects in parallel extracted Knowledge are in the form of knowledge documents, project seminars, projects films, documents of executive processes, Manufacturing, assembly and testing, and lessons learned from exit interviews and storytelling that is added to the organization knowledge base. The produced documents during the

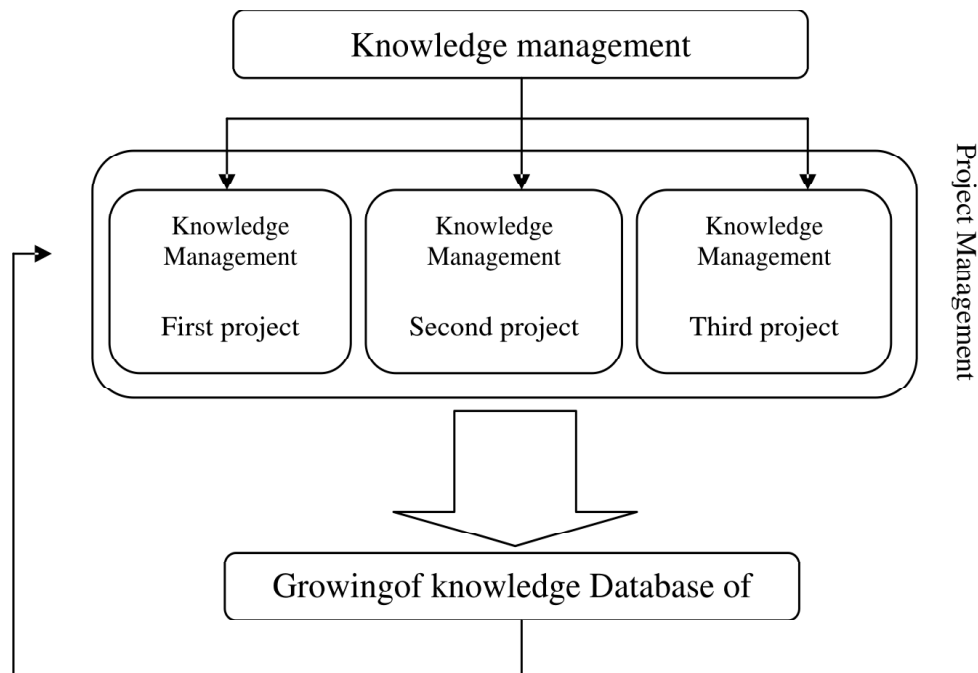


Figure 8: Interaction of Spatial Projects Management with Knowledge Management

implementation of project in staff part of knowledgemanagement is collected. Therefore organization knowledge base management is the upper reference of knowledge management teams of in each project.

## 8. CONCLUSION

This paper introduces a new viewpoint on knowledge management – the Compound (mixed) Approach – to enable the integration of KM into existing management approaches. The process oriented knowledge management of under study organization has been used as a concept to define knowledge management requirements on the basis of business needs. The KM-tools oriented approach (technical implementation) has been introduced to implement the KMS on basis of the processes oriented knowledge management.

Overall, what has offered from the mixed approach for R&D organizations can be implemented, of course as was expressed in the second component “organizational culture” Each of the organizations have special organizational culture and so must perform localization in organizational aspects of the model. But what is clearly visible in this model it is that this model is quite comprehensive and covers all aspects of organizational and

Whatever is needed for implementation of the R&D projects management has provided and whatever in a tools oriented and processoriented models is waste, has removed in mixed model.

Again, it is stressed that to implement appropriate and useful knowledge management R&D projects should be localized and be investigated all aspects of the model and the final plan be designed and implemented based on organizational needs.

## References

- [1] Davenport T. H. and Prusak, L. (2000), Working knowledge: How organization manage what they know, Harvard Business School Press.
- [2] Davenport, T. H. and L. Prusak, (1998), Working knowledge: how organizations manage what they know, Harvard Business School Press, Boston.
- [3] Wunram, Michel (2000), Concepts of the CORMA knowledge management model, Available [www.corma.net](http://www.corma.net).

- 
- [4] Shaw, George and David Smith (2003), Don't Let Knowledge and Experience Fly Away: Leveraging Scarce Expertise to Support Ongoing Competitiveness in the Aerospace and Defense Industry, Available: [http://www.accenture.com/xdoc/en/industries/communications/high-tech/ad\\_workforce.pdf](http://www.accenture.com/xdoc/en/industries/communications/high-tech/ad_workforce.pdf)
- [5] Apostolou, D., Mentzas, G. (1998): Towards a Holistic Knowledge Leveraging Infrastructure: The KNOWNET Approach, in: Reimer, U. (ed.): Proceedings of the 2nd International Conference on Practical Aspects of Knowledge Management - PAKM, Basel (CH), October, 29th-30th, 1998, 3.1-3.8.
- [6] McKeen, J. D., Staples, D. S. (2003): Knowledge Managers: Who They Are and What They Do, in: Holsapple, J. (ed.): Handbook on Knowledge Management, Vol. 1, Berlin 2003, 21-41.
- [7] Ruggles, R. L. (1998): The State of the Notion: Knowledge Management in Practice, in: California Management Review, Vol. 40, No. 3, 1998, 80-89.
- [8] Hertz, D. B. (1988): The Expert Executive - Using AI and Expert Systems for Financial Management, Marketing, Production and Strategy, New York 1988.
- [9] Baubin, T., Wirtz, B. W. (1996): Vorsprung durch Wissen. Jahrzehntelange Erfahrung bei Andersen Consulting, in: Schneider, U. (ed.): Wissensmanagement. Die Aktivierung des intellektuellen Kapitals, Frankfurt/Main 1996, 133-146.
- [10] Hongjun Fang, un Dai (2011), The Visualization Analysis of Human Resources in Science and Technology in Foreign Research Based on the Mapping Knowledge Domain, International Business Research. Toronto: Jan 2011. Vol. 4, Iss. 1; pg. 119, 6 pgs
- [11] Veda C. Storey and Robert C. Goldstein (1993), Knowledge-Based Approaches to Database Design, MIS Quarterly, Vol. 17, No. 1 (Mar., 1993), pp. 25-46.
- [12] Engle, Charles; Engle, Nancy (2010), The 2020 federal knowledge worker, Emerald Group Publishing, Limited, Vol 40, 2010-12-07, pp 277-286.
- [13] Lloria, M Begoña(2008) A review of the main approaches to knowledge management, Knowledge Management Research & Practice, vol 6, pp. 77-89.
- [14] Ronald Maier, Ulrich Remus(2003), Implementing process-oriented knowledge management strategies, Journal of Knowledge Management. Kempston: 2003. Vol. 7, Iss. 4; pg. 62, 13 pgs