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Fermentas: from Research Idea to the Market

Teaching Notes

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Summary of the case

“Fermentas” is a fast growing and successful biotechnology company in Lithuania. At any single time it has about 5-12 new product development projects. For a better control of research and development, management system “Stage-Gate” was established in 2004. According to the principles of this system, company’s experts check every project of new product development and launching to the market in certain stages at a “New Product Committee” (NPC). Their goal is to evaluate the potential of a product realistically in order to concentrate company’s intellectual resources on development of promising ideas only. The implementation of the “Stage-Gate” system has reduced the percentage of research ideas in the company being translated into commercial products from 20% to approximately 3-4%.

The case describes a decision making process during the development of one new product of the company, the Plasmid Miniprep Kit. Company’s researchers and experts deliberate in NPC meetings. Their dialogue and provided documents reveal different angles of analysis as well as the main questions which arise when testing whether a particular research idea can be turned into a commercially successful product.

The case can be used in undergraduate studies to analyse the problems of pricing and launching a new product to the market in management accounting and process management courses.

The product under analysis is intended for biotech research labs, so it will not necessarily be familiar to management students. However, the stages of decision making process and the principles of analysis are universal and can be adapted to any company with a need to manage new product development processes, to price and to set financial goals for new products.

Learning objectives

- To describe stages and to identify the roles of managers and experts in a decision making process for a new product development and launching to the market;
- To formulate the set of criteria according to which the development of a new product idea should be continued or abandoned at various stages;
- To identify the characteristics of a market, a company and a product which determine a choice of a new product pricing strategy (a “price-setter” or a “price-taker”);
- To obtain practice in setting long-term goals for a new product: competitive value proposition, target price and financial performance;
- To select and to systemize relevant information on product technology, market competitiveness and company’s financial goals necessary for target price decision making.

Student preparation

Students should have theoretical background in strategy: company’s value chain; the activities of R&D and product design stages; product life cycle; launching products to the market; factors which influence pricing depending on the level of competitiveness in the markets; management accounting background on measurement of company’s and its products’ profitability ratios, target costing and pricing.

Students should read the case before the class.

Students can be given a group task (groups of 3-5 students). For example, student groups can be assigned the role of the New Product Committee, asking them to identify or to formulate

questions to the author of a product idea and to the other members of the project in order to evaluate a potential of the new product in the market and to make a decision on its launch. Such task should help preparation for opening a discussion: to participate in structuring the main directions of case analysis in the class. The number of questions may be limited, e.g. no more than 5.

Students can be given individual preparatory tasks, asking them to answer 1-2 broad questions, e.g.:

- *Do you think the new product should be launched to the market? Why?*
- *What price would you set for a new product? Why?*

Teaching plan in the class

At the beginning of the class students can be asked questions, which would level their understanding of a situation in the company and would help planning directions of further discussion, e.g.:

1. *How would you briefly describe the main strategy of “Fermentas” value chain? In your view, is it successful or not? Why?*
2. *What is the main problem being analysed in the company?*
3. *Who participates in debating this problem? What are their views?*

Answering the first question. *How would you briefly describe the main strategy of “Fermentas” value chain? In your view, is it successful or not? Why?*

The management of the company is able to manage the whole value chain of their products: from R&D, product design, and operations which take place in the main company in Lithuania to marketing and sales, distribution and customer service which are fulfilled by subsidiaries or partners in Europe, North America and Asia. The company creates competitive advantage by emphasizing scientific innovations and new product creation. This conclusion is drawn from the main achievements that the company emphasizes: the number of newly created products, investments in fundamental research, the concentration of high quality human resources in R&D department (references to facts provided in company description sub-section). In addition, it may be said that the company strives to maintain very close and immediate contact with their clients – scientists. Therefore, customer service department is also very important in implementing the competitive strategy of the company. Such cooperation ensures successful marketing of the company as well as successful and active involvement of experts in creating new products.

The financial growth and profitability of the company is the result of a successful strategy. The company successfully manages its product portfolio by combining products in different product life cycle stages. The contribution of commercially successful products in the maturity stage allows financing high costs of creating new products, since the main resources of the company are employed effectively: scientists devote their time to invent and develop new ideas, but the company avoids wasting their time on research ideas without potential as well as further costs of production and distribution. The company competes successfully with big biotech companies because it is able to offer products of similar or higher quality at a lower price (information on prices in appendixes).

Answering the second question. *What is the main problem being analysed in the company?*

The main problem of the case should be formulated. It is formulated in two questions, which can be written on a board:

How do company's experts decide whether the new product Plasmid MiniPrep Kit should be launched to the market?

What should be its price?

Before answering the question, students should be reminded the idea of the product and asked why, in their opinion, this idea came to researcher Ramutė Pinelienė. The instructor should comment on the first (introductory) paragraph of the case: the extract explaining that it is important for scientists to research e.coli bacteria and their genetic mutations in order to diagnose and treat relevant diseases; that requires appropriate working tools in their labs. Scientists work with various reagents which enable to grow bacterial cultures. Their genome can be "cut" in order to research separate parts.

It is important for scientists that reagents used for research are conveniently packed, i.e. the whole kit necessary for one trial of bacterial culture preparation. It is also imperative that reagents are effective, i.e. provide a high yield quickly, are clean, not contaminated. The price of such kit is important, since scientists compare price per preparation of one trail of bacterial culture. It must be noted that the price of the product depends on the kit size. The size of kits varies; the most common are 10-, 50-, 100-, 250-trial kits. This information is provided by Ramutė Pinelienė during the discussion and also in appendixes.

To summarize the answers, product value proposal can be formulated in one sentence which emphasizes the competitive advantage of a product: the best product functionality-price ratio.

Answering the third question. *Who participates in debating this problem? What are their views?* It is important to name all departments which managers-experts cooperate in decision making:

- Scientists-researchers (authors of the ideas). They also act as experts in evaluating ideas of their colleagues. R&D department;
- Edita Šmergelienė. Representative from marketing department;
- Jūra Žilytė. Project manager;
- Algimantas Markauskas. Business development director;
- Scientists prof. Viktoras Butkus, prof. Arvydas Janulaitis. The participation of top-level management and owners of the company shows the importance of NPC meetings and the integrity of company's strategic management.

Analysis planning

After the discussion of introductory questions, the focus should switch to the formulated problem and analysis planning.

Students are asked to answer the question: *How do experts make decisions on new products?*

Answers should lead to the need to get acquainted with the *decision making process*, which includes:

- Raising questions (preliminary analysis; analysis of actions taken);
- Formulation of decision making stages by the sequence of questions: the separation of parallel (independent) and consecutive (dependent) questions for the analysis, the planning of deliberation timeline;
- Planning and management of further actions;
- Further corrections to the idea.

This decision making scheme can be drawn on a board. The instructor formulates *the task of the first part of the analysis*: *given the scheme, describe the decision making process in “Fermentas” for launching new products.*

Another part of the problem requires the evaluation of financial results of the product and to make decisions on further project development. The instructor formulates *the task of the second part of the analysis*: *to find information necessary to make a pricing decision and to determine the profitability of the product given this information.*

Analysis

1st part of the analysis. The goal is to *describe the decision making process in “Fermentas” for launching new products.*

Students work in groups. Students can be asked to remember questions raised during NPC meetings (preparatory task) and to prepare short presentations, e.g. 5 minutes. The list of questions is formulated from group presentations. The following discussion focuses on the sequence of questions and their (in)dependence. The instructor should draw students' attention to the main questions and their consistency according to the time when these questions are being considered at “Fermentas”. It is important to mention people who make decisions and participate in the project.

After group presentations the sequence of questions should be summarized:

1. How does the product work? Is the market interested in it? What can be its demand?
2. Is there any competition for the product? Which products are the closest competitors?
3. Can this product be distinguished from the others?
4. What product features should the company emphasize? What marketing elements should be used when launching the product to the market?
5. Would the product match the current product portfolio of the company?
6. Are existing company operations appropriate for the production of this product?
7. Does the quality of the product match external and internal standards as well as the quality strategy of the company?
8. What should be the price of the product?
9. Does the product have potential to be profitable enough?
10. Is the product ready to be launched to the market?

Questions re. the price of the product (Q8) arise in parallel with preliminary market analysis (Q2-Q4). Profitability (Q9) is analysed in parallel with the price analysis. The price can be corrected taking into account the information from Q5-Q7 and incorporate all the changes in subsequent deliberation stages.

Question 10 is about developing the product idea further. It determines whether the project will be abandoned or continued. Discussions of Q10 show the “crossroads” of a decision making process. It is **the main problem of the case**.

In summarizing the questions, main *stages of product creation process* and *decision making gates* should be identified: when the company had to decide on further development of the project. In order to complete this task the instructor can recommend to the students to read the article on “Stage-gate” management system (see references). The above questions should be attributed to appropriate stages.

1. Preliminary discussion of a researcher's idea (Q1).
 - a. Decision on granting project status.
2. Detailed discussion of product characteristics and market potential (Q2-Q4).

The goal is to evaluate product characteristics and its costs. In parallel, the analysis of competitive environment of the product is conducted, in order to compare the characteristics of competing products and to evaluate market potential as well as a possible price.

 - a. Decisions on further research on chosen characteristics of the product.
 - b. Decisions on further market analysis and marketing activities.
3. Product development: quality and technology improvement, draft description of the product (Q5, Q6).
 - a. Decision on prototype production and marketing plan.
4. Product testing and confirmation.
 - a. Decision on launching the product to the market (Q7-Q9).

According to the sequence of described decision making process and analysis plan, student groups briefly comment on each stage of decisions using examples from "Fermentas" NPC meetings. To summarise, the class formulates the main criteria, which helped "Fermentas" make decisions:

- Competitiveness by characteristics (speed, purity, effectiveness);
- Price competitiveness: \$0.84-\$1.34 per trial depending on the kit size;
- Production costs ensure profitability (\$0.20 per trial);
- Product's strategic fit in product portfolio;
- The ability to adapt technologies and operations to provide necessary characteristics.

2nd part of the analysis. The goal is to *prepare and present an analysis report by a finance director on product's profitability and provide a recommendation on project development.*

Work in groups. Students are asked to act as a finance director of the company in choosing an appropriate pricing method, setting the price for the product and evaluating the profitability, given the information provided in the case. The instructor should check the progress of work in groups and to ensure that groups have chosen a correct pricing method – *target costing*, based on market competition analysis. If some group has chosen a *cost-plus* method, the instructor should initiate a general discussion about the appropriateness of these methods in a given situation.

Prepared reports should include calculations and explanations, reasoning the choice of the price and the evaluation of profitability.

Market prices depend on a kit size. Therefore, it is important to determine the kit size of the product which price is being set. The instructor may remind students that the most popular kit sizes are 10, 50 and 250.

In market analysis it is recommended to calculate market price median for every popular size of the kit. Based on a *Price analysis report* by Edita (appendix 2) , these prices are: \$1.60 per trial for a kit of 10; \$1.05 per trial for 50, \$1.00 per trial for 100. The biggest player in the market, *Qiagen*, sells a kit of 50 for \$1.34 per trial, and a kit of 250 for \$1.16 per trial. The closest competitor, *Sigma*, makes kits of 10 and sells them for \$1.77 per trial.

Students should choose target prices based on market median and closest competitors. They should adjust these prices taking into account the distinguishing features of the product compared with competitors. If Plasmid MiniPrep Kit did not have any distinguishing features, the price offered should be lower than competitors'. However, the product of "Fermentas" works twice as fast as that of its competitors, so the price can be the same as theirs.

Kit size	10	50	250
Competitive market prices	\$1.60-\$1.77	\$1.05-\$1.34	\$1.00-\$1.16
Target price of Plasmid MiniPrep, per trial	\$1.60	\$1.05	\$1.00
Target price of Plasmid MiniPrep Kit	\$16,00	\$52,50	\$250.00
Average price per trial	\$1.22		

Will such price ensure adequate profitability?

1. Since production costs per trial (\$0.20) are given, the gross profit margin could be calculated per Plasmid MiniPrep Kit trial for different kit sizes:

For kit size of 10: $(\$1.60 - \$0.20) = \$1.40$; or 87.5% ($= \$1.40 / \1.60);

For kit size of 50: $(\$1.05 - \$0.20) = \$0.85$; or 81.0%;

For kit size of 250: $(\$1.00 - \$0.20) = \$0.80$; or 80.0% ;

The average gross profit is \$1.02 or 82,5% per one kit (let's assume production volumes of different kit sizes be equal).

The closest criteria of meeting the profitability target for the new product could be the Fermentas' recent gross profit margin (58.2%), or even the gross profit margin of Qiagen (67.0%). The information of different profitability ratios provided in appendix 4 should be used for the criteria selection purpose.

The calculated gross profit margin 82,5% exceeds both estimated target values and this could be the strong argument for the favour of potential product profitability, however we still don't know the total revenue, full product costs and the net profit margin for the new product.

2. The approximate evaluation of revenues could be retrieved from the market analysis data, provided by Edita Šmergelienė. Since the global market size for Miniprep kits is about \$133 million dollars and Fermentas usually aims for a 1% market share, the revenue estimation for the new product is \$1.33m.
3. The full costs of the product can be estimated by assigning the relevant non-manufacturing costs to the estimated production volume.

Based on cost units used in the company, i.e. the number of trials, the \$1.33 m revenue and average \$1.22 price per trial correspond on average, to production of 1.093 m. trials:

$$1.093m = \frac{\$1.33m}{1.22}$$

4. Using the 2005 year data from the Income statement of Fermentas (appendix 3) the annual non-manufacturing cost can be calculated as the difference between Gross Profit and EBIT:

$$\$4.19m. = 7.49 - 3.30 = \$4.19m.$$

5. The non-manufacturing cost for the company like Fermentas consist mainly from the R&D activity costs, therefore we can assume the output of this activity as a relevant cost driver

measure and use it for the cost driver rate estimation and cost distribution. The main output of R&D activity is the number of the new-product projects completed.

- The number of the projects completed isn't provided in the case text, but the approximate number could be estimated based on the information, provided in the *Fermentas' New Product Committee* section. At any given time there are about 5-12 new product projects in the company (8 on average). Their approximate duration (based on case chronology) is 0.5-1 year. So it may be assumed that 8-16 projects (12 on average) are completed in a year.

Let's distribute non-manufacturing costs to those 12 completed projects:

$\frac{\$4.19\text{m.}}{12} = \0.35m. , thus one project is assigned about \$0,35m. of non- manufacturing costs.

- Based on estimated average price, production costs of the Plasmid Miniprep kit comprise 16.4% of the revenue:

$$\frac{\$1.22.}{\$0,20} = 16.4\%,$$

This ratio leads to \$0.22 m. estimation of annual manufacturing costs:

$$\$0.22 \text{ m.} = 16,4\% \times \$1.33\text{m.}$$

Non-production costs are \$0.35 m. therefore, total costs of the project are:

$$\$0.57 \text{ m.} = \$0.35\text{m.} + \$0.22\text{m.}$$

Average total costs (ATC) per trial are \$0.52:

$$\$0.52 = \frac{\$0.57\text{m.}}{\$1.093\text{m.}}$$

- Operating profit (EBIT) per project is:

$$\$1.33\text{m} - \$0.57\text{m} = \$0.76\text{m}$$

Operating profit (EBIT) per cost unit (one Plasmid MiniPrep Kit trial) is, on average:

$$\$1.22 - \$0.52 = \$0.70.$$

EBIT/Sales ratio is estimated to be 57,3%:

$$0.573 = \frac{\$0.70}{\$1.22}$$

This is a high ratio compared with ratios provided in appendix 4 (ranging between 10% and 26%). It is a sufficient argument to prove the financial strength of a product. However the risk of this estimate remains, because the average total cost of one trial is sensitive to the accuracy of the demand forecast. For example, the sales estimate of 0,5m. will result in 26% EBIT/sales ratio.

- Alternative to Gross margin and EBIT margin, reference points for testing product profitability could be related to ROI (Net Profit/ Investment), ROA (EBIT to Assets) or ROE (Net profit to Equity) measure. If participants of the class are supposed to have basic financial management knowledge, they can use even companies' WACC measure (see the data provided in the appendix 3). Choosing the most relevant financial target should be related to the Companies' strategy which implies the need for financial control of

investment. According to that, ROI or WACC must be primary choice for the long term pricing decision.

10. Again, when choosing the benchmark for ROI measure, companies' *incremental investment* should prevail as a calculation base over the simple NI/CAPEX measure. Therefore we take into account the recent Fermentas' investment into the R&D, which was EUR 2.2m., or \$2.63m.

Therefore, in order to keep the level of ROI at 75.7% (as it was in 2005), the company should seek for \$1.99 m (= 75.7% x \$2.63m.) net profit per year. The companies' EBIT could be calculated, using the average tax rate of 17,2% (appendix 2):

$$240m. = \frac{\$1.99m.}{1-0,172}$$

This EBIT target corresponds to \$0,20m. net profit for each of the 12 new product project. Target EBIT margin for one trial of Plasmid Miniprep therefore should not be lower than \$0.18:

$$\$0,18 = \frac{\$0.20m.}{1.093m.}$$

If the price is planned with a goal to maintain ROI, then the minimum average price per trial should be \$0.70 (\$0.52 + \$0.18). Again, the accuracy of the primary demand and costs estimates will allow some deviation from this planed number.

Previously estimated market price of one trial (= \$1.22) exceeds this target by \$0,52 , so the profitability of the new product seems to be more than satisfying, even if the risk of the market demand remains.

Given the size of the kit (10, 50 and 250), average lowest target price (= \$0,70) could be recalculated using average price ratio coefficients:

Kit size	10 (coef. 1.315)*	50 (coef. 0.863)	250 (coef. 0.822)
Target market price of Plasmid MiniPrep Kit (PMPK), per trial	\$1.60	\$1.05	\$1.00
Lowest price of PMPK per trial, given ROI target	\$0.92	\$0.61	\$0.58
Target market price of PMPK \$	\$16,00	\$52,50	\$250.00
Lowest price of PMPK, given ROI target	\$9.24	\$30.31	\$144.33

$$*1.315 = 1.60/1.22$$

Students should present their conclusions on price and profitability valuation, make a final decision on launching the product to the market, and present a written report on the second part of the analysis for evaluation.

Conclusion

To conclude the case, the instructor may return to stages and questions of a decision making process, and remind students what information is necessary to make a primary decision on the price of a new product and to conduct a preliminary financial valuation, as well as the factors which influenced the pricing decision. Differences among pricing conducted by student groups can be used as an example: these differences arose because by working separately groups valued different information, and set different (but not necessarily erroneous) financial targets.

Students can also be asked the following questions:

How long can the company expect to maintain your offered price? What circumstances would make you reconsider these questions?

Financial valuation and price are sensitive to information on product technology, changes (or their forecasts) in product direct costs in various parts of the product chain, and changes in competitive environment. Therefore, given new information, the target price can change. Target price is set using a “getting closer” method by evaluating new information. However, it is set for a long term (for one year or more), so it is not an example of a short-term decision.

References

1. R.G.Cooper (2006). *Stage-Gate® and the Critical Success Factors for New Product Development/ BPT Trends*.
2. Horngren, Ch.T., Datar, S.M., Rajan, M.V. (2012). *Cost Accounting: a Managerial Emphasis* (14th edition). Pearson Education.
3. Atkinson, A.A., Kaplan, R.S., Matsumura, E.M., Young, S.M. (2011). *Management Accounting: Information for Decision making and Strategy Execution* (6th edition). Pearson Education.