



## THE ROLE OF INFORMATION IN PRODUCT INNOVATION PROCESS AND ASSORTMENT MANAGEMENT

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**ABSTRACT. Background:** Entities participating in the product innovation process and assortment management create an organization that processes information, so spending invested in the information processing determines the final form of the new product and assortment management. An important condition for effective communication processes, integration and cooperation between these entities is the right combination of company centers. Cooperation in this system is the basis of combining knowledge, information, experience and the skills of individual team members within the scope of the individual's role and responsibilities. The combined intellectual values determine the efficiency of new product development and assortment management. The level of cooperation in the team results in a particular level of assertiveness and cooperative spirit. Moreover, this cooperation provides the base for the concept of concurrent engineering, which is an integrated process for the development and introduction of a new product onto the market.

**Methods and results:** Studies carried out so far reveal a positive relationship between the use of information derived from market research (marketing information obtained from MDSS / MES) and the success of a product. On the basis of this study, it was found that inappropriate, irrelevant and outdated data and technical documentation, and inadequate distribution of such information causes communication problems between the members of the project team, which is a major barrier to integration and cooperation teams, and has a negative impact on the level of success of new product designs.

The information technologies discussed above should generate eight key types of information required in supporting decision-making processes in new product development: the strategic, financial and program management, new product design (internal sources), technical, the customer and their needs (internal and external sources), and competition and regulations (external source). This arrangement presents sets of information corresponding to information necessary for the formulation of a strategic marketing plan proposed by Ph. Kotler and G. Armstrong.

**Conclusions:** The use of the above types of information differs in the different phases of the integrated product life cycle. In the pre-project phase (FFE - fuzzy front - end activities), the company may need all kinds of information. However, in the commercialization and marketing phases what is primarily required is information about the recipient (the formulation of marketing programs) and program-project management (introduction of a new product onto the market). Technical information is required in the design and development phases of prototypes. Legal and regulatory information regarding the competition, and financial and strategic considerations are especially important in the testing and the economic evaluation phases of new product development.

**Key words:** information streams, product innovation, process innovation, new product assortment management.

### INTRODUCTION

Currently, information describing the status of the product innovation process must be collected in large databases, taking into account the high expenditure on technical

measures. This requires the use of effective methods of collecting and processing data and information on-line. It should also be noted that the traditional models, analytical or empirical, cannot solve all the problems identified in the process of product innovation and assortment management. There are few models with which to predict whether

a potential new product is selected in the ranges of tolerance, accepted by the parties surrounding the company, but sometimes the information supporting these technologies are applicable elements of artificial intelligence, for example, such as neural networks. The purpose of this article is to present the information flow in the process of product innovation and management of new assortment and controlling technology of these streams in companies introducing new products into the market. Authors also propose the strategic tools that provides access to high quality information CIDMM and EIA as the result of analysis of information systems used in marketing channel.

## **INFORMATION STREAMS OF PRODUCT INNOVATION PROCESS**

The current business management information systems contain data sets and information necessary to make a decision. However, in most companies these collections are scattered across the many different systems and platforms and places of occurrence. Thus, lack of integrity of the collection of data and information needed for decision-making extends access to them and, consequently, the process of decision-making.

Product innovation process and assortment management requires a very large number of information links synchronized in time. In conventional systems, the information flow of information is not an integrated and synchronized, which results from the nature of media and information. Also, the process of distributing data and information causes many delays, incompleteness, distortion and higher costs to obtain them. These companies can solve problems by using advanced information technology to capture and data collection, transmission, processing, decision-making processes, sharing in all phases of new product development process and assortment management [compare Dąbrowski 2009].

Today, every business is a system of data and information processing, and the level of expenditures for the processing of information also determines the final concept, form and structure of the new products in marketing

offer [Kahn 2006]. Thus, there are two important, mutually interpenetrating, range of activities related to the processing of information: focus on the development of the product and the process of technical and logistics flow of information and focused on the process, organizational and marketing information flow. The strength and width of the two streams of information flow increases, along with the progress of the product innovation process, see figure 1.

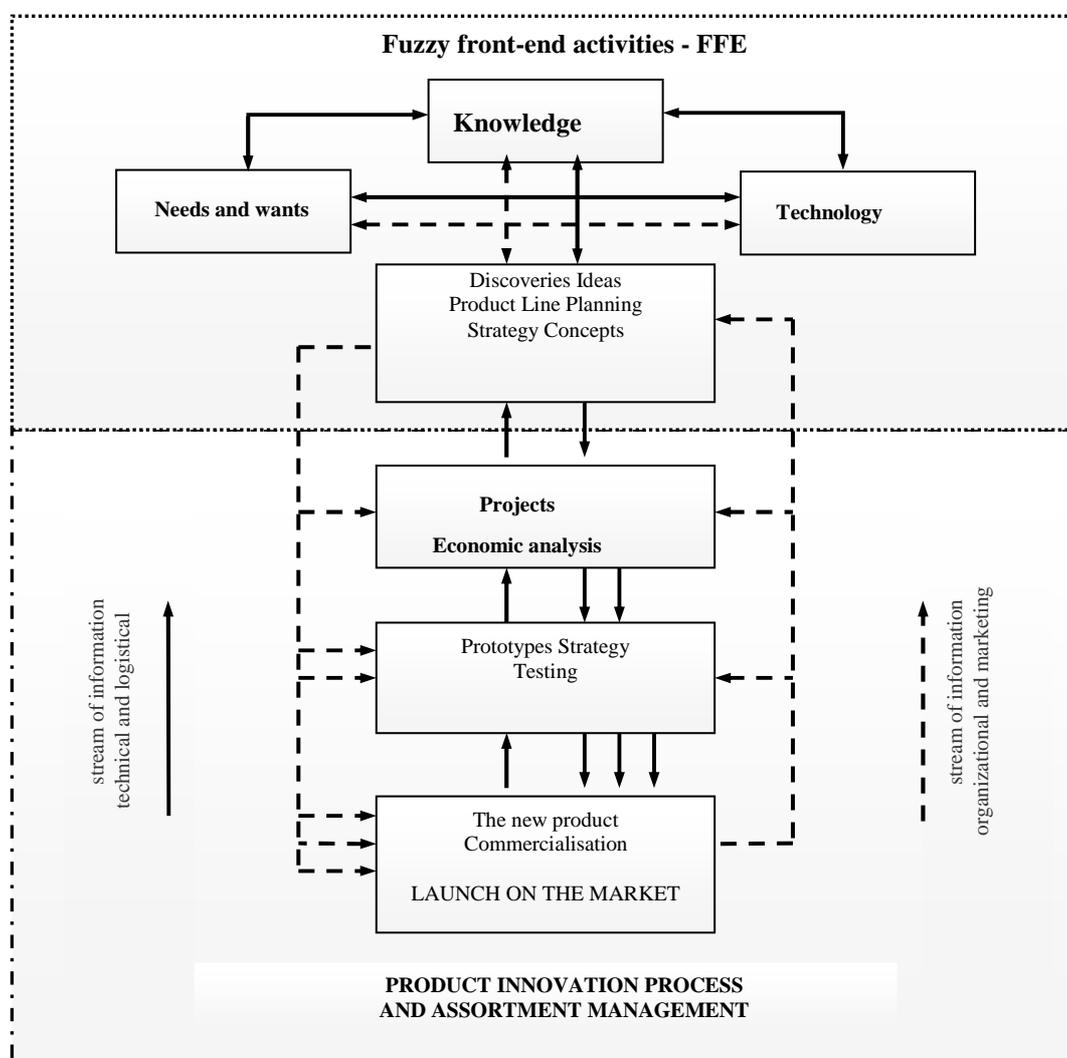
Technical information flow in the different phases of the innovation process and assortment management is characterized by repeated determination of the required data and corresponding to this redundancy. Systems, incorporating more elements than is necessary for functional reasons for increased reliability, are developed techniques and software tools for the products design and their visualization, quality control, process planning, engineering support and logistics (Computer-Aided Design , Quality, Planning, Engineering, Logistics). In these systems contain information necessary for the geometric description of the new product. CAD systems, in particular, are a starting point for the flow of technical efficiency, and electronic data interchange systems - EDI (Electronic Data Interchange) to optimize the logistics flow (exchange of technical data, documentation and exchange of information, collaboration with customers, suppliers) [Atuahene-Gima 2005, Moorman and Miner 2007].

Appropriate data structures and information, including a common data model and information allow to integrate partial solutions. The flow of information must also be possible in the opposite direction to the acquired knowledge can be tested and verified for immediate correction and updating of the major phases of the product innovation process, microstructure, and to compare the size of the received and selected to ensure the quality of the new product.

To achieve the best quality of the new product under the circumstances it is therefore possible economically, because spending on information processing and investment in the process, you can rationalize simultaneously. At the same time only in the production and

marketing phases of the investment can fall at the same time, so as soon as possible from the start of production of the new product must achieve a stable level of production without reservation in terms of quality. Thus, already

in the design and development phases of the new product must take action to minimize the time lag between onset and diagnosis of errors and defects in construction of the new product [Warnecke 1999].



Source: own study and elaboration

Fig. 1. Information streams in the product innovation process and assortment management  
 Rys. 1. Strumienie informacyjne w procesie innowacji produktu i zarządzania asortymentem

Stream of information organizational and marketing content is to assist the rationalization of the product innovation process and match the dimensions of a new product to meet the needs, expectations and preferences of customers, and suppliers, intermediaries and other entities surrounding the company.

## THE CONCEPT OF CIDMM MODEL

On the basis of current network structures, the structure of the software can be formed, supporting the product innovation process and assortment management, coordinated with the processes of production and marketing (sales). You can try to rebuild an inclusive D. Schacher model CIM - Computer Integrated

Manufacturing, and as a result can be implemented computer-integrated concept CIDMM - Computer Integrated Development, Manufacturing and Marketing. In this system, the information generated at any point in the process flow as soon as possible, to those customers whose decisions and actions are dependent on this information. CIDMM concept introduces the principle of grouping and its synthetic information sharing, especially for analytical purposes. Integration is possible provided that the introduction of standards for the exchange of data between programs. It should be noted that the implementation of modern methods of product innovation process and assortment management, such as concurrent engineering, it may be feasible only with the use of the concept of CIM or CIDMM, enabling a significant increase in the efficiency of the new product development process, also due to the high efficiency of the flow of streams Information.

Comprehensive use of techniques and tools in CIDMM system requires a comprehensive analysis of conventional information links between information entities and recreate them in the communication between the software modules. These links can be easily seen in all phases of product development, from fuzzy front-end phase (FFE) to the phases of design, product development, manufacturing, commercialization and assortment management. The design and prototyping phase, the project team should be made to the CAD recording features of the new product, relevant to the recipient, which should be identified by the method of quality function deployment (QFD - Quality Function Deployment) and the techniques of analysis functions (FAST - Function Analysis System Technique) [compare Rutkowski 2007]. In this way they are developed by the public perceived value, build the "house of quality". It is also important to identify and take account of market trends, product innovation, and taking into account the ideas of independent innovators. This record can then be used in the control phase and qualitative analysis of the product, implemented using a CAQ software. Conclusions of the examination and analysis of the quality of the new product should then hit the CAD system. You can also see the impact

on the construction of new issues raised in the design process of technological processes and assembly using the CAP. Programs control devices and machines of CAM technology is receiving information from the CAP, but they can also be a source of information for other systems. These information technologies can improve and optimize control programs, and ultimately improve the quality of the new product at a given level of the cost of its development and production. Thus, the development of systems CIDMM should move towards the fulfillment of assumptions without errors and product defects [Organizacja i Sterowanie Produkcją 2002].

New techniques such as artificial intelligence (AI - Artificial Intelligence), based on neural networks, are used as tools to help design and prototyping stages. Artificial intelligence systems enable the development of complex projects, new products, characterized by variable parameters during the technical and structural characteristics. Also allow solving disclosed in the development of quality problems. Expert systems based on models using AI and neural networks at the same time, generate process management procedures based on information obtained in the previously completed operations. Thus, existing solutions can be adapted to current conditions by enabling opportunities for learning neural network system controlled by AI. The accuracy of designs and prototypes of new products and their compatibility with the needs of customers, is significantly dependent on the quality, quantity and reliability of data (sequences of training data) collected during the monitoring of the actual process of new product development and assortment management.

In the process of new product development and assortment management effective knowledge management and its creation is largely dependent on the implementation of the concept of the product data management system (Product Data Management System - PDMS). Product data management system provides the infrastructure for data and information generated in the process of product development and assortment management. This is a fundamental argument in favor of its implementation in the company. However, this

implementation requires significant investments in software and hardware, and maintenance, consulting services, systems integration and training. It also requires a commitment of time and management of the enterprise and can potentially cause interference within the organization.

### **THE BENEFITS OF INTEGRATION OF DECISION SUPPORT SYSTEMS IN THE PRODUCT INNOVATION PROCESS AND ASSORTMENT MANAGEMENT**

The benefits resulting from the implementation of this system may include [Armstrong 2001]:

- costs reduction through better access to consistent data and information, and faster communication and the ability to fully assess the various options for new projects, the introduction of the concept of concurrent engineering as a method of developing a new product,
- improve the productivity of the design and prototyping (the development team efficiently and productively use their time),
- better engineering changes manage,
- can be the basis for the implementation of ISO 9000 quality system, to maintain a balance between staff, processes, and technology (the company's organizational culture change),
- realistic costs of system implementation.

The basis for product data management, decision support, is oriented to specific thematic data warehouse applications. Data Access Tools provide team members a graphical interface with a data warehouse. Therefore, people involved in the development of a new product can directly affect the structure contained in the databases with naming libraries, with records, tables, and columns. These tools allow for extensive formatting, so that reports on the action taken in the development of a new product may have a specific figure. In the latest IT solutions are integrated MRPII / ERP class systems (manufacturing resource planning / enterprise resource planning) systems on a new data management product (PDMS), a database

application is the integration of material requirements planning. These systems are characterized by a variety of different sources of origin and to achieve the objectives which have been constructed.

The following are recommended best practices for integrating class systems MRPII / ERP (material resource planning / enterprise resource planning) systems on a new data management product (PDMS / CIDMM) [MRP/ERP and PDM: Understanding the fit...]:

- use the product structure management interface and its amendments, including the exchange of data;
- PDM considered as a server in an address, and if possible, to control all access to the data obtained by the product data management system;
- ensure automatic compliance process, in order to preserve the integrity of the structure of the product in its life cycle;
- provide access to data without undue registration;
- break down the traditional barriers between existing designers and engineers, and marketing and finance employees through the use of project teams, training, co-operation and full exchange of data;
- create data in the PDM system and transfer to MRP / ERP (transferred data includes both data on the product, as well as the structure of the product, and because data on the unit of measure, source code, product code, type-status identification document supplier, supplier part number);
- use parallel processing of data in both systems in a situation to make a formal engineering change (control number, description, classification codes, etc.);
- electronically on-line (in real time) permanently monitored and updated product data;
- avoid duplication of data errors, obsolete and unauthorized access to data.

Manufacturing, which will have significant control over the configuration of the product down through the integration of systems, MRPII / ERP and PDM / CIDMM can expect the following benefits:

- reduced storage costs / materials, lower stocks of overdue materials, smaller differences in the states of materials, better use of existing stocks, the reduction of costs of the new product;
- reduction of production costs and sales, lower labor costs, waste, more efficient and faster made changes, better use of lines, higher production efficiency.

Information systems development and implementation, especially Web-based, facilitates data management and information and increases the efficiency of the new product development process. It should be noted, however, that the usefulness and functionality of the application available to a greater degree focuses on the information supporting the production, marketing and sales of existing products, rather than the information supporting the decisions taken in the process of product innovation. So this is a potential area to be completed by the software vendors.

It should be noted that the availability, timeliness, value determines the possibilities of using the information in a rational manner the various methods in the process of product innovation and assortment management, its marketing during the product life cycle.

## **STRATEGIC MANAGEMENT PRODUCT OFFERING TOOL - EFFICIENT ITEM ASSORTMENT**

Satisfactory financial performance depends on properly selected range of appropriate strategies and new products. New products appear and disappear from the market more quickly, which is why it is extremely difficult to build a product mix of appropriate width and depth of assortment, which contains the optimal number of best-moving brands. Finding the right answers to the challenges faced by managers brands of products, product category, and space is not an easy task. Recommendations for determining the optimal balance between product breadth and depth of assortment, there are still difficult for many companies to implement. On the market there are many solutions to support the process of effective management range, but most of them

are in the planning phase of the main letter assortment approach is pushing the "one model fits all". Meanwhile, taking into account the criteria required by various attributes, such as size, location, income, consumers, etc. This requires the development of appropriate assortment ranges (i.e. assortment ranges) tailored to the needs of the local market, it is also a prerequisite for the success of a new product commercialization phase [Rutkowski 2011].

Efficient Item Assortment is a strategic tool that provides access to high quality information, using effective and recognized by the market EIA procedures and analyzes to help decision making in the management of product offerings. To quickly create a complex assortment lists EIA also offers retailers, manufacturers and distributors the opportunity to combine forces and use of competitive advantage and achieve additional growth of the product line or category.

Processing and analyzing the available data product manager is able to check whether a range of products includes appropriately shaped product mix to ensure the diversity sought by customers while increasing sales across the category. Using a friendly-to-use data import wizard, Efficient Item Assortment allows you to import relevant data and market sales, which greatly facilitates selection of appropriate information needed to make effective decisions assortment. Another improvement is the ability to maintain employment data import settings as a profile for multiple use. In addition, fast and simple implementation allows you to enjoy better results after implementation of the program. With the right strategy and tactics define the product and corrections applied on the product mix, you can quickly record an impressive improvement in labor productivity and a significant shortening of the implementation of category plans.

Regardless of whether or not the strategy for the product line is to increase the speed and defense market segment, the system gives the possibility of partnerships between retailers, manufacturers and distributors who share their knowledge of the market and the producers of common strategies. Putting basic questions

such as who, what, how, where, why, how often, how the customer buys the system supports an objective analysis to create the optimal product mix. This allows you to achieve the main goals for the product line or category. To confirm that the share of the product in the category meets the requirements of the market and sales allocation, the system helps to filter the list of products with detailed methodology and procedures.

The removal of unprofitable units of the product offer, add or maintain efficient range of products from each market segment will allow its effective implementation of product and market strategy, and thus achieve measurable benefits - higher sales and profits and lower losses and operating costs [Nakata Cheryl, Di Benedetto C. Antony 2012; Merle, Di Benedetto 2011].

The system provides flexible and simple-to-use reports that allow you to focus on the analysis and spend less time on data processing. Powerful graphical user interface presents the analytical elements in tabular and graphical form, so greatly simplifies the process of decision-making. As a result, it is easier to monitor changes in sales value and quantity. Using the module system (Combined Performance Index - CPI) of the product or segment groups, using one or more sets of data can be compared to the products category or another. The user has access to critical information to determine whether the objectives of the category in the right way to optimize the cost of distribution and exhibition space, the stock and the flow of customers.

The main benefits of the system supporting the management of product offerings:

- flexible data structure - no predefined fields,
- import market data, POS and processed panel data available in different formats,
- connection to the source data range using the data import wizard,
- flexible structure design options based on user-defined key data for the use of user-defined multi-criteria weighted according to the applicable business rules,
- load the consumer decision tree structure (CDT) and its use in the analysis of range,

- generation of key assortment lists with one click,
- assortment management decisions with exceptions,
- review recommendations to facilitate decision-making by removing, adding, or behavior of the product range,
- use notes to track the logic of the proposed changes in assortment,
- use a fully reversible mesh allowing for analysis and finalization of range,
- monitoring the performance category with powerful reporting module,
- analysis and extensive tabular charts with advanced graphical user interface,
- integration with most systems management space through the use of Excel and CSV format (Comma Separated Values - comma separated values for data transfer).

For example Strategix is a supplier of market-leading range of management tools and a sales space. JDA Portfolio Company Intactix Software Inc. is a fully integrated solution that provides support in the process of category management, assortment planning and optimization, data analysis, reporting, sales, demand planning and maintenance category. It consists of: Space Planning by IntactixTM, Floor Planning by IntactixTM, Shelf Assortment by IntactixTM, Efficient Item Assortment by IntactixTM, Intactix Knowledge BaseTM [Strategix, Assortment Management]. The system allows for instant access to information to assist in managing the company's products. So you can get information about the number and value on offer goods, the amount established and realized margins, the size of the profit markdown control, the amount of loss, the size of loss, the results of the promotion is the sales, turnover of goods. All these details are known, both for individual goods, and groups of the whole range. Thanks to determine their role in shaping the overall turnover of the company. This information and the resulting consequences are used to make strategic decisions about the directions of further development of the company.

## CONCLUSIONS

Complex financial and marketing analysis requires vast amounts of data processing. To analyze these do not jeopardize the operation manager, has been developed data replication technology. This means copying data from other databases (Oracle, PostgreSQL). These databases are characterized by an open architecture that enables the creation of arbitrarily complex queries in SQL, and therefore obtaining even the most complex reports. For managers, managing a highly extensive range of products, information showing the impact of individual marketing activities on the overall financial performance and the ability to plan the cyclical nature of such actions are necessary for the continued, effective operation of the company. Thus obtained, using the marketing, statistics (daily, monthly, etc.) and their analysis, form the basis for delineation of the direction of the company.

Quick access to information, via remote transmission of data to the control panel, allows the preparation of any studies which are aimed at facilitating decision-making for management, R&D, purchasing and marketing department. With the information provided by the system, you can quickly make decisions, which in the modern market is very important.

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## ROLA INFORMACJI W PROCESIE INNOWACJI PRODUKTU I ZARZĄDZANIA ASORTYMENTEM

**STRESZCZENIE. Wstęp:** Podmioty uczestniczące w procesie innowacji produktu i zarządzania nowym asortymentem tworzą sieć organizacji (ta sieć powinna być zintegrowana) przetwarzających informacje, zatem nakłady poniesione na realizację procesów informacyjnych determinują ostateczną formę nowego produktu oraz jego sukces rynkowy [Crow 2002]. Istotnym warunkiem sprawnego przebiegu procesów komunikacji, integracji, współpracy tych podmiotów jest właściwa kolokacja centrów wartości w przedsiębiorstwach. Współpraca w tym układzie jest podstawą łączenia wiedzy, informacji, doświadczenia oraz umiejętności poszczególnych członków zespołów projektowych w ramach indywidualnego zakresu roli oraz odpowiedzialności. Poziomą współpracę w zespole jest natomiast wypadkową poziomu asertywności oraz poziomu kooperatywności. Poza tym współpraca jest fundamentalną bazą koncepcji inżynierii współbieżnej, czyli zintegrowanego procesu rozwoju i wprowadzania nowego produktu na rynek.

**Metody i rezultaty:** Dotychczasowe badania ujawniają pozytywny związek pomiędzy stopniem wykorzystania informacji pochodzącej z badań marketingowych, a różnymi miernikami powodzenia produktu. Poza jednak informacjami rynkowymi zespoły projektowe potrzebują także innych rodzajów danych i informacji, które istotnie determinują powodzenie nowego produktu. Przedstawione technologie informacyjne powinny generować osiem kluczowych rodzajów informacji niezbędnych we wspomaganym decyzyjnym procesie rozwoju nowego produktu: strategiczne, finansowe, zarządzania projektem, techniczne, dotyczące odbiorcy i jego potrzeb oraz konkurencji i regulacji prawnych. Taki zbiór informacji odpowiada grupom informacji, niezbędnych w procesie formułowania strategicznego planu marketingowego.

**Wnioski:** Zakres wykorzystania wymienionych wyżej rodzajów informacji jest różny w poszczególnych fazach zintegrowanego cyklu życia produktu. W fazach przedprojektowych (FFE - fuzzy front - end activities) firma może potrzebować wszystkie rodzaje informacji. Natomiast w fazie komercjalizacji i wprowadzania na rynek wymagane będą przede wszystkim informacje dotyczące odbiorcy (formułowanie programów marketingowych) oraz zarządzania programem-projektem (wprowadzanie nowego produktu na rynek). Informacja techniczna wymagana jest w fazach projektowania i rozwoju prototypu nowego produktu. Informacje prawno-regulacyjne, dotyczące konkurencji oraz uwarunkowań finansowych i strategicznych ważne są przede wszystkim w fazie testowania i oceny ekonomicznej nowego produktu.

**Słowa kluczowe:** strumienie informacji, produkt, innowacja, proces innowacji, nowy produkt, zarządzanie asortymentem.

## DIE ROLLE VON INFORMATIONEN IM PROZESS DER PRODUKTINNOVATION UND DES SORTIMENTSMANAGEMENTS

**ZUSAMMENFASSUNG. Einleitung:** Die Unternehmen, die am Prozess der Produktinnovation und des Managements eines neuen Sortiments teilnehmen, bilden ein Netz von Organisationen (dieses sollte nach Möglichkeit integriert sein), die Informationen verarbeiten. Die Aufwendungen für den Informationsaustausch zwischen ihnen bestimmen also die endgültige Form des neuen Produkts und beeinflussen seinen Markterfolg [Crow 2002]. Wesentliche Bedingung für einen effizienten Verlauf der Kommunikations-, Integrations- und Kooperationsprozesse zwischen diesen Unternehmen ist die richtige Kollokation der Wertschöpfungszentren in den Unternehmen. Die Zusammenarbeit auf diesem Gebiet bildet die Grundlage für die Verknüpfung von Wissen, Informationen, Erfahrung und individuellen Fähigkeiten der Mitglieder der Projektteams im Rahmen ihrer je individuellen Rollenzuweisung und Verantwortlichkeit. Das Niveau der Zusammenarbeit im Team ist dagegen die Resultante aus den Niveaus von Durchsetzungswillen und Kooperativität. Außerdem ist Zusammenarbeit die grundlegende Basis für die Konzeption der verteilten, gleichzeitigen Entwicklung (Concurrent Engineering), also des integrierten Entwicklungs- und Markteinführungsprozesses für neue Produkte.

**Methoden und Resultate:** Bisherige Untersuchungen haben eine positive Korrelation zwischen der Nutzung der Informationen aus der Marktforschung und verschiedenen Messgrößen für den Erfolg des Produkts gezeigt. Neben Informationen aus dem Markt brauchen Projektteams jedoch auch noch andere Arten von Daten und Informationen, die den Erfolg eines neuen Produkts wesentlich determinieren. Die vorgestellten Informationstechnologien sollen acht grundlegende Informationskategorien hervorbringen, die zur Entscheidungsunterstützung bei der Entwicklung neuer Produkte erforderlich sind: strategische, finanzierungsbezogene und Informationen aus dem Bereich des Projektmanagements, technische Informationen und solche über den Abnehmer und seine Bedürfnisse, schließlich Informationen über die Konkurrenz und die rechtlichen Rahmenbedingungen. Eine solche Informationssammlung entspricht den Gruppen von Informationen, wie sie im Prozess der Formulierung eines strategischen Marketingplans benötigt werden.

**Fazit:** Welche der vorstehend genannten Informationsarten in den einzelnen Phasen des integrierten Produktlebenszyklus vorwiegend abgerufen werden, unterscheidet sich je nach diesen Abschnitten. In der Phase vor Beginn des eigentlichen Projekts (FFE - fuzzy front-end activities) kann das Unternehmen alle Arten von Informationen gebrauchen. In der Phase der Kommerzialisierung und Markteinführung dagegen sind vor allem Informationen über den potentiellen Abnehmer (Formulierung von Marketingprogrammen) und solche zum Management des Projektprogramms (Markteinführung des neuen Produkts) gefragt. Technische Informationen sind während der Projektentwicklung und der Erstellung des Prototyps des neuen Produkts erforderlich, Informationen zu den rechtlichen Rahmenbedingungen, zu den Wettbewerbern und den finanziellen und strategischen Bedingungen sind vor allem während der Testphase und während der wirtschaftlichen Bewertung des neuen Produkts wichtig.

**Codewörter:** Informationsströme, Produkt, Innovation, Innovationsprozess, neue Produkte, Sortimentsmanagement.

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