European Journal of Marketing

Awareness, use and effectiveness of models and methods for new product development

Ed J. Nijssen Karin F.M. Lieshout

Article information:

To cite this document:

Ed J. Nijssen Karin F.M. Lieshout, (1995), "Awareness, use and effectiveness of models and methods for new product development", European Journal of Marketing, Vol. 29 Iss 10 pp. 27 - 44

Permanent link to this document:

<http://dx.doi.org/10.1108/03090569510098483>

Downloaded on: 25 February 2015, At: 00:25 (PT)

References: this document contains references to 31 other documents.

To copy this document: permissions@emeraldinsight.com

The fulltext of this document has been downloaded 2273 times since 2006*

Users who downloaded this article also downloaded:

Angie Craig, Susan Hart, (1992), "Where to Now in New Product Development Research?", European Journal of Marketing, Vol. 26 Iss 11 pp. 2-49 <http://dx.doi.org/10.1108/03090569210023037>

Susan J. Hart, Michael J. Baker, (1994), "The Multiple Convergent Processing Model of New Product Development", International Marketing Review, Vol. 11 Iss 1 pp. 77-92 <http://dx.doi.org/10.1108/02651339410057536>

Nigel Pope, (1998), "Consumption values, sponsorship awareness, brand and product use", Journal of Product & Brand Management, Vol. 7 Iss 2 pp. 124-136 <http://dx.doi.org/10.1108/10610429810216883>

Access to this document was granted through an Emerald subscription provided by 304742 []

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.

Awareness, use and effectiveness of models and methods for new product development

Models for
new product
development

27

Ed J. Nijssen

Erasmus University, Rotterdam, The Netherlands, and

Karin F.M. Lieshout

SKIM/INDIS Market and Policy Research, The Netherlands

Received August 1994

Revised January 1995

Revised May 1995

The strategic importance of new product development and new product models and methods

A large number of models and methods have been introduced to improve a company's performance of new product development (NPD)[1]. These models and methods include brainstorming, focus group, in-home use test, limited roll-out, etc. As NPD has become a strategic necessity for companies[2] and the commercial success rate of new products is still low, a high adoption and diffusion of new product models and methods may be expected. Even though the use of new product models and methods in themselves will not guarantee success, their use may complement a company's NPD efforts and may assist them to become more successful[1,3]. New product models and methods may help to identify problems at an early stage and assist in directing the NPD effort in the right direction.

However, despite the positive influences these models and methods may have on companies' efforts, Mahajan and Wind[4] report low usage rates for most models and methods in their exploratory study among US *Fortune* 500 firms. Possibly, major potential users are unaware of the existence of these models and methods, they experience an unsupportive organizational culture for their use, or they have used them for a (short) period but have then decided to abandon their use[5]. If, indeed, awareness is the bottle-neck, then there is a job for universities, polytechnics and consulting firms to fill this gap. However, if the use is low owing to shortcomings of the models, researchers should try to improve their quality. For these reasons we decided to examine this subject in greater detail. Several questions were raised. To what extent are companies aware of the existence of new product models and methods, and do they use

---

The authors would like to thank Louis P. Bucklin, Ashok Gupta and two anonymous reviewers of the *European Journal of Marketing* for their helpful comments and suggestions on improving this article, and Jan J.W. ten Bosch for his help with organizing the focus group.

European Journal of Marketing,
Vol. 29 No. 10, 1995, pp. 27-44.
© MCB University Press, 0309-0566

them? Why do they use them and at which stages of the NPD process? What are the companies' experiences with these models and methods, and do they in the end contribute to company performance?

The first section of this article focuses on current literature and the empirical evidence available on the use of new product models and methods. A classification scheme for the different models and methods is included. In the second section the research questions are specified. In the third section we discuss the methodology of the empirical study, and the fourth section contains the results. The final section contains the conclusions and discussion. The results are compared with the exploratory findings of Mahajan and Wind[4] on the use of models and methods in the USA.

Empirical evidence on the role of models and methods

NPD is a complex and sizeable activity, with only a low rate of commercial success[6-8]. In order to reduce NPD risks, a company needs to go through an extensive process before it can introduce a new product in the marketplace. Traditionally, this process is split up into a number of phases: idea generation, screening/evaluation, concept development and testing, marketing strategy development, business analysis, product development, market testing and commercialization[9, p. 310]. However, recently more emphasis has been placed on the fact that, to some extent, these phases are best performed simultaneously. It may help to reduce the time to market of the new product. Multi-functional teams have been put forward as an important way to enhance the commercial success of the new product[10,11]. Also, numerous new product models and methods have been developed over the years to make the NPD process more manageable. If one considers all possible versions and modifications of the new product models and methods, over 600 different types can be identified[1]. These models and methods generally serve to identify problems systematically and to improve on NPD outcome by obtaining specific insights into opportunities. We classified the most popular models and methods based on four basic NPD questions[12]:

- (1) Which product should be designed?
- (2) How must the product be designed?
- (3) How should the product be introduced on the market?
- (4) What is the anticipated success rate of the new product?

These questions relate to four underlying NPD problems, namely:

- (1) the idea generation problem;
- (2) the product optimization problem;
- (3) the marketing mix optimization problem;
- (4) the prediction of success problem.

The results of our classification attempt are presented in Figure 1. Only the models and methods most often cited in the literature are included in our study.

Despite the numerous articles which deal with the contents of specific models and methods, little is known about the extent and the way they are actually used by companies[4,13]. There is only a small number of empirical studies dealing with this issue[14]. Most of the studies focus on the idea generation stage. Geschka[15] investigated the penetration level of several creativity methods (brainstorming, morphological analysis and synectics) among 500 German companies in the period 1973-1980. He found that, except for brainstorming, these methods had a low level of awareness – although awareness had risen significantly in the time period between the two studies – and were used only on a limited scale. The methods used most were also the ones with the most favourable evaluation. Geschka estimates, based on his research and experience as a consultant, that penetration of idea generation methods had reached saturation in Germany in 1972[16]. Verhage *et al.*[17] also investigated methods for idea generation. They performed personal in-depth interviews at nine Dutch companies. They reported little use of formalized procedures to generate new ideas systematically. A more frequent application of such methods appeared to be hindered by the fact that many managers had serious doubts about their effectiveness, even if they were not familiar with them, and could not build on their own experiences.

With regard to models and methods for product optimization, Griffin[18] has estimated that, even today, the use of quality function deployment is limited. This new and comprehensive approach was thought to be used by about two

Figure 1.
Classification of new
product models and
methods

dozen US companies by 1987. For a new and less complicated method as conjoint analysis, Wittink and Cattin[19] estimate that about 200-400 commercial applications were carried out during the early 1980s. This can be considered a remarkable track record for a new method. With new product research as one of the major businesses of the market research industry, one might expect a continuing prosperous growth.

Apart from the above-mentioned studies which focus on a particular model/method, there seem to be only two studies which address the issue of the use of models and methods from a broader perspective. Schelker[1] investigated several models and methods in Switzerland among 90 small and large companies. He looked at methods of analysis and forecasting, idea generation methods, selection methods and several control/planning instruments. He found a reasonable degree of use of these methods and satisfaction with them. Furthermore, there appeared to be a limited, but important, role of models and methods in dealing with the innovation process successfully. Respondents indicated the use to have some positive impact on perceived project success. Also, Mahajan and Wind[4] have recently contributed to the body of knowledge on the use of models and methods. They found that the use of new product models and methods in the USA by large firms (*Fortune* 500 firms) is not very widespread. However, despite the low and unfocused use of these models and methods, the users seem to be satisfied with their performance.

Research questions

Looking at the earlier studies and the results from Mahajan and Wind[4], it is surprising to note that, between the mid-1970s and the early 1990s, the use of these models has not increased, although we must take into account that the empirical results derived from different countries, i.e. Switzerland/Europe and the USA. A possible explanation is that Mahajan and Wind[4] focused on *Fortune* 500 firms while Schelker[1] also included small firms in his research. Possibly, large firms have already tried and abandoned the use of these new product models and methods. This appears to be the case, for instance, with profit impact of marketing strategy and Boston Consulting Group (BCG) models. McCabe and Narayanan[20] report that large companies were among the first to use these instruments, but stopped using them because they were not able to capture adequately the complexity and turbulence of their markets. However, there are alternative explanations. Potential users may experience an unsupportive organizational climate, as Verhage *et al.*[17] noted, or even be unaware of the existence of these new product models and methods. As Mahajan and Wind[4] confronted their respondents only with the names of the new product models/methods, they could not provide an adequate insight into the problem of awareness and knowledge. In fact, their findings that the respondents used the models and methods in an unfocused manner may be a result of the research approach used, showing that respondents find it difficult to recognize a model/method by name. Another area for research, next to the area of diffusion, concerns the impact which the use of these models and methods has on the

company's performance. The aim of using models and methods is to prevent project failure and improve success. To encourage successful use of these models, and to have a positive influence on NPD and company performance, a well-structured NPD organization is required[16].

To obtain further insight into the awareness, use and effectiveness of the new product models and methods, we formulated six research questions:

- (1) To what extent are companies aware of the existence of new product models and methods?
- (2) To what extent do they use them?
- (3) At which stages of the NPD process do they use them?
- (4) Why do they use them?
- (5) Are they satisfied using them, and what are the main shortcomings?
- (6) Does their use relate to company performance?

We focused on these questions to obtain a better understanding of the role of new product models and methods in the NPD process. The questions integrate a number of issues addressed in previous research and extend the research to the area of the relationship between the use of models/methods and performance. To answer these research questions both qualitative and quantitative research was performed.

Research

Qualitative research

To find out more about NPD in The Netherlands and to learn more about the new product models and methods which are being used, we first decided to conduct a qualitative research. Several expert interviews and a focus-group discussion were planned and executed. The expert interviews concerned three faculty members of the department of industrial design of a well-respected Dutch polytechnic. The focus group was arranged through a project group on industrial marketing from the Dutch Marketing Society. The focus group consisted of seven practitioners, both managers and consultants, involved in NPD. The content of the questionnaire used by Mahajan and Wind[4] was discussed in the expert interviews and focus group.

Both the interviews and focus group pointed out that our research should control for the differences between consumer goods and industrial goods companies (business-to-business). Industrial companies conduct NPD in a different way compared with consumer goods companies[21]. In industrial NPD the customers are, for example, more involved in, and part of, the process itself. Therefore, the extent to which the NPD stages are distinguished or present may differ too. This may affect the new product models and methods that are used. Furthermore, the focus group members indicated several times that they did not know a model or method by name. However, once it was explained they recognized the model/method and indicated use of a similar approach.

Sometimes the models and methods were included in, or used in combination with, the tools and techniques introduced by a consulting firm (e.g. McKinsey's toolbox).

Quantitative research

As a result of the qualitative research and the fact that most of the marketing's academic writing on NPD is aimed at consumer goods companies[22], we focused on industrial companies. The sample gathered was a quota sample consisting of 75 industrial companies, taken from the Dutch ABC register of companies. The respondents were actively involved in the NPD process, such as marketing managers, new-business managers, research and development managers, etc. The response rate was 60 per cent. Mainly marketing managers responded to our questionnaire (70 per cent). The sample comprised four major industries (electronics, machinery, metal and paper) and a group of miscellaneous companies (see Table I). The median size of the companies was 200-500 employees (see Table II). The main reasons for non co-operation with the research were "no time to answer the questions" (86 per cent), "we only fill out mailed questionnaires" (6 per cent), and "the company's policy is not to engage in interviews" (6 per cent).

The data were gathered using a computerized questionnaire and telephone interviews. It allowed for a nested approach of questioning, first asking for awareness by name before providing a definition of the model/method. The questionnaire was pretested on a limited scale. This resulted in a few minor changes.

Table I.
Sample structure:
industries covered

Industry	Percentage of sample
Electronics	11
Machinery	37
Metal	14
Paper	19
Miscellaneous	19
Total	100

Table II.
Sample structure:
company size

Number of employees	Percentage of sample
20-50	6
50-100	11
100-200	31
200-500	37
500-750	9
>750	6
Total	100

To limit the length of the questionnaire, the research was limited to 11 models and methods (see Appendix 1). Only models and methods which had shown at least some degree of use by companies in previous research and some level of awareness within the focus group were selected. Market forecast models were excluded, as most of them are specific computer programs with a level of use/awareness below 5 per cent in the USA. Furthermore, the research focused on new-to-the-world products, new product lines and additions to existing product lines, as new product models and methods appear especially useful to support innovative new products[4].

The variables were operationalized in the following way. Awareness by name and content as well as use and degree of use were asked for each model/method using binomial scales (yes/no), except for the degree of use, which was asked on a three-point scale (sometimes/several times/always). The term use was not specified. It captured both formal and informal use. Though one might expect a positive effect on the level of use, as respondents may have a natural tendency to admit to use of models/methods to look sophisticated and well organized, we found no evidence for such behaviour. In the case of a model or method not being used, we asked whether the technique had been used in the past (yes/no), including the date the technique had been used for the last time. This was done to establish former use as in much detail as possible. Thus, former use is defined as companies who used a model/method but no longer use it.

Based on previous research[1,4], a list of options was generated with regard to reasons for use and shortcomings. Satisfaction was measured using a three-point scale (high/middle/low).

In order to get a good impression of the way the companies had organized their NPD, several additional questions were asked. These included: number of departments involved in the NPD process, degree of interaction between these departments, level of support by top management, and the number and extent to which NPD stages were generally completed. Five-point scales were used, except for the number of stages completed. Eight NPD stages were distinguished[9].

Finally, we asked for the company's gross profits level relative to its competitors in the industry as an indicator of overall company performance[23]. Again, a five-point scale was used (bad performance compared with competitors'; good performance compared with competitors).

Results

Awareness of the models and methods

As might be expected, the results show that there is a large difference between awareness of a model/method by name and content (see Table III). The average familiarity of the respondents with the models and methods by name is 30 per cent, whereas the familiarity after explanation is 57 per cent. This is almost double. Six of the 11 models and methods under investigation have an extremely low level of awareness (i.e. less than 15 per cent). Three techniques

Table III.
Awareness of the
models and methods

	Percentage of respondents who know the method after description	Percentage of respondents who know the name
Brainstorming	97	96
Concept testing	88	29
In-home use test	82	51
Product life cycle	81	65
Focus group	71	63
Morphological analysis	54	14
Conjoint analysis	51	4
Quality function deployment	32	7
Limited roll-out	29	3
Synectics	28	6
Delphi method	18	0
Average	57	30

have a score below 30 per cent, even after explanation. These are the Delphi method, limited roll-out and synectics. Brainstorming, focus group, product life cycle and in-home use test are to be considered best known and well-known models/methods. They have an awareness of over 80 per cent.

Use of the models and methods

In Table IV we present the results on the use of the different models and methods by the companies in the sample. The average penetration level of the models/methods is 30 per cent. This is about half the number of respondents who know the new product models and methods by content description. Among the models/methods that are mostly used are: brainstorming, concept testing and in-home use test. About 60 per cent of *all* respondents indicate that they use these models/methods. The Delphi method and synectics are hardly used at all. Their usage level is below 10 per cent.

Table IV.
The use and former use
of different models and
methods (percentage of
all respondents)

	Use	Former use
Brainstorming	61	9
Concept testing	61	1
In-home use test	60	0
Product life cycle	39	3
Focus group	38	1
Morphological analysis	29	1
Conjoint analysis	17	0
Quality function deployment	17	1
Limited roll-out	17	0
Synectics	10	0
Delphi method	6	0
Average	32	2

Calculating for the fact that quality function deployment (QFD) and conjoint analysis are relatively new methods, and Delphi is a rather complicated method to use, the overall results seems to suggest a more-than-average overall level of penetration of these new product models and methods.

Furthermore, within the sample there are few former users of the models and methods (see Table IV). For instance, for brainstorming there are only seven former users compared with 46 users. So, compared with the level of users, the level of former users of the different models and methods is low. Only a small number of companies seem to have abandoned these instruments already.

Use of the models and methods at different NPD stages

Most of the models and methods have been developed to deal with specific problems of NPD and are thus meant to be used in specific stages of the NPD process. Table V shows the empirical results. Although we do see a concentration of use at those stages of the NPD process at which the different methods are actually aimed, they are also being used at other stages. This is especially true for a technique like QFD and all idea-generation methods. In fact, except for limited roll-out, all methods are (for more then 25 per cent) used in stages for which they are *not* intended. Therefore, we must conclude that the different methods are not used in a focused manner.

Finally, a low level of use of models/methods (i.e. a dip) can be noted at the marketing strategy, business economic analysis and commercialization stages.

Reasons for use

For ten out of the 11 models/methods under investigation, the main reason for use is the identification of problems (see Table VI). For the models and methods at the idea generation “stage” the second most important reason stated is to improve the success rate of the product. However, moving down the NPD process, a shift in reasons for use can be noted. The second most important reason at the product optimization and marketing mix optimization “stages” is to supply support for the company’s salesforce or to help in marketing of the new product.

Degree of satisfaction with the models and methods and shortcomings

In order to be able to see how the models and methods perform, information was gathered on the level of satisfaction and the shortcomings perceived. The results are reported in Table VI. They show that most users are very satisfied. The low percentage of complaints registered seems to complement these findings. The users of QFD, focus group and morphological analysis in particular report a high level of satisfaction. However, we must be careful in generalizing these results, as the number of users per model/method is limited.

The main shortcomings are the time for implementation and execution of the models and methods. Forecast inaccuracies and not being able to capture the complexity of the marketplace are also important shortcomings.

Table V.
Number of firms which
use the models and
methods in the different
stages of the NPD
process

Stage	Brain- storming	Models and methods										Percentage of firms
		Morphological analysis	Synecotics	Product life cycle	Delphi method	Group discussion	In-home use test	Conjoint analysis	Concept testing	Quality function deployment	Limited roll-out	
Idea generation	37 (84)	8 (38)	5 (71)	16 (57)	2 (50)	15 (56)	0	4 (33)	3 (3)	8 (67)	0	72
Idea screening	25 (57)	11 (52)	3 (43)	8 (29)	2 (50)	16 (59)	1 (2)	2 (17)	9 (29)	8 (67)	0	60
Concept development and testing	13 (30)	16 (76)	2 (29)	7 (25)	2 (50)	13 (48)	5 (12)	8 (67)	30 (88)	9 (75)	1 (8)	64
Marketing strategy	9 (21)	6 (29)	0	8 (29)	0	4 (15)	7 (16)	2 (17)	7 (16)	2 (25)	1 (8)	34.7
Business economic analysis	6 (14)	5 (24)	0	4 (14)	0	2 (7)	0	3 (25)	1 (2)	3 (25)	0	25.3
Product development	11 (25)	13 (62)	1 (14)	7 (25)	2 (50)	12 (44)	25 (58)	7 (58)	17 (39)	7 (58)	3 (25)	68
Market testing	5 (11)	3 (14)	0	2 (7)	1 (25)	11 (41)	25 (58)	4 (33)	9 (21)	2 (17)	10 (83)	60
Commercial- ization	10 (23)	3 (14)	0	4 (14)	1 (25)	8 (30)	5 (12)	1 (8)	3 (7)	4 (33)	10 (83)	36
Total number of users	44	21	7	28	4	27	43	12	44	12	12	73

Note: Figures in parentheses indicate percentages

Method	Number of respondents	Degree of satisfaction (per cent)			Primary usage		Most important shortcoming	
		High	Middle	Low	Reason	Per cent	Shortcoming	Per cent
Idea generation								
Brainstorming	44	81	11	5	Identify problems	52	Too much time	27
					Improve success rate	41		
Morphological analysis	21	86	10	5	Identify problems	86	Too much time	24
					Improve success rate	48		
Synectics	7	72	29	0	Identify problems	43	Too much time	29
Product life cycle	28	79	21	0	Identify problems	39	Market too complex to capture with model	21
					Improve success rate	25		
Focus group	27	89	4	7	Identify problems	67	Inaccurate forecast	26
					Improve success rate	44		
Delphi method	4	75	25	0	Identify problems	50	Too much time	25
					Support salesforce	25	Market too complex to capture with model	25
In-home use test	43	77	14	5	Identify problems	58	Too much time	33
					Support salesforce	35		
Conjoint analysis	12	75	17	0	Improve success rate	83	Inaccurate forecast	25
					Support salesforce	58	Too much time	25
Product optimization								
Concept testing	44	75	23	2	Identify problems	55	Too much time	18
					Support salesforce	43		
Quality function deployment	12	92	0	0	Identify problems	83	Too complicated	17
					Improve success rate	75	Too much time	17
Marketing mix optimization								
Limited roll-out	12	67	33	0	Identify problems	47	Too much time	42
					Support salesforce	33		

Table VI.
The degree of satisfaction, reasons for use and perceived shortcomings of the methods

Effect of use of models/methods on company performance

In order to investigate the relationship between the use of NPD models and company performance we performed regression analysis. The independent variables were two factors labelled "degree of organization of the company's NPD" and "degree of use of models/methods", resulting after factor analysing all NPD variables (see Appendix 2). Within the two-factor solution the first factor comprised the five NPD variables: number of departments involved in the NPD process, degree of interaction between these departments, level of support by top management, and the number and extent to which NPD stages were completed (Cronbach $\alpha = 0.7$). The second factor contained the (sum of the) frequency of use of the models and methods by the company. The dependent variable was the company's level of gross profit compared with that of its competitors. The total model estimated included the main effects of the two factors, but also their interaction effect[24]

The results of the regression analysis are presented in Table VII. They show that the model fits. The adjusted R^2 is significant and has the value of 0.14. Both main effects are significant too, but the interaction is not. So, there is only a direct effect of both the degree to which the company's NPD is formally organized and the frequency of use of models and methods on company gross profits.

Conclusions and discussion

The results from the empirical study show that the awareness of new product models and methods by name and content differs considerably. The awareness by name is only 30 per cent for the models and methods included in this research. The awareness by content is almost double – 57 per cent. About half of all the people who are aware of these models and methods by content also apply them, resulting in an overall penetration level of 30 per cent. However, large differences can be noted between the different techniques. Brainstorming, concept testing and in-home use test are mostly used.

The level of awareness and penetration of some models (e.g. conjoint analysis) may be affected by the fact that companies contract market research companies to assist them while dealing with NPD-related problems. Future research may therefore be aimed at the developments in the use of new product models and methods by market research companies.

Table VII.

Regression results:
impact on company
gross profits

	β	<i>T</i> -value	<i>T</i> significance
Factor 1 "degree of organization of the company's NPD"	0.28	2.2	0.03
Factor 2 "degree of use of models/methods"	0.35	2.9	0.01
Factor 1 $\times$ 2	0.11	0.9	0.40
<i>Notes:</i>			
Adjusted $R^2 = 0.14$; <i>F</i> -value = 4.20; <i>F</i> significance = 0.00; Sample size = 75			

The penetration level of idea generation methods for Dutch companies seems to lag behind that of German and Swiss companies. Geschka[15] and Schelker[1] already report penetration levels similar to ours in the mid-1970s and early-1980s. Possibly, these instruments have been pushed more by the universities and consulting firms in these countries. However, the higher usage levels may also be related to the German culture. Germans tend to do things rather systematically[25,26].

Comparing our results with those of Mahajan and Wind[4], several differences can be noted (see Table VIII). These differences seem to be more dependent on the different types of companies in the two samples than due to the cross-cultural differences. First, Dutch companies seem to make more use of the product life cycle. However, the Dutch sample contained mainly small companies. The large *Fortune* 500 firms in the US sample have probably already abandoned this simple concept[20,27]. QFD and conjoint analysis – being relatively new methods – seem to have a higher acceptance among the US companies. The same is true for the Delphi method. However, again company size may explain the difference. Second, the Dutch companies seem to make more use of concept testing and less use of focus groups and limited roll-out. This may be explained by the different nature of the companies in both samples. The Dutch sample contained industrial companies only, whereas the US sample consisted of industrial goods, consumer goods as well as service companies. In industrial markets companies receive more feedback from their customers on an ongoing basis and are probably more focused on lead users than, for instance, consumer goods companies.

So, overall, the penetration levels of the different models and methods seem to match between the Dutch and US companies.

Just like Mahajan and Wind[4] we find a remarkable distribution of use of the different models and methods over the different stages of the NPD process. Despite the fact that many models and methods are intended to be used for a

Method	The Netherlands ^a (<i>N</i> = 75)	USA[4] (per cent) (<i>N</i> = 78)
Product life cycle	31	8
Morphological analysis	3	<5
Synectics	4	8
Delphi method	0	9
Concept testing	57	26
Focus group	33	68
Conjoint analysis	1	15
QFD	4	9
Limited roll-out	1	42

Note:

^aPercentage of use based on the recognition of the model/method by name, therefore comparable with the results of Mahajan and Wind[4]

Table VIII.
Cross-cultural
comparison: percentage
of use of models and
methods

specific type of problem (i.e. idea generation, product optimization) practitioners seem to apply them at other stages, to identify or solve other problems. They probably use these models and methods in a creative and more practical, and thus less formal, way. This may also have to do with the fact that they perceive the NPD process to be an iterative rather than a sequential process. The fact that a large number of respondents do not know many of the models/methods by name indicates that they may even have (re)invented these models and methods themselves. (Just imagine someone asking a colleague to try out/test an improved product for a number of weeks.)

What is remarkable is the low level of use registered at the marketing strategy, business economic analysis and commercialization stages of the NPD process. It may be an artefact of the number of stages in the NPD process distinguished in the research. It may also be caused by the limited number of new product models and methods included in the research. However, more probably, this finding reflects the fact that the companies under investigation are operating in business-to-business markets. In these companies the marketing function is of a different nature and often less well developed[21]. It influences the types of model and method used. For example, Moore[22] reports that 75 per cent of the industrial firms he investigated conducted some market research prior to initial screening, but only 20 per cent conducted large-scale surveys[3, p. 79].

The identification of problems is the main reason for using new product models and methods. This is true for all models, except for conjoint analysis. With conjoint analysis it is to improve the success rate of the new product. Looking at all models and the different types of problem of the NPD process at which they are aimed, a remarkable shift can be seen within the second reason for use mentioned. At the early stages of the NPD process, the second most important reason for use is to improve the success rate of the product, whereas at later stages generating support for the company's salesforce seems to become more important. The latter finding is an important addition to the findings of Mahajan and Wind[4] who also found the identification of problems and improving the success rate to be prime reasons for use of models and method in the USA. The new finding reflects the stage at which management's attention shifts from developing the new product to commercializing it effectively.

The main shortcomings of the use of new product models and methods are the time they take to execute or implement, predict unforeseen problems and the fact that the market may be too complex to capture all its intricacies by the model. The latter is especially true for qualitative methods like focus group and conjoint analysis, and a simple, single-dimensional concept like the product life cycle. Also, these findings are in line with earlier findings of, for example, Mahajan and Wind[4]. Therefore, Dutch managers experience similar flaws in these models/methods as do their US counterparts.

The respondents tend to be satisfied with the models and methods they use. This is reflected in both the low percentage of former users and the low

percentage of shortcomings mentioned. On average, less than 25 per cent of the respondents do mention one or more shortcomings. As this is a subjective measure of performance provided by the users, we may want to be careful in its interpretation. The users may be biased (i.e. exhibit cognitive dissonance – since we have invested in the technique we have to say we are satisfied). However, this outcome is in line with the previous findings[1,4,15]. Those who use these models and methods are content. It seems to help them structure their problems. To determine the actual efficiency of the models and methods, future research should develop better measures.

A more objective measure for the effectiveness of the models and methods is the result of the regression analysis performed. It shows a clear link between the frequency of use and company's gross profits. The low R^2 found indicates that other explanatory factors have to be considered. The results do not say anything about the direction of causality. Furthermore, they may be dependent on the type of industry and the complexity of the companies' operations as well as the type of products[18]. Schelker[1] found differences in penetration levels for some models/methods (e.g. analysis and prognosis methods) between industries while Geschka[16, p. 26] established a significant difference in the evaluation of success of idea generation methods between industries. Future research in this area is needed. However, the current findings provide important reasons for management to use models and methods in the NPD process. These preliminary results complement success factors like those previously identified by Cooper[3,28,29].

New product models and methods seem to have an average overall level of penetration. As users are generally satisfied, there appears no direct need for major improvements on existing methods. Nevertheless, scholars and practitioners should keep looking for new and better instruments[30]. As a large number of companies are still unaware of the existence of several important models and methods, universities, polytechnics and consulting firms should pay more attention educating current and future managers on this subject.

Note and references

1. Schelker, T., *Problemlösungsmethoden in Produkt-innovationsprozess, (Problem-solving Methods in the New Product Development Process)*, published dissertation, Verlag Paul Haupt, Bern, 1976.
2. Craig, A. and Hart, S., "Where to now in the new product development research?", *European Journal of Marketing*, Vol. 26 No. 11, 1992, pp. 3-49.
3. Cooper, R.G. and Kleinschmidt, E.J., "An investigation into the new product process: steps, deficiencies and impact", *Journal of Product Innovation Management*, Vol. 3, 1986, pp. 71-85.
4. Mahajan, V. and Wind, J., "New product models, practice, shortcomings and desired improvements", *Journal of Product Innovation Management*, Vol. 9, 1992, pp. 128-39.
5. Feldman, L.P. and Page, A.L., "Principles vs. practice in new product planning", *Journal of Product Innovation Management*, Vol. 1, 1984, pp. 43-55.

6. Clark, K.B. and Wheelwright, S.C., *Managing New Product and Process Development*, The Free Press, New York, NY, 1993.
7. Urban, G.L. and Hauser, J.R., *Design and Marketing of New Products*, 2nd ed., Prentice-Hall, Englewood Cliffs, NJ, 1993.
8. Crawford, C.M., *New Products Management*, 3rd ed., Richard D. Irwin Inc., Boston, MA, 1991.
9. Kotler, P., *Marketing Management: Analysis, Planning, Implementation and Control*, 7th ed., Prentice-Hall, Englewood Cliffs, NJ, 1991.
10. Millson, M.R., Raj, S.P. and Wilemon, D., "A survey of major approaches for accelerating new product development", *Journal of Product Innovation Management*, Vol. 9, 1992, pp. 53-69.
11. Takeuchi, H. and Nonaka, I., "The new product development game", *Harvard Business Review*, January-February 1986, pp. 137-46.
12. Oppedijk van Veen, W.M., *Consumentenonderzoek binnen de Faculteit van het industrieel ontwerpen*, (Consumer Research in the Faculty of Industrial Design), Delft University Press, Delft, 1987.
13. Buijs, J., *Innovatie en interventie*, (Innovation and Intervention), 2nd ed., Kluwer, Deventer, 1984.
14. Holt, K., *Product Innovation Management: A Workbook for Management in Industry*, Butterworths, London, 1987.
15. Geschka, H., "Creativity techniques in product planning and development: a view from West Germany", *R&D Management*, Vol. 13 No. 3, 1983, pp. 169-83.
16. Geschka, H., "Introduction and use of idea generating methods", *Research Management*, May 1978, pp. 25-8.
17. Verhage, B., Waalewijn, Ph. and van Weele, A.J., "New product development in Dutch companies: the idea generation stage", *European Journal of Marketing*, Vol. 15 No. 5, 1981, pp. 73-85.
18. Griffin, A., "Evaluating QFD's use in US firms as a process for developing products", *Journal of Product Innovation Management*, Vol. 3, 1992, pp. 171-88.
19. Wittink, D.R. and Cattin, P., "Commercial use of conjoint analysis: an update", *Journal of Marketing Research*, Vol. 53, July 1989, pp. 91-6.
20. McCabe, D.L. and Narayanan, V.K., "The life cycle of the PIMS and BCG models", *Industrial Marketing Management*, Vol. 20, 1991, pp. 347-52.
21. Workman, J.P. Jr, "Marketing's limited role in new product development in one computer systems firm", *Journal of Marketing Research*, Vol. XXX, November 1993, pp. 405-21.
22. Moore, W.L., "New development practices of industrial marketers", *Journal of Product Innovation Management*, Vol. 4, 1987, pp. 6-20.
23. Dess, G.G. and Robinson, R.B. Jr, "Measuring organizational performances in the absence of objective measures: the case of the privately-held firms and conglomerate business unites", *Strategic Mangement Journal*, Vol. 5 No. 3, 1984, pp. 265-73.
24. The correlation between the interaction and both factors was 0.16 and 0.09 respectively.
25. Hofstede, G., *Cultures and Organizations: Software of the Mind*, McGraw-Hill, London, 1991.
26. Hofstede, G., *Culture's Consequences: International Differences in Work-related Values*, Sage, Beverly Hills, CA, 1984.
27. Rogers, E.M., *Diffusion of Innovations*, 3rd ed., The Free Press, New York, NY, 1983.
28. Cooper, R.G., *Winning at New Products*, Addison-Wesley, Reading, MA, 1988.
29. Cooper, R.G., "New products: the factors that drive success?", *International Marketing Review*, Vol. 11 No. 1, 1994, pp. 60-76.

30. Sanchez, R. and Sudharshan, D., "Real-time market research: learning by doing in the development of new products", *Department of Business Administration*, working paper, University of Illinois, Champaign, IL, 1993.

Further reading

Crawford, C.M., "The hidden costs of accelerated product development", *Journal of Product Innovation Management*, Vol. 9, 1992, pp. 188-99.

Gupta, A.K. and Wilemon, D.L., "Accelerating the development of technology-based new products", *California Management Review*, Winter 1990, pp. 24-45.

Appendix 1: definitions

Method/model	Description
Brainstorming	A systematic creative group session in which barriers to creative thinking are removed to stimulate the production of new ideas through association
Morphological analysis	An approach to find a large number of theoretical solutions to a problem by dividing it into smaller parts/problems. For every part, solutions are generated. These solutions are then linked together to solve the whole problem
Synectics	A creative group session in which the original problem is converted into a much wider problem or analogy. For this alternative problem solutions are generated. At a later stage these solutions are transformed back into solutions for the original problem
Delphi method	A multi-survey consisting of several sequential rounds in which a number of experts are asked to give their opinion and vision on developments. Through feedback one general vision is established
Focus group	A group session of customers in which they react to and discuss a number of topics. The aim is to gather information on underlying needs, wants, etc.
Product life cycle	Construct in which the sales/volume of a product are/is mapped over time, resulting in an S-shaped curve. It can be used to determine the life-cycle phase in which the market exists and help to draw conclusions with regard to the need to adapt existing products or start looking for new products
Concept test	A method of asking a number of customers to evaluate a particular product concept. The product concept can be explained to the customers in writing or can be visualized by simple means
In-home use test	An approach that has a number of customers test a new product "at home" for a certain period of time. Afterwards experiences/problems encountered are discussed
Quality function deployment	A method designed to help the new product development (NPD) project team identify and interpret the needs and wants of customers. The aim is to establish the importance of product attributes and transform them into technical requirements
Limited roll-out	An approach for introducing a new product to the market. The new product is first introduced on a small scale, with the objective to expand slowly in order to limit market risk. During the introduction the content of the market strategy may be modified.

Appendix 2: method of analysis

Factor analysis was used to reduce the number of variables associated with the organization of the companies' NPD. The factor analysis used the principal component method and varimax rotation. The cut-off criterion used was eigenvalue > 1 . The two factors derived explained 59 per cent of variance. The two-factor solution was accepted based on the theoretical argument of treatment of the extent of use of the new product models and methods as a separate construct.

The two factors derived refer to the general level of organization of the company's NPD and the extent of use of models and methods. The factors are therefore labelled "degree of organization of NPD" and "degree of use of models/methods" (see Table AI).

Table AI.
Results of the factor
analysis performed on
the NPD variables

Variable	Factor 1: degree of organization of the company's NPD	Factor 2: degree of use of models/methods
Number of departments involved in the NPD process	0.70	0.30
Degree of interaction between these departments	0.61	0.15
Level of support by top management	0.54	-0.15
Number of NPD stages completed	0.72	0.30
Extent to which NPD stages are generally completed	0.89	0.23
Frequency/intensity of use of models/methods	0.05	0.90
Eigenvalue	2.50	1.04
Cumulative variance percentage explained	41.7	59.0

This article has been cited by:

1. MARC GRANER, MAGDALENA MIßLER-BEHR. 2014. METHOD APPLICATION IN NEW PRODUCT DEVELOPMENT AND THE IMPACT ON CROSS-FUNCTIONAL COLLABORATION AND NEW PRODUCT SUCCESS. *International Journal of Innovation Management* **18**, 1450002. [[CrossRef](#)]
2. Marc Graner, Magdalena Mißler-Behr. 2013. Key determinants of the successful adoption of new product development methods. *European Journal of Innovation Management* **16**:3, 301-316. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
3. GERRIT A. DE WAAL, PAUL KNOTT. 2013. INNOVATION TOOL ADOPTION AND ADAPTATION IN SMALL TECHNOLOGY-BASED FIRMS. *International Journal of Innovation Management* **17**:03, 1340012. [[CrossRef](#)]
4. GERRIT A. DE WAAL, PAUL KNOTT. 2012. PRODUCT INNOVATION TOOL ADOPTION BEHAVIOUR IN TECHNOLOGY-BASED NEW VENTURES. *International Journal of Innovation Management* **16**:03, 1240001. [[CrossRef](#)]
5. Dayu Jin, Kah-Hin Chai, Kay-Chuan Tan. 2012. Organizational adoption of new service development tools. *Managing Service Quality: An International Journal* **22**:3, 233-259. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
6. Efthimios Bothos, Dimitris Apostolou, Gregoris Mentzas. 2012. Collective intelligence with web-based information aggregation markets: The role of market facilitation in idea management. *Expert Systems with Applications* **39**:1, 1333-1345. [[CrossRef](#)]
7. Muammer Ozer. 2011. Understanding the impacts of product knowledge and product type on the accuracy of intentions-based new product predictions. *European Journal of Operational Research* **211**:2, 359-369. [[CrossRef](#)]
8. Catharina von Koskull, Martin Fougère. 2011. Service development as practice: A rhetorical analysis of customer-related arguments in a service development project. *Scandinavian Journal of Management* **27**:2, 205-220. [[CrossRef](#)]
9. Gerrit Anton de Waal, Paul Knott. 2010. Process and strategy influences on product development performance in New Zealand. *Small Enterprise Research* **17**:2, 193-206. [[CrossRef](#)]
10. Athanasios Krystallis, Michalis Linardakis, Spyridon Mamalis. 2010. Usefulness of the discrete choice methodology for marketing decision-making in new product development: an example from the European functional foods market. *Agribusiness* **26**:1, 100-121. [[CrossRef](#)]
11. Tsu-Ming Yeh, Fan-Yun Pai, Ching-Chow Yang. 2010. Performance improvement in new product development with effective tools and techniques adoption for high-tech industries. *Quality & Quantity* **44**:1, 131-152. [[CrossRef](#)]
12. Muh-Cherng Wu, Ying-Fu Lo, Shang-Hwa Hsu. 2008. A fuzzy CBR technique for generating product ideas. *Expert Systems with Applications* **34**:1, 530-540. [[CrossRef](#)]
13. E. Van Kleef, H.C.M. Van Trijp. Opportunity identification in new product development and innovation in food product development 321-341. [[CrossRef](#)]
14. Muh-Cherng Wu, Ying-Fu Lo, Shang-Hwa Hsu. 2006. A case-based reasoning approach to generating new product ideas. *The International Journal of Advanced Manufacturing Technology* **30**:1-2, 166-173. [[CrossRef](#)]
15. A.I.A. Costa, W.M.F. Jongen. 2006. New insights into consumer-led food product development. *Trends in Food Science & Technology* **17**:8, 457-465. [[CrossRef](#)]
16. Janez Prašnikar, Tina Škerlj. 2006. New product development process and time-to-market in the generic pharmaceutical industry. *Industrial Marketing Management* **35**:6, 690-702. [[CrossRef](#)]
17. Stefan Lagrosen. 2005. Customer involvement in new product development. *European Journal of Innovation Management* **8**:4, 424-436. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
18. C.W. Thia, Kah-Hin Chai, John Bauly, Yan Xin. 2005. An exploratory study of the use of quality tools and techniques in product development. *The TQM Magazine* **17**:5, 406-424. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
19. Ellen van Kleef, Hans C.M. van Trijp, Pieterlun Luning. 2005. Consumer research in the early stages of new product development: a critical review of methods and techniques. *Food Quality and Preference* **16**:3, 181-201. [[CrossRef](#)]
20. Muammer Ozer. 2002. Concept testing of Internet services. *European Journal of Innovation Management* **5**:4, 208-213. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
21. Tomás Manuel Bañegil Palacios, Francisco Javier Miranda González. 2002. Assessing the validity of new product development techniques in Spanish firms. *European Journal of Innovation Management* **5**:2, 98-106. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
22. Francisco Javier Miranda González, Tomás Manuel Bañegil Palacios. 2002. The effect of new product development techniques on new product success in Spanish firms. *Industrial Marketing Management* **31**:3, 261-271. [[CrossRef](#)]
23. Edwin J. Nijssen, Ruud T. Frambach. 2000. Determinants of the Adoption of New Product Development Tools by Industrial Firms. *Industrial Marketing Management* **29**:2, 121-131. [[CrossRef](#)]
24. Edwin J. Nijssen, Ruud T. Frambach. 1998. Market research companies and new product development tools. *Journal of Product & Brand Management* **7**:4, 305-318. [[Citation](#)] [[Full Text](#)] [[PDF](#)]

25. Roy McLarty. 1998. Case study: evidence of a strategic marketing paradigm in a growing SME. *Journal of Marketing Practice: Applied Marketing Science* 4:4, 105-117. [[Citation](#)] [[Full Text](#)] [[PDF](#)]