

COMPETING THROUGH NEW PRODUCT DEVELOPMENT SUPPORTED BY KNOWLEDGE GAINED FROM INVESTIGATIONS ON SUCCESS FACTORS

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Abstract

The paper discusses the management application of revealed and/or benchmarked success factors of new product development. It couples success factors and recent management concepts on competitiveness. Information related to the reflected knowledge is gained from literature relevant to product innovation management and marketing. Management aspects are emphasized especially through product innovation management models and processes, as well as cost and time saving endeavor with reference on opportunities of the network organization. Marketing aspects are highlighted through focusing on marketing intelligence support to new product development and launch.

Keywords: competition, innovation management, knowledge diffusion, marketing, network organization, product innovation.

1. Introduction: Increasing Importance of Learning from Innovation Experiences

The adoption of the diffused competitive knowledge is essential to develop company's abilities to compete successfully at the market place. Valuable knowledge may be gained from the revealed and published success factors of new products, as well as from management concepts that systematically integrate learning from experiences. Management learning is a vital source for companies of transition economies toward market economy including Hungary. Besides of scientific publications also academic teaching programs of innovation management and marketing are dedicated to integrate and diffuse up-to-date knowledge.¹

Innovation engenders products or services appreciated and demanded at the market place and can result in both venture benefit and national development in technology and socio-economic fields. Enterprises and environment have to be

¹This study integrates some main points of the author's paper entitled 'Success factors of product innovation in the light of the recent concepts of company's competitiveness' presented at the conference 'Under the Attraction of Developed Economies' (VERESS, 2001). The author is lecturer of New Product Marketing for students in Technology Management and Industrial Design Engineering.

therefore open to new ideas and inventions. The history of technological and economic development in Hungary shows that many inventions or new product ideas of Hungarian engineers and scientists, as like as the 'biro' or the 'hologram' for instance, achieved success and benefit abroad. Success sought for and achieved abroad has usually been due to the lack of domestic venture capital, entrepreneurs' trust or appropriate business environment. In several cases indifference or failure have been caused by resistance to new ideas, originated in social or political constraints in the home country. In the last few years four main factors have been revealed as principal constraints to innovation at companies (PAPANÉK, 1999), namely weakness of financial resources, few chance for sufficient financial return, limited R&D capacity, and weakness of information required for making appropriate decision.

Both historical and contemporary new product success stories and experiences in the world offer a huge source of knowledge for company learning. T.A. Edison, one of the most successful innovators registered over 1200 patents during his life. A plenty of revolutionary new products have been developed in the framework of his ventures including the highlight bulb, 3.5 mm cinema films, the phonograph, the electric car and many others. A remarkable message of the Edison's oeuvre is: he appreciated better than ever that the real challenge in innovation was not invention – coming up with good ideas – but in making them work technically and commercially (TIDD, 1997).

Investigations on a great number of technological inventions born all over the world have revealed that while technological constraints were often incurred, *failures were mainly due to weaknesses in innovation management and marketing* at firms. Now it is widely recognized that the success of new products requires being secured by appropriate firm's strategies, carefully formalized product development process, efficient coordination and management of the different activities, as well as by systematic use of new product marketing tools. This latter includes marketing intelligence support, e.g. methods of collecting and controlling customer and market information in order to identify market opportunity, to define a product or service concept that offer real benefit to customers, and to determine and implement a winner launch strategy.

The paper reviews the success factors of new product development from the aspect of highly marketing oriented companies. It stresses on opportunities of strategies, management concepts and decisions, processes and methods, and highlights the close connection between competition and innovation. For this endeavor it refers on knowledge revealed by international investigations and their publication. *Fig. 1* shows the conceptual focus of the paper.

2. Innovation Imperative and Competition

Successful development and launch of new products could not be performed without the participation of at least three stakeholders. Innovation, e.g. creation of something new, and new ways of problem solving is a perpetuate challenge for *cre-*

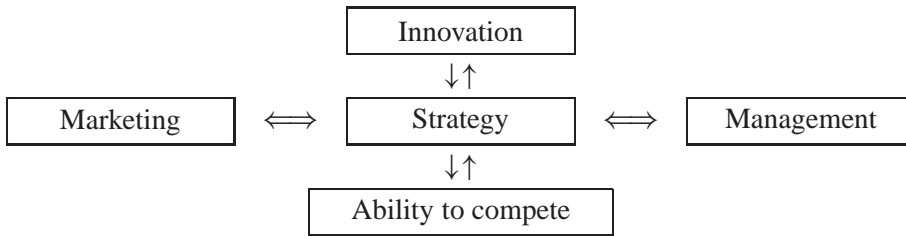


Fig. 1. Conceptual framework: components of competition through innovation

ative people including scientists, engineers, designers, marketers and others. Any newness has always been attractive for its *potential users*, willing to be customers of products and services that offer them advantages of new technologies, like better quality or higher performance, saving time, risk, energy or money. Customers are also attracted by products and services which use promises for their higher living standard, which are of the last trend or fashion, which ones enable them to demonstrate individual prestige, and so on.

The matching of creators' and user' aspirations may occur when new products and services will be available on the market thanks to *business interest* and innovation endeavor of *organizations*. Identifying customer needs, generating, supporting or acquiring new product ideas and transferring them in a new product offering on the market represent a real imperative for companies. According to DESCHAMPS and NAYAK (1995:4) many chief executives are convinced 'if we do what is right for the customer, our market share and our return on assets will take care themselves.'

Innovation, marketing and competition are closely interrelated with each other. Innovation imperative and pressure are stated by numerous theoretical issues (DRUCKER, 1998; DICKSON, 1994; PORTER, 1980, and others). The role of new products in company market success is empirically proved by data gained from investigations. According to POWER et al. (1993) in the US companies that top their industries in profitability and sales growths get 49 percent of their revenues from products introduced in the past five years. The least successful firms get only 11 per cent of sales from new products. GRIFFIN (1997) found similar records thanks to new products: 49% of sales growth at successful companies and the half of that at the remaining ones. At the beginning of the 80s 28% of company growth were originated in new product launch (Booz, Allan and Hamilton, 1982).

Company success derives in large measure from continuous innovation. Product innovation based upon differentiating strategy, and products which are differentiated on both quality and other features achieve twice the normal return on investment (TIDD, 1997). New product development is indispensable to competition, but requires special management knowledge and capabilities both in strategy and in operations. Company management ought to recognize the nature of environmental changes and find right answers, better ones or faster than competitors.

Like tools of the strategic approach, as well as management and marketing

methodology of product innovation have been developed in a close linkage with efficient operations at leading firms. A main challenge of innovation consists in the ability to respond to the contemporary high speed of technological and market changes. Managers have to be able to recognize changes immediately, adapting strategies rapidly and finding or reorganizing sources effectively in order to achieve appropriate activities. That is why continuous investigation and analysis of success factors play an essential role of competition. Theoretical issues and recommendation based upon experiences and best practices may help learning of managers. Works presenting the recent winner strategic concepts as well as management and marketing methodology may enable companies to manage their adaptation to changes. Competitive knowledge helps companies in shaping dynamic attitude and finding individual answers through adoption of efficient methods to compete.

Success factors of new product development identified by surveys of US consulting firms are usually considered as basic references in innovation literature. For the 1980s the research findings of Booz, Allan and Hamilton Inc. (1982) played an indicative role. For the 90s a survey conducted by Arthur Little Inc. (1991) delivers considerable information about the 'performance secret' of product juggernauts e.g. leader innovators. Besides these works a valuable number of investigations have dealt with research on product innovation performance that distinguishes winner companies from the loser ones. It is demonstrated by them that continuous research is vital because success factors change over time. The new product development is a highly complex process, so success factors are also numerous and complex.

3. Success Factors of New Product Development

Success may be measured and interpreted on different levels such as the levels of new product projects, the company's overall new product performance or individual new products, respectively. MONTOYA-WEISS and CALANTONE (1994) conducted research on new product projects and classified the identified influencing factors in four main groups e.g. factors related to strategy, development process, market and environmental factors, and organization (see *Table 1*). The table contains the success factors on the level of the company's overall new product performance, as well, based on research by COOPER and KLEINSCHMIDT (1995). Using the benchmarking method the latter has highlighted that success depends also on such as conditions like innovation culture and atmosphere at a company, and senior management's involvement with and corporate commitment to new product development. COOPER and KLEINSCHMIDT (1995) analysed cases of 135 big European and North American firms. The benchmarking method helps to reveal the best practices and permit learning from it for any company.

On the level of individual new product success especially profit and market share are measured (HART, 1996), and a special attention is paid to launch timing effect. On company level success is first among all measured by sales records. The latter approach includes the analysis how the different resources contribute to the

Table 1. New product success factors at the project level and at the company level

<i>Factors to drive new product success at the project level</i>	<i>Factors of company's overall new product performance</i>
<p><i>Strategic Factors</i></p> <ul style="list-style-type: none"> • Product advantage • Technological synergy • Marketing strategy • Company resources • Strategy of product <p><i>Development Process Factors</i></p> <ul style="list-style-type: none"> • Proficiency of technical activities • Proficiency of marketing activities • Proficiency of up-front (home-work) activities • Protocol (product definition) • Top management support • Speed to market • Financial/business analysis <p><i>Market Environment Factors</i></p> <ul style="list-style-type: none"> • Market potential/size • Market competitiveness • External environment <p><i>Organizational Factors</i></p> <ul style="list-style-type: none"> • Internal/external relations • Organizational factors 	<p><i>Process</i></p> <ul style="list-style-type: none"> • firm's new product development process • specific activities within this process <p><i>Organization</i></p> <ul style="list-style-type: none"> • the way the program is organized (e.g. a cross-functional team vs. functional approach) <p><i>Strategy</i></p> <ul style="list-style-type: none"> • the firm's total new product strategy (as part of its corporate strategy) <p><i>Culture</i></p> <ul style="list-style-type: none"> • the firm's internal culture and climate for innovation (e.g. support for teamwork and intrapreneurs) <p><i>Commitment</i></p> <ul style="list-style-type: none"> • senior management's involvement with and corporate commitment to new product development

success. The difference in appreciation of project and company performance is often due to the importance of a new product in the overall business activity of a company. A success factor identified on company level is not always appreciated on project level and vice versa.

Research findings presented in new product marketing literature stress especially on success factors related to marketing concepts and methods. It is revealed that success or failure is highly connected with marketing performance. (See *Table 2* based on URBAN-HAUSER, 1993: pp. 51–57).

Innovativeness and value of new products, satisfaction of identified or anticipated customer needs, as well as correctly defined market trends and sufficient demand play a definite importance for the success. Many of the remaining success factors is related to appropriate company strategy and efficient management processes including organization and communication between participants. Failure may be resulted in by weaknesses of market information and process coordination, those of the launch program and timing, as well as by mismatching of programs with company strengths.

Table 2. New product success factors and reasons of failure – from a marketing aspect

<i>Success factors</i>	<i>Reasons of failure</i>
<ul style="list-style-type: none"> • Match customer needs • High value to the customer • Innovative new product • Technical superiority • Screening, analysis and decision support system • Favorable competitive environment • Fit internal company strengths • Communication among functions • Top-management support • Enthusiastic new product organization • Disciplined new-product process • Avoid unnecessary risk • Short time to the market • Global focus – worldwide strategy • Quality and customer satisfaction in all phases 	<ul style="list-style-type: none"> • Market too small, forecasting error • Poor match for the company • Not new/not different product • No real benefit • Poor positioning versus competition • Inadequate support from the channel of distribution • Poor timing • Rapid competitive response • Major shifts in technology during the development process • Changes in customers tastes • Changes in environment constraints • Poor after-sales services • Insufficient return on investment • Lack of coordination in functions • Organizational problems

A survey conducted in Hungary presents that the main sources of motivation and success of product and process innovation at companies include senior management and proprietors commitment to innovation, information support to decisions, and cooperation with users (PAPANÉK, 1999:131).

4. Management of Innovation for Success

Market success of any new product remains to be uncertain but achievement may be influenced by management tools of new product development. Uncertainty is mainly due to the fast changes of environment, especially to those of market conditions. Changes require quick responses including modification of the product offer of a company. New product decisions need creativity in strategy formulation, as well as high professionalism in planning and implementing development activities. *Applying a systematic and formal management decision approach is closely linked to improved success in the development and launch of new products.*

As in innovation management, as well as in company management one can in general identify three main issues.

1. The first one is related to the marketing management concept: successful companies build their strategies and actions on customer centered behavior and continuous innovation. This includes sustainable competitiveness through value creation and adapting activities to changes.
2. The second issue reflects the performance level of management functions to which learning, knowledge and skills are significant contributors. Learning and applying efficient processes, methods and techniques are required in each of the management operations like analysis, planning, organizing, implementing and controlling.
3. The third issue is imbedded in the need of reengineering organizations and operations regarding every process at companies. Reengineering is aimed at higher quality and efficiency including improvement in time, cost and communication requirements.

How to innovate is a central question. According to TIDD (1997) innovation decision includes two key questions: How to structure the innovation process appropriately, and how to develop *effective behavioral patterns or routines* which define operations. Research findings report that even the smallest improvement of product development and launch process may lead to reducing the high share of failed new products. Improvement is usually achieved in strategic approach, organization and methodology. Publications report that the revealed success factors promote many firms to initiate reengineering in their product innovation process and to implement processes more effectively. New product development models evolve over time. *Table 3* shows different generations of conceptual product development models and their key features (TIDD, 1997:30).

The product innovation process is more than giving birth to a new product in its physical entity. It includes also the launch and the life cycle management of a new product (URBAN and HAUSER, 1993; DESCHAMPS and NAYAK, 1995). According to this concept the new product development process includes:

- Finding out what customers might need or want
- Generating ideas and technologies to meet such needs or wants
- Developing, realizing and launching a new product

Table 3. Generations of new product development models

Generation of new product development models	Key features
First/second	Simple linear models – market pull, technology push
Third	Coupling model, recognizing interaction between different elements and feedback loops between them
Fourth	Parallel model, integration within the firm, upstream with key suppliers and downstream with demanding and active customer, emphasis on linkages and alliances
Fifth	Systems integration and extensive networking, flexible and customized response, continuous innovation

- Providing supporting services and managing product life cycle.

For successful product innovation the *development of management processes* plays a vital role. Based upon experiences of leader companies (DESCHAMP and NAYAK, 1995) the new product development process includes six basic management processes, namely

- Intelligence development process
- Idea management
- Resource management
- Product and/or technology development and planning
- Project or program management
- Product support management.

The intelligence development process is the basis of all new product developments. By this process a company collects relevant data on technology, market trends, customers and competitors. Data will be transformed into information, disseminated and used in all the development processes. Information may give birth to new ideas.

Idea management includes collecting, evaluation, selection and screening of ideas as well as validating them before ideas become imbedded in product and technology strategies and plans of a company. Validation may be carried out in labs and on the market, in the framework of ‘precursor projects’.

Resource development – including technology development – as one of the key processes is often realized in strategic alliances or close relationship with suppliers. The successful new product development requires special resources like skills, capabilities and competencies within a company and with suppliers.

Product and technology strategy development as part of the business strategy determines where, how and with what frequency the company intends to compete with new products. Defining where to compete raises questions about product lines and market segments, as well as against whom – which competitor – to compete.

Defining how to compete includes definition of means and weapons. Frequency includes determination of the rate of product renewal or time cycle.

Program and project management is the core process of new product development. Besides product conception and development, product engineering and production it also includes product launch. Planning the project includes four main phases: planning the product itself, planning the technology to use, planning the deployment of resources and finally, planning the project phases.

Product support starts at the launch of the product and ends when the product will be withdrawn. It is extended on product follow-up and services. For industrial products the real value to customers may be transferred through supporting technical services, like installation, maintenance and others. For other products services deliver added value. This last phase of the new product development may be extended on the whole product life cycle management.

As regards the new product development abilities of Hungarian enterprises, one can refer to a study about the impact of foreign direct investment on marketing capabilities (BERÁCS et al, 1997). It was found that this impact appeared in improvement of production and customer policy while functional achievements such as new product development, market research, relations with suppliers and market intermediaries fewer positive changes have occurred. Other publications state that for structuring the innovation process appropriately, and developing effective behavioral patterns or routines many Hungarian companies use patterns of ISO 9001 quality standards.

5. Time, Cost and Risk Reducing Trends in the Product Innovation Process

Critical success factors of new product development change over time. An international survey conducted by Arthur D. Little Inc. (DESCHAMPS–NAYAK, 1995) on the product innovation process revealed the most important new product success factors at leader companies. European, US, and Japanese participants in the survey were asked to indicate the level of effort their companies were applying toward each of seven broad benefit objectives. Research finding showed the primary objectives as follows:

- Getting our new products to the market on time, as planned (76%)
- Improving the appeal of our products to customers (73%)
- Developing our new products faster from concept to market introduction (68%)
- Developing products that are easier to manufacture, sell, install, service (61%)
- Reducing costs/investments related to new product development/introduction (47%)
- Reducing the payback period of our new products (47 %)
- Increasing the number of new products we introduce to the market (44%)

Companies are highly interested in objectives related to time and cost. Japanese manufacturers appeared more interested than US and European companies in almost every aspect of the product innovation process. Their biggest difference has appeared for the second (90 %) and the sixth (65 %) aspiration, e.g. to the aspects of improving the appeal of new products to customers, and to reduce the payback period.

Estimates suggest that being first into the market means a firm obtains a 50% market share for that product or service (TIDD, 1997). Other benefits include costs reduction (in work hours and inventories), and improved customer relationship because of better, more rapid service.

The time factor has become a fundamental parameter of company management. This also proved by such terms like 'just in time' and 'simultaneous or concurrent engineering'. Company ability to elaborate and carry out product innovation projects with a considerable speed, e.g. reducing time to the market has become a real competitive tool.

Speed is an important competitive tool, moreover, strategy. According to STALK and HOUT (1990:98) 'generally, if a time-based competitor can establish a response three or four times faster than its competitors, it will grow at least three times faster than the market and will be at least twice as profitable as the typical industry competitor'. Speed can be looked at from three perspectives: from the customer satisfaction view, from the supplier's side and from a strategic standpoint (DESCHAMPS and NAYAK, 1995). Rapid response to customer's demands means satisfied customers. From a supplier's side the most time-sensitive processes are supply chain management, manufacturing and logistics. Competing through speed requires a high degree of process effectiveness and efficiency. In strategic perspective speed can be considered as a means of exploiting an innovation advantage.

In the new product development process simultaneous engineering is considered as a means to reduce time taken to develop and commercialize new products. Other important sources of time and cost reduction are the carefully performed early stages of the development process. Early stages include idea generation and screening, concept development and concept testing. They occur before a physical presentation of a product has been developed. Activities done in the early stages are less costly and often lower time consuming activities in relation to the remaining tasks. It is far cheaper to change a concept than redesign a physical product and its manufacturing process. It is important therefore, that the concept taken forward to development is close to what is finally required (HART, 1996:21). This requires well defined strategy, conscious screening of ideas and definition of customer needs and preferences and their feeding in the development process. While the time needed to the early stages increases, the overall time of the development process will be reduced.

Time advantage may be acquired through efficient coordination of different conditions and interests. Besides of the own firm's strategic interest it is required to take in consideration the advantage to deliver to customers, as well as the possible business interest and opportunities related to manufacturing of suppliers. This means a complex optimization task. This is aimed at gaining benefit from a mar-

ket opportunity, winning customers and suppliers over to cooperation, reducing together time and cost in order to make a new product successful and resulting in improvement in own firm's profitability.

Time and cost saving endeavors are directly linked with risk management. The new product development process considered as a process of risk management includes further features, like the next ones:

- The product development process is carefully formalized. Many firms apply ISO 9001 recommendations. In formalization or modelling tasks it is taken in consideration the own firm's specificity as well as the category of new products to develop.
- The new product development process is secured by decision support systems. This includes marketing information system – data base and marketing research – models and submodels of problem solving like managerial submodels, special software, etc.
- Parallel designing process – concurrent or simultaneous engineering – is applied instead of sequential organization of different activities.
- Instead of traditional functional organizations crossfunctional new product teams (venture teams) are organized to deal with the product development activities.
- Applying iteration and stage gate system helps to insert control in each phase of the development process and to take go/no go/modify decisions. Iteration permits to control how partial achievements respond to the product concept and other requirements.
- Applying computer systems like CAD/CAM or CIM generates improved design at lower cost and do it faster. These systems include many of the design functions and their integration with marketing and engineering.
- Inserting resolute tools related to human resource management like motivation, effective communication and organization culture promotes sharing internal stakeholders interest in the success of the product development and launch process.
- New product development carried out in the framework of strategic alliances or network organizations results in cost and time saving through involvement of external stakeholders.

6. Advantages of Network Organizations

Networks permit a firm to exploit external sources of innovation. According to TIDD et al. (1997) there are three essential ingredients in corporate strategies: (1) The position of the firm, compared to competitors in terms of its products, processes and technologies; (2) The technological path open to the firm, due to its accumulated competencies, and the emerging opportunities that these are able to exploit; (3) The organizational processes followed by the firm, in order to integrate learning across

functional, divisional or corporate boundaries. External linkage, namely alliances and network organization may satisfy the latter requirement.

During the last twenty years fundamental changes occurred in the role of purchasing and the importance of suppliers for manufacturer. Purchasing does not continue to be a passive buying task but is transformed in interactive partnership that involves the firm's interest related to innovation, too. In the earlier times firms preferred internal diversification e.g. integration of a large scale of different activities in order to avoid close dependence from suppliers. Now, specialization and outsourcing have become a leader trend. Aiming at efficiency and ability to compete in the framework of the contemporary knowledge led global economy firms prefer specialization on core competencies. This requires closer collaboration with suppliers and customers, and creation of network organization. In the field of innovation firms often collaborate with competitors by the way of forming strategic alliances.

The typical forms of collaboration are subcontracts, cross-licensing, research consortia, joint venture, strategic alliances and networks. Firms collaborate with partners or competitors for a number of reasons:

- to share cost, technology, expertise
- to reduce the cost of technological development and market entry
- to reduce the risk of development and market entry
- to reduce the time taken to develop and launch new products
- to acquire new technology or market access
- to achieve economies of scale in production
- to increase learning potential.

The main potential risks of collaboration are associated with leakage of information and knowledge, loss of control or ownership and divergent aims and objectives, resulting conflicts.

Network organization is a new type of organization that helps individual firms to obtain and maintain competitive advantage. It facilitates reducing transaction costs on the one hand and to take advantage of external sources on the other hand. Network organization is a non hierarchical coalition of independent organizations or autonom organizational units of a firm, specialized on different tasks or competencies (ACHROL and KOTLER, 1999). Cooperation means increased interdependence in many fields like planning and manufacturing, as well as in profitability and customer satisfaction. Network organization is a long term commitment to close cooperation between participants. Literature reports about experiences that *network organization results in higher efficiency and ability to compete at the market place in relation to individual firms.*

Management concepts on competencies and resources enabling firms to obtain and maintain competitive position are closely connected with new product development and formal interfirm cooperation. *Competencies* signify a combination of knowledge and resources, which enable together the company to perform a function. Thus one can speak of a production competence, a management competence,

a product development competence. *Core competencies* are those competencies which critically underpin the organization's competitive advantage (PRAHALAD and HAMMEL, 1990). Resources include material and immaterial assets. *Resources* can be categorized in many ways, as like as linked to (1) production (engineering and manufacturing skills) (2) technology (equipment, processes, research and development, patents and trade marks), (3) supply chain (partnership, trust and goodwill of partners), (4) distribution channel (extension, quality of personnel) (5) marketing and customer relationship (market structure, brand equity, customer loyalty, advertising).

Many studies have shown that product innovation failure is often caused by firms trying to launch products which do not match their competence base (COOPER and KLEINSCHMIDT, 1990; TIDD et al. 1997:50). *If competency is not found within the firm, it can be available through knowledge or other resource obtained from partnership.* Strategic advantage comes when competencies make it difficult for others to copy or enter the market.

7. Concluding Remarks – Learning to Innovate and Compete

Innovation is a crucial tool of competition. Investigation on success factors of new product development delivers valuable information for learning of firms. According to findings the leading success factors of new products are linked with strategic thinking and careful shaping of the new product development process. Company success depends upon well defined competitive strategy and product concept as well as quality of processes, e.g. management efficiency and marketing effectiveness.

Strategy is focused on finding and maintaining competitive advantage on the market, offering value to customers in cooperation with different partners. Market environment changes continually and success factors are more and more complex. Ability to adopt or initiate changes through innovation includes both routines and creativity in decisions and processes. Leader international companies are usually able to initiate changes. The majority of companies may achieve success by learning and imitating. Theoretical works in innovation management and marketing integrate knowledge into concepts, models and methods and enable companies to be competitive. This permits firms learning to innovate and to compete.

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