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R&D-MARKETING INTEGRATION IN THE NEW PRODUCT DEVELOPMENT PROCESS

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Abstract

The requirement of quick accommodation to dynamic changes strengthens the role of knowledge flow in interfunctional relations. The requirement of integrated knowledge is the most explicit in the relations of R+D and marketing, researchers are increasingly aware of its key role in innovation.

The integration of R+D and marketing – the interface problem – is a decisive field in current international innovation researches; particularly its role in the development of new product is in the limelight. The issue of integration is complex, the possibility and necessity to connect knowledge elements are influenced by a wide range of external and organizational factors. There is close relation between integration and the strategic behavior of companies.

The goal of theoretical researches is to reveal the causes of integration niche in order to create efficient and productive interface.

Keywords: R+D-Marketing, interface, innovation, new product development.

1. Innovation and Interfunctional Integration

In the period of globalization and accelerated technological development, the starting point of strategy creation at companies is to understand the dynamics of changes and to elaborate the right reactive capacity. Competitive edge comes from the ability of a company to collect and process information and to respond quickly with the adequate product (MROZ, [34]). *Information* will have key role in the efficiency of innovation and will become more important than the product itself regarding the attainment of competitive edge (DOYLE, [7]).

The ability of the organization *to recognize the value of outside information, to process and to apply them* is called the *absorption capacity of the organization* by Cohen and Levinthal (cited by TANG, [43]) and they emphasize its critical significance in the *innovation capacity*.

Information giving impetus to innovation and mediating the changes to the outside environment (TANG, [43]) gets into the organization through *different functions*. An organization can benefit from its absorption capacity, if:

- all the functions relevant for the efficiency of innovation will have roles in the decisions;
- knowledge elements belonging to each function are linked through transactions and cooperation among the functions.

Regarding innovation, linking *technical* (technological) *and market* (marketing) expertise is the main field of knowledge flow among functions. The role of absorption capacity has been upgraded in both respects.

- As a result of globalization the *scope of innovation has expanded*, companies have to watch and analyse the external changes continuously in order to make use of the new opportunities.
- Fast changes *eliminate already acquired markets*, time-honored technical and marketing solutions overnight. Even winning strategies will wear off soon (DOYLE, [7]). Competitors copy the successful products. Available and well communicated information is the key to flexible changes and the development of alternative actions.
- *To act first*, to respond faster and more decisively than the competitors often means insurmountable competitive edge, which requires constant and close look at the customers, market and technological trends.
- *Regular tracking of consumers' satisfaction* is necessary to develop customers' loyalty. Innovative companies will become studying organizations not only technically but also in their constantly maintained knowledge of the customers (DOYLE, [7]).
- *The growing number of possible sources of technical knowledge elements* (IANSITI–WEST, [21]) burst the R+D framework based on its own potential. Companies must always watch the scenes of technical-technological breakthroughs; look for the actors, connecting links from where the necessary knowledge elements can be integrated. The technological foresight activity will have strategic role and will become an integral part of the practice of R+D management (EDLER, [9]).

The role of linking innovation and market orientation in successful company development will have increasingly greater role in theoretical researches (BERTHON et al. [4]). Instead of the traditional approaches contrasting the two management philosophies, analysts look at market orientation as the basis and not the replacement of company innovation (BERÁCS, [2]).

The linking of the two orientations reframes the roles both from technical and market aspects:

- *Approaching the technical knowledge to market criteria* indicates a shift from the initial linear model of innovation to integrated approach highlighting the criteria of practical utilization. According to theoretical experts advocating the linkage of innovation and market orientation, the rationality of innovation-orientation is given by the ability of the technology to create market and customer (BERTHON et al. [4]). Hungarian researchers of the subject also

emphasize that innovation will take place only if the result on the market acknowledges the creative idea (HOVÁNYI, [20]), if the products and services developed with novelty are successfully sold (IVÁNYI–SZILÁRD, [22]). The compulsion to adapt to the accelerated changes will quickly cease the separation of invention and practical application, and the two areas' building on each other and their interrelation is becoming increasingly evident (REKETTYE, [37]).

- *Approximation of market knowledge to the technical criteria* means reinterpretation of the role of marketing, a shift from linking to the end of the innovation (product development) cycle to integration with the whole development process. Marketing knowledge as backend, which means promotion and support of sales is replaced by marketing knowledge, as 'fore end', the integrated marketing process (MROZ, [34]).

2. The Role of R+D and Marketing Interface in the Development of New Product

The investigation of the connection of the three functions R+D, marketing and production, the so-called 'developing triad' is in centre of research dealing with interfunctional flow (RUEKERT–WALKER, [38], SONG et al., [41], OTTUM–MOORE, [35]). Within research on the connection of the 'developing triad' – particularly as companies outsource production – integration of R+D and marketing are in the limelight. Both functions *provide inputs* for tasks decisive for the successful market role of the company, in this way integration of their expertise is indispensable for the success of the innovation processes (GRIFFIN–HAUSER, [14]).

Researches looking at the importance of the *flow* between R+D and marketing appeared first in the 70s. *Managing the R+D/marketing interface* was emphasized first in the 1980s and has been regarded as a company *success factor* since then (GRIFFIN-HAUSER, [14]).

The analyses focus on the *role of R+D/marketing interface in the development of a new product*. Because of the shortening life-cycles, companies increasingly have to face the highly cost-intensive and uncertain activity of developing and introducing new products. The *multifunctional process* of product development includes several activities carried out by groups with different abilities, knowledge elements, resources, competences and cultures (AYERS et al., [1]). Since the efficiency of efforts made for success is not decided by the expertise of only one group, function, but the linkage of their knowledge elements, researchers look at the efficient management of interfunctional integration as a decisive factor in reducing the risk of product development.

Researches on relations between interface and the success of the new product have different disciplinary backgrounds. The different linkage models revealing the impact mechanisms can be grouped into three decisive research perspectives (GIMA et al., [12]):

- *Information processing*. Information processing is the central dimension of the R+D/marketing interface. The new product-development teams are actually the information processing subsystems of the organization (MOENAERT–SOUDER, [32]).
- *Resource dependence*. Marketing and R+D can play their roles in the development process as a function of the necessary resources. Relating group interests may lead to conflicts and hinder the linkage of knowledge elements through competition between the two functions.
- *Social policy*. The new product development process is interwoven by the interest-enforcing endeavors of the actors and their struggle for positions (MARHAM, [30], MAUTE–LOCANDER, [31]), therefore sufficient integration between the two fields during the development process will determine not only the performance of the new product, but may promote the *balance among the power structures* (JIN, [25]).

Although researchers look at the problem from different disciplinary backgrounds, all linkage models show that the role of integration in the constantly reviving, complex process of new product development can be analysed only in dynamic approach, *in the context of organization-environment*.

2.1. Context of Interface

2.1.1. External Environmental Factors

Perceived Environmental Uncertainty

Changes in environmental – market, technological – uncertainty influence the interdependence of functions and in this way the need for integration.

Changes in consumer needs. Growing consumer needs – according to the experiences of empirical studies – influence new product development in two ways. *Higher consumer expectations strengthen the processes of market knowledge competence* and in this way increase the integration need between R+D and marketing (GUPTA et al., [15], GRIFFIN–HAUSER, [14], LI–CALANTONE, [29]). At the same time, it has also been proved that higher customer expectations may influence the success of the new product also through the *intensity of R+D operation* (LI–CALANTONE, [29]).

Changes in technology. Changes in technology on the market of certain products may differ significantly. Researchers' opinions about the impact of technological changes on certain processes of market knowledge competence are different (LI–CALANTONE, [29]). There is a consensus that the speed of technological changes, the shorter technological life-cycles increase technical uncertainty related to the project. In this way, higher level R+D and marketing integration is necessary (GUPTA et al., [15], GRIFFIN–HAUSER, [14]). Opinions on the impact of technological changes on acquiring consumer information are quite contradictory. While

some researchers say that fast technological changes stimulate consumer knowledge (NARVER and SLATER, (1990), cited by LI–CALANTONE, [29]), others underscore that if technology develops fast, the information provided by the consumers may lose its value. Consumers may be less aware of the developing technology, in this way close interaction with the consumers may provide less insight into the developing market (JAWORSKY–KOHLI, [24]), or at least no significant relation is shown between the speed of technological changes and getting information about consumers (LI–CALANTONE, [29]).

Competition intensity. Innovation studies provided empirical background to researchers' presumptions that strong competition increases the role of using competitors' knowledge in the innovation processes (HAN et al., [18]) and in new product development (BRIDGES, ENSOR and THOMPSON, 1992, cited by LI–CALANTONE, [29]). Empirical studies have also indicated, the shorter a product's life-cycle the more intensive the activities are to watch the competitors during the product development. According to researchers, the reason is that the close watch of the competitors gives early warning whether the opportunity created by the emerging technology is used to achieve speed-advantage in the new product development (LI–CALANTONE, [29]). The conclusion from the above research is that the information about rivals in intensive competitive environment plays relevant role in new product development decisions, what increases the dependence of R+D marketing on inputs.

The *character of the competition environment* also influences the role of integration. On markets where several critical competition factors are present, there is greater possibility to combine the different knowledge elements in the field of activity wider both in technical and marketing aspects. R+D and marketing functions may significantly support each other in the development of the differentiating advantage, thus management of interface may have important role in the new product development. If no differentiating advantage can be obtained on a market, the role of the interface may be restricted by highlighting the cost-efficiency criteria, or the relation of R+D and production will be more decisive in the 'developing triad'.

Accordingly, researches on the relations between external environment and interfunctional integration agree that *stronger – market and technological – environmental uncertainty requires greater R+D/marketing integration* (GUPTA et al., [15], RUEKERT–WALKER, [38], HAN et al., [18], SOUDER–SONG, [42]).

The fact that external changes *continuously reevaluate the responsibility of functions* in the development of new products is an important consideration for the integration effects of environmental uncertainty. The role of knowledge elements and information relating to certain functions is modified simultaneously by the changes in the technological and market environment just as public and environmental restrictions (GRIFFIN–HAUSER, [14]). Changes in the competition environment highlight marketing; the acceleration of technological changes increases the responsibility of R+D.

Cultural Environment

Factors influencing the new product development may have different roles as a result of cultural differentiation, therefore neither can the integration need be separated from the cultural environment the company operates in. Researches comparing Japanese and American product development models (SOUDER–SONG, [42]), for example, indicated perceivable differences in three conditions. They are the inclusion of the top management, decentralization and the extent of R+D and marketing integration. The results have shown that R+D/marketing integration plays more important role in the collectivist Japanese culture where experts of certain functions give priority to the success of the project over the interest of their own division (SOUDER–SONG, [42]).

2.1.2. Company Factors

Organizational Orientation

The measure of the marketing-oriented company behavior is the perception of the importance, free flow and incorporation of market knowledge into the decision-making practice of the other functions. Empirical researches prove, *the more aware the top management of the importance of market knowledge, the stronger the link between R+D and marketing in product development is* (LI–CALANTONE, [29]). Functions increasingly approximate each other in the organizational and management process of customer-oriented business enterprises, and working groups with several functions promote the integration of market and technical knowledge elements (DOYLE, [7]). On the other hand, organizational isolation of marketing and R+D is experienced at highly technology-oriented companies, where the top management along with R+D claim that concentration on technology in the innovation process is more important than information about customer needs (GIMA ET AL., [12]).

Organizational Size

Integration of R+D and marketing functions is a critical factor in new product development only in case of a given company size. The bigger an organization, the more specialized the R+D and marketing functions are, often they are physically separated, what risks their distancing from each other and the communication between them is fading (GRIFFIN–HAUSER, [14]). Technical and market knowledge elements are often concentrated in one hand at small organizations or the two different subcultures are related to individuals and not to groups which causes conflicts to smaller extent.

Strategic Behavior of the Organization

Interactions between R+D and marketing *are based on strategic positions*. Different strategic alternatives require the inclusion of R+D and marketing resources and capacities to different extents, so the choice of strategy and the need for integration are closely related to each other (GUPTA et al., [15], GRIFFIN–HAUSER, [14]).

- Companies pursuing *first-to-market* strategy want market-leading position built on technological advantages. Both market and technical risks of using the strategy are very high, up-to-date knowledge for the forecast of market trends and technological foresight are both indispensable for success. R+D and marketing functions are greatly interdependent pointing at high level integration. It is an empirically proved fact that the managements of leading companies require integration more than defender companies with lower level of innovation (GUPTA et al., [15]).

In case of *defender* companies, the importance of flow among functions is related to the speed of follow-up.

- The *early-to-market* companies aim at application-oriented improvement of successfully introduced innovations, technological solutions. They are mature innovations; therefore the existing experiences reduce technical (technological) uncertainty. Market positions, however, are not settled yet, the development of the individual competitive edge keeps both R+D and marketing costs at high level. The requirement of fast response in the selection and integration of the technology, and the significance of the information about markets and competitors in creating differentiating advantage call all for knowledge integration.
- Companies pursuing *late-to-market* strategy often copy products successfully on the market at decreasing costs. A critical factor in using a strategy with small market- and technical risk is the price; interdependence of functions because of little own know-how is slight.

Organizational Attributes

Organizational structures play a decisive role in the operation of interface (CALANTONE et al., [5]), therefore literature in this field pays great attention to revealing the *organizational factors* of integration (GUPTA et al., [15], CALANTONE et al., [5], GRIFFIN–HAUSER, [14], AYERS et al., [1]).

Company Organization Innovations Promoting Integration (GRIFFIN–HAUSER, [14]) opens up new prospects in researches. Recognizing the limits of functional separation, the goal of researches is to reveal the organizational attributes, which are positive basis for interfunctional relations, encourage cooperation on the merit, early

conflict management, and ideas about common goals. Several studies (GRIFFIN–HAUSER, [14], OTTUM–MOORE, [35]) deal with the impact of integrations mechanisms on new product development.

2.2. Project-level Interface

Innovation 'basically is the process of raising and executing a project with the goal to market or utilize the innovative product, process or service' (TANG, [43], p. 298). In this way a decisive direction in research is the study of the impact of project-level interface. Project-level interface can be studied along different dimensions (GRIFFIN–HAUSER, [14]).

2.2.1. Necessary Level of Integration – Situational Dimension

Situational dimensions are summed up by the necessary level of integration and are influenced by two factors: the character and situation of the project (GRIFFIN–HAUSER, [14]).

Subject-Specific Situational Dimension – the Character of the Project

All new product development projects embody a given performance-, demand- and technology level (GRIFFIN-HAUSER, [14]). Individual projects may substantially differ regarding market (customers and competitors) and technological risks, even if the company pursues the same strategic course.

- *Innovative character* of the new product, its novelty for the company and/or market,
- *complexity* of the new product, the relation between technology and product development compared to the former new product project,
- *importance* of the new product, its impact on the profitability and productivity of the company

have role in it.

In case of different projects, the necessary level and type of integration is also different. Generally accepted is that *higher uncertainty necessitates stronger R+D/marketing integration* (RUEKERT–WALKER, [38], GRIFFIN–HAUSER, [14], TANG, [43], SOUDER–SONG, [42], GIMA et al., [12], JIN, [25], GOMES et al., [13]).

The reduction of the project risk depends on knowledge to be acquired and on learning. Greater uncertainty requires mutual attainment of new knowledge elements, changes in knowledge base and so it increases the interdependence among functions. If we accept the definition, according to which *flexibility of R+D and*

marketing means endeavor to attain knowledge elements, abilities belonging to other field (JIN, [25]), we can conclude, the stronger the uncertainty of the project, the greater the role of the flexibility of the two functions is in the success of the new product development process (GIMA ET AL., [12], JIN, [25]). These relations are true even on the contrary, the actually achieved integration level decreases uncertainty in the project through mutual adaptation of the knowledge elements and in this way influences both technology and market results (GRIFFIN–HAUSER, [14]).

Phase-Specific Situational Dimension – State of the Project

Need for integration is *different in given stages* of the product development process. The utilization of the synergy potential of R+D and marketing is mainly needed in the early phase of product development (generating and selecting ideas, developing and testing product concept). Later, the integration is less critical for success, then relation between R+D and production has greater emphasis (GRIFFIN–HAUSER, [14], GUPTA–SOUDER, [16]). In the period of market entry, the role of marketing knowledge elements is decisive.

2.2.2. The Achieved Integration Level – Structural and Process Dimensions

The achieved integration level characterizes *structural and process dimensions*, which cover company actions promoting integration (GRIFFIN–HAUSER, [14]). They are focused on three big fields:

- communicated and used information,
- functional transactions crossing borders,
- coordination mechanisms influencing relation.

Interface researches are interwoven by all the three topics, but as a result of different emphases, theories of the integration transaction and the one based on collaboration have been separated (KAHN, [26]). The border between the two theories is whether integration is traced back to interaction or cooperation among functions.

Interaction-based approach – which is present not only in theoretical literature (GUPTA et al., [15], GRIFFIN–HAUSER, [14], MOENAERT et al., [32]), but in company practice as well: *it seems decisive to increase the frequency of contacts and in this way the possibly most intensive flow of information* to make the new product successful (KAHN, [26]). Followers of this school emphasize the role of formal communication, officially coordinated activities in order to increase transactions among the functions.

Followers of the school *measure the level of integration with the intensity of interactions; they think frequent interaction is the efficient integration* (KAHN,

[26]). This causes the main deficiency of the transaction-based approach, which means that *exaggerated emphasis on information sharing overshadows the efficient adaptation of information*. Several researchers warn of this phenomenon, negative for integration. KAHN [26] emphasizes that frequent contacts among functions and quantitative increase of shared information themselves do not mean advance for the project and vice versa. The cooperation between the two functions is not equal to frequent contacts. BERNASCO et al., [3] highlights that although different meetings, committees, and telephone calls develop interaction but not necessarily the cooperation. To this end, the goals are to be shared, mutual understanding and stronger informal activities are needed. JAWASALLA and SASHITTAL [23] point out that interactions among R+D and marketing experts as members of a group consisting of different experts may be frequent, but they themselves do no guarantee the development of trust and solidarity within the group. According to AYERS et al., [1] the quantity (frequency) of interactions is not equal to their quality and if the relation is disfunctional or adversarial, forced interactions are not suitable for their remedy.

The collaboration-based concept interprets the integration as cooperative behavior (KAHN [26]), when the relation among functions goes beyond negative attitudes, behaviors coming from role-oriented differences and mutual understanding, common goal and shared resources become typical. The cornerstone of collaboration philosophy has *developed relational norm and informal communication promoting it* (GOMES et al., [13]). The followers of the school say the returns of developed relational norms are stronger cooperative behavior, which is the condition of efficient integration (AYERS et al., [1]). At the same time, the significance of the response is also emphasized: the higher level of cooperation stimulates interaction among functions since requires closer relation and more communication, which does not necessarily mean formal communication!

The integration requires the increasing *role of flexibility* in both fields (JIN, [25]). Resulting from the lack of structure in collaboration-based integration, it often manifests itself in employees' crossing their scope given by their roles. *Role flexibility means a behavior leaving the functional role, when some experts undertake extra functional tasks, which belong to other function during the project*. It is empirically proved that role flexibility exerts significant positive impact on information flow between marketing and R+D (MOENAERT et al., [32]).

2.2.3. Outcome Dimension

The outcome dimension shows the impact of integration on new product success, which is operationalized by certain models with different groups of indicators. The outcome dimension can be interpreted from two aspects (GRIFFIN–HAUSER, [14]):

- actually achieved integration level,
- correlation between necessary and achieved integration levels.

The actually achieved integration level can be grasped from both of knowledge-capital and relational capital.

Measures of efficiency regarding knowledge-capital:

- Functional results (R+D and marketing) achieved through attainment of new knowledge elements coming from the other field;
- Joint results, realization of project goals through linkage of knowledge elements, making use of their synergy potential.
- Outcome dimension is quite complicated regarding relational capital. Psycho-social results perceived by the participants, experienced efficiency of relations with individuals belonging to the other function, the extent of conflicts among groups might belong here (RUEKERT–WALKER, [38]).

Another aspect of outcome dimension is the *extent of correlation between the necessary and achieved integration levels.*

If the *achieved integration level remains below* the level which is required by the character of the project, uncertainty will not decrease to the necessary extent and it might endanger the efficiency of product development (GRIFFIN–HAUSER, [14]). In this case it may happen that:

- Information relevant for the project is not shared and processed to the extent of the mutual interdependence of functions, so both technical and market uncertainties will increase;
- The dependence of R+D function is stronger than the marketing information aimed at it and processed by it, which makes its adjustment to technological market needs and transformation of R+D results to market successes more difficult;
- Dependence of marketing function is stronger than technical information aimed at it and processed by it. Marketing does not integrate sufficiently technical inputs necessary for new product development, so converting situational utility to the language of product quality may encounter difficulties.

In addition, *neither can integration on a level higher than desirable be clearly deemed favorable*. If the achieved level of integration is higher than necessary, *team members will lose sight of their own functional tasks* as a result of flowing knowledge elements not relevant for the project, which may increase market/technical risk (GRIFFIN–HAUSER, [14]). Too close relation may pose obstacle to challenges, suppress conflicts, and clashes of the different viewpoints, which are indispensable parts of the multifunctional process of product development (DYER–SONG, [8], AYERS et al., [1]).

3. The Integration Niche

3.1. Role-Oriented Differences

The new product development process is complex and iterative; therefore its success is significantly influenced by the *personalities and communication capacities of the*

participants in addition to expertise (AYERS et al., [1]). Looking at information flowing among functions and tasks to be performed, different behaviors and attitudes also appear, *therefore the integration of tasks and activities means the coordination of attitudes and behaviors, as well* (GOMES et al., [13]).

There is theoretical and empirical evidence that R+D and marketing experts judge differently the function specific tasks and inputs necessary for the new product development process (ERNST–TEICHERT, [10]), what means *they perceive the interface problems differently*.

The professional orientation theory as one of the disciplinary backgrounds of researches (JIN, [25]) traces back the causes of perception differences of the new product development process to different *role orientations* of the two functions. The difference can be shown at both aspects of role orientation, they are as follows:

- *professional specialization* is professional commitment, values, abilities and attributes belonging to the professional subculture;
- *organizational socialization* is the involvement of experts, commitment, loyalty to organizational goals, and related values, attitudes, abilities and knowledge.

Cumbersome sharing and processing of information and knowledge elements among functions cause communication disorders, which act against integration endeavours. Since the *new product development process can be interpreted as a series of information processing activities* (GUPTA et al., [15], MOENAERT et al., [32], GRIFFIN–HAUSER, [14], SOUDER et al., [42]) information reception has outstanding role for integration. Researches have devoted great attention to studying the relation between mutual processing ability of information and the success of product development (RUEKERT–WALKER, [38], MOENAERT et al., [32], MOENAERT–SOUDER, [33], OTTUM–MOORE, [35], GIMA et al., [12]).

To study information reception thoroughly – in relation to the two functions – the impact mechanism of *participation and influence* are to be separated:

- *participation* refers to what extent information sharing and communication is present between R+D and marketing in course of new product development (ACQUISITION–DICKSON (1991) cited by GIMA et al., [12]);
- *influence* shows to what extent the information provided by participants in the new product development process lead to changes in the behavior, attitude and/or actions of recipients (KOHLI (1989) cited by GIMA et al., [12]).

The question of information reception is closely related to the *perception of the usefulness of information*. The *clarity* of information means the cornerstone of interface problems. Resulting from role orientation differences, both functions have their own *languages*, information style and their process and evaluate incoming information through this filter. ‘While marketing experts speak about product utility and perceived positions, R+D experts understand the quantitative language of specifications and performance.’ (GRIFFIN–HAUSER, [14], p. 196).

Because of the different languages, information decoding, in this way perception of usefulness is difficult (MOENAERT–SOUDER, [33]). It may cause dissatisfaction with the project role of the other function, the extent and quality of

information and knowledge elements and provides it finally with the judgment of the whole new product development process (ERNST–TEICHERT, [10]). Because of perception differences and response distortions, participation and influence may separate and in this way, in spite of information sharing, the knowledge elements do not integrate to the necessary extent.

Since role orientation can be *interpreted dynamically*, the possibilities of participation and influence are determined also by further personal factors regarding both R+D and marketing functions during different new product development processes. They include:

- *expert power* – to what extent the person belonging to the given function is taken seriously if he/she has relevant information on the new product development process (GIMA, [12]);
- *interest in the new product development results* – to what extent the experts belonging to the given function are influenced by the results of the process (project) (DAWES et al., [6]). The impact of the result on the career, recognition and status of the marketing and R+D actors;
- *influencing attempt* – the extent of endeavor or pressure exerted by the individual to have his/her information and needs adopted and used (GIMA, [12]).

Interactions of R+D and marketing experts, in course of new product development, evolve *as a function of perceived interdependence*. The more a function perceives its dependence on the other one the *more interactions* take place by crossing the function borders and the greater the effect of the information providing group on the information recipients is (RUEKERT–WALKER, [38], SOUDER–SONG, [42]). It has been empirically proved that the *relevance of the received information favorably influences the perception of its usefulness* (MOENAERT–SOUDER, [33]), which means that knowledge elements critical for the success of the project exert mutually greater influence on the decision-makers of the other functions. The above relations are confirmed by the results of benchmarking examinations. The experts of both functions think that *expert power – whether referring to own or other function – is in positive relation with influence* (GIMA et al., [12]).

3.2. Formal and Informal Controls

Because of the integration-limiting effect of communication problems, it is important to reveal the organizational factors, control mechanisms, which may have role in information flow and processing among functions and in this way in the success of new product development. Theoretical literatures pay great attention to the study of the influential role of formal and informal controls (AYERS et al., [1]).

Informal controls refer to the behavior of the members of the organization and regarding integration approach, *relational norms* among functions are to be listed here. When looking at interface-problems theoretically, it is important to separate

relational norms and integration (AYERS et al., [1]). Although both concepts refer to relation among functions, the difference is:

- relational norms referring to the *character of the relation* between experts of the two functions, in fact show its atmosphere and fundamental rules (e.g. solidarity, trust);
- *integration* reflects *interaction related to the given project* between the two groups in the process of product development.

Empirically proved positive relation is shown between the intensity of communication among functions and the clarity, credibility of information (MOENAERT, [33]). Continuous contacts promote to bridge technical limits coming from the differences of task-specific languages (information style) and in this way the *development of relational norms* (AYERS et al., [1]).

Developed *relational norms respond to communication, improve its efficiency* (MOENAERT–SOUDER, [33], AYERS et al., [1]), and in this way promote integration. Good working relations are stimulating to mutually share and receive knowledge elements relating to the projects (MOENAERT et al., [32]). During projects, however, new interactions appear and joint successes give further impetus to strengthen cooperative behavior, which means that they have reaction on the development of relational norms. *Relational norms between R+D and marketing and integration have positive effects on each other* (AYERS, [1]).

Relational norm between R+D and marketing and integration are both related to the success of the new product. *The relational norm between R+D and marketing increases the probability of the success of the product* (AYERS, DOUGLAS et al., [1]). If the *relation is supported* from both sides, they will act to promote the achievement of the common project goal. On the other hand underdeveloped relational norms will restrict the sharing and adaptation of new knowledge elements (MOENAERT–SOUDER, [33]).

4. Formal Controls

Making new product development activity *formal* is related to the fact to what extent an organization emphasizes rules and regulations during the performance of special marketing and R+D tasks (GIMA et al., [12]). Two factors of formal control mechanisms, *centralization and formalization* are in the limelight of interface researches.

- *Centralization*. Centralization prefers vertical communication, while the essence of functional integration is horizontal networking. Centralized decision-making structures hinder interaction between R+D and marketing experts taking part in product development, make communication difficult, in this way counteracts the development of relational norms (CALANTONE et al., [5], AYERS et al., [1]). The impact of project centralization on the success of the new

product is the subject of a separate examination. In case of project centralization, communication relating to the project, decision-making and power are in the hands of relatively few ones, what adversely affect the quantity and quality of information sharing between R+D and marketing (MOENAERT et al., [32]).

- *Formalization*. Formalization clarifies the roles and responsibilities of those working in the fields of R+D and marketing in the development process, its favourable effect on integration and the success of product development is proved by wide-ranging researches (GUPTA et al., [15], RUEKERT–WALKER [38], GRIFFIN–HAUSER, [14]; AYERS et al., [1]). Making interaction schemes formal has positive impact on the transactions between the two functions (RUEKERT–WALKER, [38]), improves communication, and strengthens information exchange (MOENAERT et al., [32]).

The contradictory effects of formalization and centralization on integration appear also through interfunctional conflicts (DYER–SONG, [8]). *Formalization* decreases uncertainty, misunderstanding, thus eliminates a part of conflict sources. *Centralization*, on the other hand, simplifies and accelerates conflict management but also works as a kind of conflict-suppressing mechanism. Researchers (DYER–SONG, [8]) defined conflicts resulting positive changes as *constructive conflicts*, where partners are susceptible to each other's problems and concluded that *formalization correlates positively, centralization negatively with constructive conflicts among the experts of functions.*

While the positive impact of formalization solutions on integration is proved theoretically and practically, we should not ignore that their application will increase the *complexity of the management of the product development process*. Therefore it is important that the applied solutions be in accordance with the innovative character and complexity of the project (GRIFFIN–HAUSER, [14]).

A common denominator of researches looking at the role of formalization from different aspects is that *making interaction schemes formal acts as an important platform for the development of informal interactions and relational norms* (MOENAERT–SOUDER, [32]). Formal control mechanisms do not influence the success of the new product directly but through informal controls and integration (AYERS et al., [1]). Therefore a relationship essential for the management of the interface can be concluded: the existence and strength of relational norms is a stronger decisive factor in the success of the new product than the extent of R+D-marketing integration (AYERS, [1], KAHN, [26]).

These ideas make us to tell apart *integration* between R+D and marketing from *efficient integration* (AYERS et al., [1]). *Integration is regarded efficient if it is based on developed relational norms and cooperative interactions.*

5. Summary

Increasingly more company managements recognize the necessity to create efficient and productive interface (AYERS, DOUGLAS, [1]) and a shift is experienced from internal functional competition tackling with operational disorders to cooperative behavior (GUPTA–WILEMON, [17]). Examinations indicated at the same time that in most cases the integration of R+D and marketing is at much lower level than expected (SAGHAFI, [39], AYERS, [1]). It shows the complexity of the interface problem and at the same time gives further impetus to theoretical research. Of the new research trends the following may be highlighted:

- Studying how *close the relation between interaction and cooperation in different stages of new product development is* (GOMES et al., [13]). Empirical studies show that the *relation between interaction and cooperation is the strongest in the early stages of the new product development process*. In the early stages of budgeting, planning, scheduling and product concept, the stronger the interaction, the more cooperative the participants' behavior and attitudes are and more intensive the communication is. R+D and marketing experts did not attribute such a great role to cooperation in the stage of developing, testing and selling the product.
- *The role of direct R+D/consumer integration*. Increasingly more frequent manifestation of role flexibility is that R+D employees establish direct contacts with the customers (MOENAERT–SOUDER, [33]). Several researches emphasize the favorable impact of direct contact with the customers on efficient integration. Customer participation stimulates communication, coordinates the two functions, and in this way contributes to the accord of consumer needs and technical solutions (LI–CALANTONE, [29]). The relationship between R+D and the customer, which is the establishment of direct R+D/consumer integration has greater and greater role in current, short-cycle new product development processes. The comparison of the roles of direct R+D/consumer and R+D/marketing integration for the efficiency of new product development processes is still an unexplored field of interface (SOUDER et al., [42]).

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