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KNOWLEDGE MANAGEMENT SUPPORT IN INTRODUCING INNOVATIVE PROCESS

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Abstract – Satisfying consumers` requirements for product quality, price and production times constitutes nowadays a vast and sophisticated field of activities which penetrate all business functions of a company. These requirements present a serious problem to companies.

The paper concentrates on the evaluation of organisational processes, the employees and technology in an enterprise with knowledge management. It also wants to stress those partners and consumers are included into the evaluation chain with the help of knowledge management, and that they are directed towards new knowledge acquisition. This altogether adds to higher business success of an enterprise.

For planning business functions and especially the production process it is necessary to have a support, the tools, which give answers to the customers' demands. One of such tools is the QFD method (Quality Function Deployment), which has been introduced into the process of product designing in the enterprise.

Keywords: knowledge, organizational learning,

1. INTRODUCTION

The tendency to still more rapid change and increasing modification rate still continues and concerns all areas of our society. In special way this applies to companies, because the dynamics in the surrounding field of the company cause there appropriate dynamics in the companies themselves [1].

Shorter product life cycles with increased product complexity are a challenge for the operational innovation and knowledge management. Technological developments, particularly in the information and communication technology, are the base for many of these modifications.

Because of the rapid change of the surrounding field, the own willingness of modification is constantly submitted to a hard examination. Companies therefore must increase the own flexibility to be able to react on trend breaks in markets and technologies. Exactly that can be obtained by stabilization of the organizational adaptability (see fig. 1).

Knowledge management, thereby, can be understood as function-spreading instrument of control for the purposeful management of an organization by special consideration of "knowledge".

Beside the financial basis knowledge is the most important resource for innovations. These innovations are again basis and engine for the structure and the lasting protection of a competition advantage (see fig. 2). In order to lead a company successfully, systematic handling of "knowledge" becomes more important.

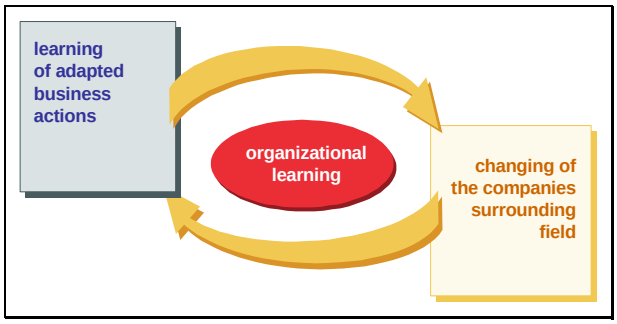

Figure 1: Cycle of organizational learning [2]

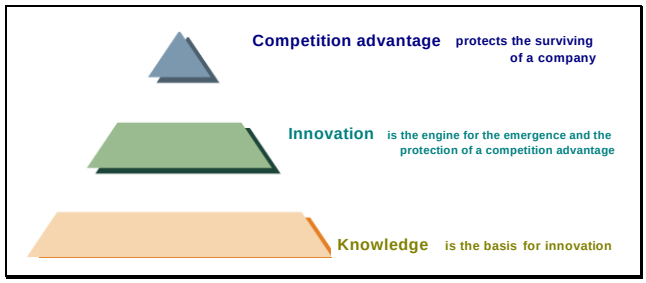

Figure. 2: From knowledge to competition advantage [4]

"Today the increase in value develops from "the productivity" and "the innovation". Both mean the use of knowledge to the work." [3]

Because of the increasing innovation dynamics, knowledge moves into the focal point of the business performance. To regard innovation processes under the focus "knowledge", leads to new or until now neglected organization measures for the management of innovation processes in companies.

2. BASE MODEL OF THE KNOWLEDGE MANAGEMENT

Knowledge management means carefully directed co-ordination of the factor of production "knowledge" and the management of basic conditions, which support the process from individual available knowledge to organizational

knowledge. Non-standard and collective knowledge are to be applied then during creation of value processes. Knowledge management thus means not the management of the factor of production "knowledge", but the management of the organization with special consideration of the aspect "knowledge".

In order to facilitate this management, one differentiates - referring to a base model of knowledge management (see fig. 3) - between data and knowledge level. This differentiation is based on the one hand on the traditional separation from knowledge of the employees (social subsystem) and on the other hand on data in information and communication systems (technical subsystem).

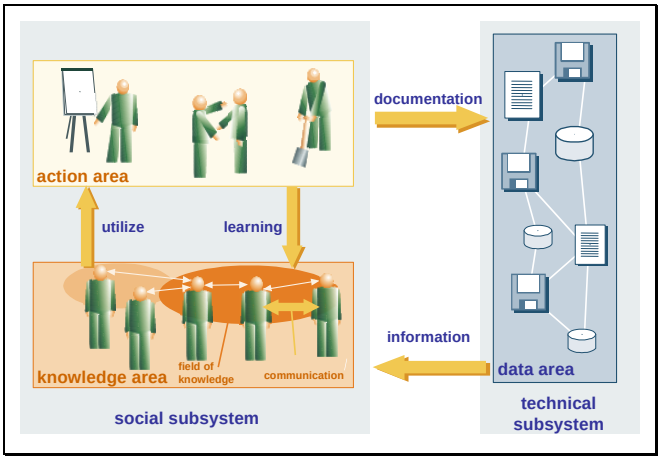

Figure 3: Base model of knowledge management [4]

On the data level all data of an organization can be found, i.e. its documented, collective knowledge. The knowledge level contains the organizational knowledge base and is that area, where a social networking takes place in the form of communication. Here are the "memories" of all employees.

The two levels are connected by the processes of information and documentation. Knowledge is generated from data, transferred by the process of information. By the process of documentation knowledge is transferred into data again (made explicit).

Additionally an action level is described, on which the development of knowledge and the use of knowledge during the creation of value processes take place. By the process of the application of knowledge this is transferred on the action level into concrete actions. Via assuming the results of action an extension of the "memory of a company" can take place via learning again.

Knowledge level, data level and action level are coupled with the five essential processes as information, documentation, communication, application and learning and make up a base model of knowledge management. In further consequence this model will be used to point out specific aspects. The organization of basic conditions on the three levels and the support of the processes between the levels can be implemented by different measures.

On data level it is in particular the support of the data networking by means of information and communication technologies. However a climate of the knowledge division and - networking can only be created on the knowledge level by an appropriate organization development and organization culture development. Likewise it can be guaranteed on the action level, with the help of an appropriate process organization, that knowledge, which has been created in individual projects, is also available to future projects.

3. INNOVATION MANAGEMENT AS PART OF KNOWLEDGE MANAGEMENT

Today, the organization of company-internal innovation processes can be regarded as an existence-crucial success factor. „Innovation" is not only a word, which came into fashion, but a central term of future-oriented company guidance. The question is not any longer whether innovations have to be implemented in a company, the questions are when and how the specific innovations are realizable, as successfully as possible, in order to introduce a new product, a new service or a new process.

To manage innovation processes nowadays does not only mean to react time-fairly and purposefully on modifications in the company surrounding field but also being the time ahead, participating in the organization of the future actively. The innovation ability of a company, which is finally determined by the willingness of its employees to modification, today can be seen as the core competence of a successful company.

4. MODIFICATION OF THE ORGANIZATIONAL KNOWLEDGE BASE

Each modification is connected with learning processes, which finally enable an adjustment to a new situation. The target of the company is to become a constant learning company, which understands and operates innovation actively from the inside out as a permanent, organic process. "Organizational learning" and thus the internal extension of the organizational knowledge base becomes an important target of companies in the knowledge management.

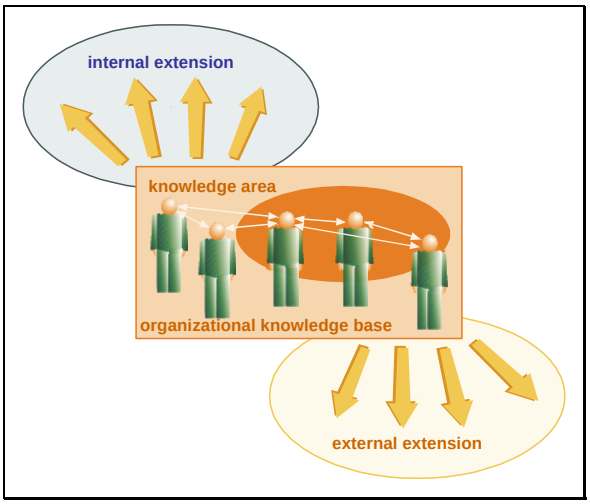

Figure 4: Extension of the organizational knowledge base [5]

The increasing specialization into individual branches of science increases the number of fields of knowledge. The

focusing on few core fields of knowledge is necessary and becomes one of the strategic major tasks in the operational knowledge management. Networking with other companies, participating with their core fields of knowledge, can be seen as an external extension of knowledge (see fig. 4).

Apart from external networking, internal networking offer good possibilities to attain strategic knowledge advantages. Today these possibilities for many companies represent unused potential. The range is from informal exchange of knowledge to the formation of legally obligatory alliances. As a matter of principle it can be said that, the more largely the organization, the more important becomes internal networking, the smaller, the more important is the external networking. In figure 5 possibilities for a knowledge transfer are pointed out on the basis of the base model.

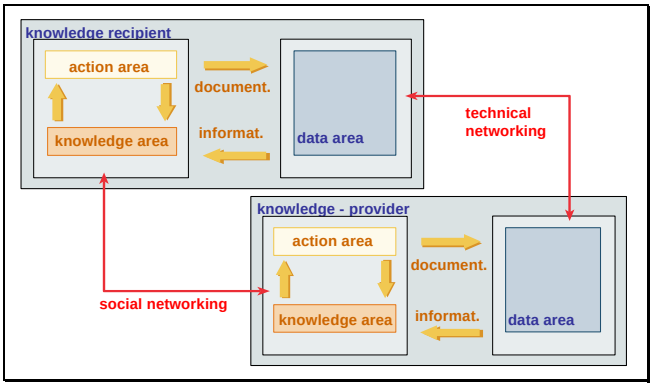

Figure 5: Possibilities for a knowledge transfer [6]

In the operational innovation and knowledge management the inclusion of external resources or external sources of knowledge seems to be at first sight a rather critical measure. The danger of knowledge discharge from the company and the increase of the dependency on other organizations are questions and problem definitions, which occur. Nevertheless an increasing networking of companies with external partners can be observed also during the accomplishment of innovation processes.

5. DEVELOPMENT BY NEW KNOWLEDGE

If the available knowledge supply does not cover the knowledge requirement, either an internal extension or an additional external extension of knowledge must take place from external services. The basis of the decision making process are the core competences of creating products and services for the customers of a company.

The internal extension of the knowledge supply takes place via generation of knowledge, which can be understood as a function of the innovation management. In addition necessary basic conditions must be created. The development of knowledge requires the use of creative potentials and teamwork. The methodical support is based on a multiplicity of established creativity techniques, depending on the definition of the problem. The technical emphasis of the team members of so called creativity workshops should differ if possible and go beyond the field of knowledge of the problem definition.

In order to break out and to find new methods of solution it is meaningful to cooperate with external knowledge carriers and experts, if necessary. The interaction and communication of the users within the problem field can open up new solutions, which resulted e.g. by the transfer of solutions from complementary fields of knowledge. The inclusion of external knowledge potentials for company-internal innovation processes can have the following motives:

- the field of knowledge cannot be covered for temporal and economic reasons
- internal generation of knowledge seems not to be not meaningful strategically

The external extension of the base can be implemented by outsourcing. Potentials, which do not rank among the core fields of knowledge of the company, can be bought as customized services. Therefore also specific functions can be counted apart from routine activities, which can be completed only by appropriate experts or knowledge carriers. On the other side it is also important to use the experience of external partners who can help to structure and develop the fields of knowledge that are relevant for the company.

6. PRINCIPLE OF QFD

QFD is used in the early phase of product development and it is applied to the whole technical process development, production planning, manufacturing and providing quality.

QFD is performed in four phases [7]:

- PHASE 1- it transforms customers' demands into product characteristics.
- PHASE 2- transforms product characteristics into characteristics of its parts.
- PHASE 3- transforms characteristics of the parts into production technology.
- PHASE 4- transforms production technology into production instructions.

Each phase is represented through one or more matrices .

QFD method with clear and logical steps permits clear understanding of different phases in the system of designing new products.

The advantages of QFD are:

- products meet customers' wishes and demands and there are practically no changes in products in serial manufacturing,
- we can learn in time if our product will be successfully competitive on the market,
- motivation is greater due to QFD method, because of teamwork and on-time communication at all levels,
- all new knowledge on the changes of market demands and technical innovations can be used in the designing product process in different phases; so this method is dynamic [7],
- easier and clearer product costs and production processes definition which enables product cost optimising.

7. QFD IMPLEMENTATION FOR THE CASE OF A RELAY TYPE TRK 10

Phase 1 of QDF covers the customer`s sales and after-sales service requirements, but special emphasis is placed on

the customer`s technical requirements. The term service in the narrower sense has no real meaning in the production of relays because a relay simply has to be replaced in case of breakdown or failure, provided that the electric service life guarantee has not expired. As relay failures may cause substantial damage, the producer is sometimes bound to assume responsibility for the resulting costs. As a consequence, the most important aspects of service requirements are the shortest possible response times to complaints, prompt measures and a relay shelf life warranting impeccable operation within the required parameters during the guaranteed electric service life.

A comparison of the relay TRK 10 with two relays produced by competitive companies as seen by our customers reveals a slight lagging behind our competitors precisely in the field of electric service life and maximum contact system loading, which is only logical since these two characteristics are closely interlaced. All other requirements are fulfilled equally well as with our competitors, except the relay size (miniaturisation) and selling price, which are both in favour of our product.

It turns out that the most important technical characteristics of the relay are an optimal contact system, an optimal magnetic circuit and high- precision assembly that assures reliable relay functioning. On the other hand, total automation of relay assembly, although indispensable, has proved to be a great technical difficulty due to the delicate high-precision miniature component parts. In addition, total automation needs highly flexible special-purpose assembly lines for the production of a variety of TRK 10 relays.

A comparison of the technical characteristics of the relay TRK 10 with the relays produced by our competitors clearly reveals that the quality of the in-built materials, relay dimensions and informing of customers (catalogues, leaflets, Internet, fairs, etc.) is on the highest possible level, or even exceeds the quality of competitors. The outcome of comparison with our competitors is not so good for assembly automation and cost price, which is only logical since these two characteristics are in close connection. The response to complaints and the trace ability of products also lag behind the achievements of our competitors.

We transferred the most important technical characteristics of the relay TRK 10 to Phase 2 of QFD and studied how the components of the relay affect them. It has been found again that the contact system with its in-built parts and their characteristics (on which the functioning of the contact system depends) represents the most important part of the relay. In Phases 3 and 4 of QFD the analysis gets deeper as production planning and design are discussed. The final results of analysis are operation and control instructions. Individual results are analysed and transferred to the next QFD phase. The selected variables are finally analysed by the FMEA method.

8. CONCLUSIONS

A global knowledge management is to guarantee that the factor of production “knowledge” is used just like the traditional factors of production effectively and efficiently, in order to achieve the company targets. Another advantage is the improvement of the adaptability of an organization; additionally the action potential is increased. Knowledge management especially is useful with creation of new products and services.

The following points describe the use of knowledge management in companies:

- transparency over knowledge potentials and knowledge gaps,
- higher motivation of the employees as “thinking” people,
- Establishment of a learning organization,
- increase of competition ability,
- Guarantee of long-term survivability of the company.

In the knowledge of the employees there are almost inexhaustible reserves for the future success of the company. Therefore the systematic use of the resource knowledge becomes the central strategic topic of companies.

The Quality Function Development method is based on team work, so we worked in groups too, together with the leadership the goals were defined and we analysed the problems and the methods.

Due to the four phases of the QFD method it was possible to achieve good work surveillance and reach quick decisions. QFD was used to handle the characteristics, important for the life of the product. Clear matrices and an evaluation system give a profound estimation of the product, because it is being constantly compared to other products in competition.

The comparison between our product and the product of the best competitor in the branch showed that we are able to compete on the market, but the process of estimation must always be present so that we can keep the place we have achieved.

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