

# EXAM

## Product Planning – Needs and Opportunities

**Course code: PPU085**

**Wednesday 2019-01-16 at 14.00-18.00**

**Examiner:** Professor Johan Malmqvist.

**Questions:** Professor Johan Malmqvist, 031 – 772 1382, [johan.malmqvist@chalmers.se](mailto:johan.malmqvist@chalmers.se). Prof Malmqvist will visit the exam rooms at approximately 14.30 and 16.00.

**Department:** Industrial and Materials Science.

**Solutions:** Will be posted on the course's PingPong page on Thursday 2019-01-17.

**Results:** Will be announced no later than Wednesday 2019-02-06.

**Grades:** The maximum score on the exam is 20 points. 8 points are required for passing the exam and a "3" grade. For grades "4" and "5", 12 and 16 points are required, respectively.

**Exam review:** Date, time and location for the exam review will be posted on the course's pingpong page no later than 2019-02-06.

## Tools

No tools except pen, paper and dictionaries are permitted.

NB! Solutions should be documented with text and drawings. Equations should be motivated. Also partially solved problems will be assessed. If some details are missing in the problem statement, introduce suitable parameters and assume, if necessary (reasonable) numbers.

## Do not use red ink!

Each sheet should be marked with the anonymous code and should be numbered in ascending order for the entire exam.

One only problem solution should be written on each sheet. This applies also when the solution is very short. Sheets without anonymous code will not be assessed.

## 1 Patents (2 p)

- a) Patent searches are grounded in statements of utility (what problem is solved), structure, and function. Exemplify what these statements could be by using a post-it note as an example.
- b) When the post-it note was invented, could it have been granted a patent? Why/why not?

### Solution

- a) The keyword used to search for patents similar to a post-it notes could comprise:

Utility	Documenting ideas or mementos on small pieces of paper in such a way that they can be attached to a variety of surfaces, de-attached and then re-attached somewhere else. The attach-de-attach-move-re-attach to possibly be repeated multiple times
Structure	Paper (writable surface), glue (adhesive)
Function	Provide writeable surface, attach, de-attach, move

- b) The granting of a patent requires that the idea is *useful*, *novel* and *non-obvious*. A post-it note is certainly useful and the particular kind of glue an non-obvious idea. At the time it was also novel. So, yes it could have been granted a patent.

However, it was the adhesive (glue) that was patented in 1972, entitled Acrylate Copolymer Microspheres, providing the patent with a broader scope of application. (This information is not required in the answer, of course).

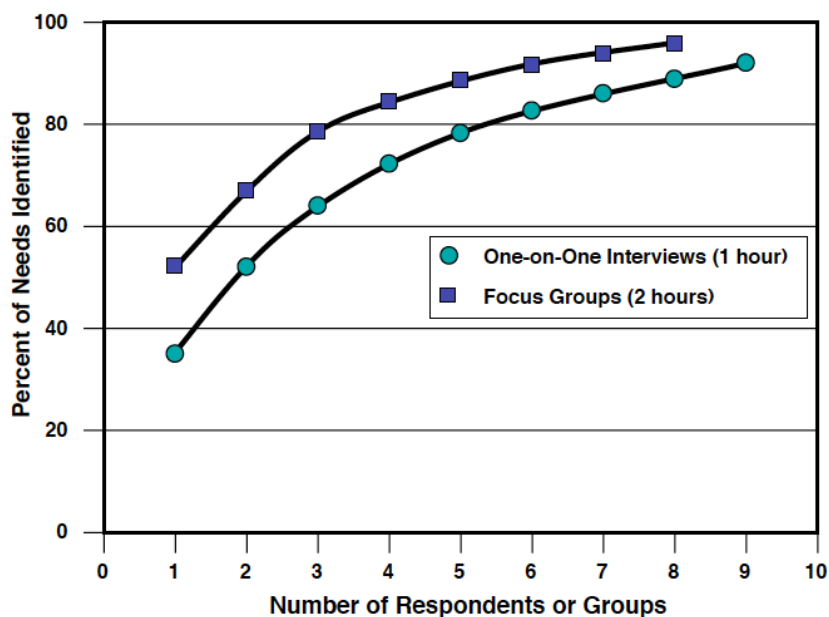
## 2 Customer needs (2 p)

- a) What does “saturation” refer to in customer needs elicitation? Answer with text and graphic. Why is this useful to know?
- b) What are lead and extreme users? What are the benefits of interacting with these user categories? Give examples of typical lead and extreme users.

### Solution

- a) Saturation in the customers needs elicitation task refers to the relationship between the number of surveyed/interviewed customers and the fraction of all customer needs that one can expect to elicit. The fraction has been measured to start at about 35 % for one interview to reach 90 % + with 10 interviews, see graphic below. When the fraction approaches 100 % it is called saturation – we learn little more about customer needs by interviewing more people.

This curve helps to plan customer needs studies and to assess the level of imprecision given an acquired number of interviews.



From: Griffin, Abbie and John R. Hauser. “The Voice of the Customer”, *Marketing Science*. vol. 12, no. 1, Winter 1993.

- b) Lead users experience a new product ahead of others, and stand to benefit greatly from the new product. They often have useful ideas to share, and can articulate their needs better than the average user. Typical examples include elite athletes, surgeons and military planners.

Extreme users use the product in special environments or have individual circumstances that require them to have an adapted product. Extreme users special needs may reflect latent needs of mainstream users. Examples include elderly or individuals with functional variations/disabilities.

### 3 Market size estimation (2 p)

Imagine that you are the start-up car manufacturer Precious Motors and you have just developed a new premium sedan which you intend to launch on the UK market. Your intended sales price is 60,000 GBP.

The population of the UK is approximately 66 million (2017). Examples of car prices in the UK are Ford Focus Estate (24,000 GBP), BMW 320d GT (41,000 GBP) and Jaguar XJ saloon (72,000 GBP) (typical specifications).

Estimate the size of your target market in the UK. List and quantitatively assess your assumptions.

#### Solution

Assumptions:

- The number of cars in a high GDP is around 30-40 % of the population, estimated first to 35 %
- Cars are on the roads for in average 10 years, possibly a bit long (12 years for premium cars)
- The market segment for entry level premium cars (BMW 320) is assumed to be 25 % of the total, and for high level (Jaguar XJ) 5 %, meaning that the inbetween segment for the LonQ is 20 %, but probably a bit lower, estimated to 10 % with a 30 % margin of error, i.e., 7-13 %.

Target market size = Population x Share who have cars x Car fleet turnover x Share in targeted marketed segment.

Target market size with expected assumption =  $66,000,000 \times 0.35 \times 0.1 \times 0.1 = 231,000$ .

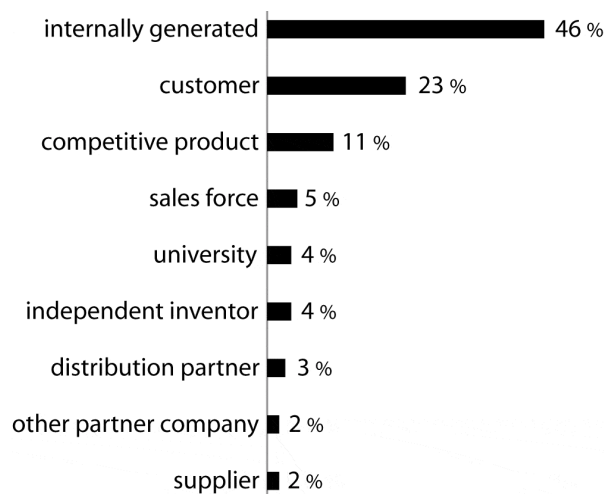
Target market size with high assumptions =  $66,000,000 \times 0.40 \times 0.1 \times 0.13 = 342,300$ .

Target market size with low assumptions =  $66,000,000 \times 0.30 \times 0.0833 \times 0.07 = 115,455$ .

Conclusion: the expected target market segment is estimated to 231,000 cars, with effects of imprecision in assumptions in the range +/- 100,000.

## 4 Opportunity sources (3 p)

The picture below shows the results from Terwiesch and Ulrich's survey of sources for opportunities.



**Source:**

Terwiesch and Ulrich survey of 524 managers in diverse service and product industries, 2006.

- What is the main implication of this data for product development?
- For the two main categories in the graphic, identify some product development methods or organizational approaches that can help companies identify that kind of opportunities.

### **Solution**

- The data shows that if a company is to be successful in terms of identifying product opportunities, is it not sufficient to rely only internal sources (such as own research and product development departments) or only on external sources (such as customers or competitor benchmarks). Working with both kinds of sources is essential and of approximately equal importance.
- Tools and organisational approaches that promote internal opportunity identification include setting up research labs, performing idea generation (“brainstorming”) sessions and having systems where employees can submit improvement idea.

Tools and approaches for identifying external ideas include customer or supplier visits/interaction, expert interviews, patent searches, literature studies, visits to trade fairs etc.

## 5 Stakeholder identification and needs analysis (3 p)

Imagine that you have invented a software that can be used for assessment of environmental impact of mechanical products. The initial development was done in research project and thus a result of "technology push", but now you wish to get a more comprehensive and precise understanding of customer needs.

Consider a manufacturing company and identify the stakeholders for such a product within and outside of the company. What are their main activities and interests in this situation? Suggest at least one requirement (a wish or a demand) for each stakeholder.

### Solution

In the table below, three groups of stakeholders can be discerned. One group is concerned with the practical use of the tool. Another group prepares the companies processes and IT infrastructure so that a new software tool can be easily adapted. A third group is concerned with the contents of the tool, on a must level (laws & regulations) as well as on an aspirational level (awards).

Stakeholder	Activity and interest	Typical requirement
Design engineer	Use the system on a regular but infrequent basis	Easy to learn Present results as metrics that can be included in trade-off studies
Environmental engineering expert	Daily use and support for novice and less frequent users	Enable advanced environment analysis such as what if-scenarios Enable development of environment impact models that are customized for the companies' products
Product development manager	Needs the environmental impact assessment results but will not use the software actively	Good report generation capabilities Enable product- and product family level aggregations
Operational developer	Design the working processes in which the software is used	Easy to import/export data from other IT tools
IT manager	Install and maintain the software	Must run on our standard operating system and computers
Environment legislator	Writes laws and regulations and wishes for professional software to comply with these	Evaluates the compliance of the software with laws and regulations
Environment lobbyist	Pushes companies to improve environmental friendliness beyond legal requirements, for example by customized awards (5 star buildings)	Facilitate the computation of relevant metrics

## 6 Business model development (4 p)

In Sweden, the research institute HUI Research annually appoints the “Christmas Gift of the Year” ([www.hui.se/nyheter/arets-julklapp-2018](http://www.hui.se/nyheter/arets-julklapp-2018)). The year's Christmas Gift award is an analysis of prevailing social trends and a reflection of the Swedes' current and/or future consumer behaviour.

In order to obtain the title Christmas Gift of the Year, one or more of the following three criteria must be met:

- The product should be a novelty or have gained a new interest during the year.
- The product should represent the time we live in.
- The product must account for a high sales value or be sold in a large number of units.

Some recent winners include Robotic vacuum cleaners (2015), Virtual reality (VR) glasses (2016), and Electric bicycles (2017)

In 2018, “Recycled clothing”, defined as “garments wholly or partly made of recycled material or second hand”, was selected.

Your task is to identify some new product types that can be classified as “Recycled clothing” and analyse how the business model of a traditional large clothes manufacturer might change in order to adapt to and exploit this new market situation. Examples of such manufacturers include H & M, Zara, Boss, Levi’s, and Ralph Lauren.

For reference, a business model canvas template is attached to the exam thesis.

### Solution

Potential new product opportunities related to recycled clothes include:

- **Subscriptions.** The customer subscribes to a particular kind of garment (e.g T-shirts) and receives a new garment every month while returning the former.
- **Almost-new garments.** Garments returned from subscribers (possibly after multiple subscriber uses) can be washed and re-conditioned and sold as “almost new”.
- **Repair and remanufacturing.** The customer turns in a used garment which is re-manufactured to almost new condition.
- **Re-use of cloth.** Cloth from larger garments is cut up and re-used in smaller garments/textile products (hats, caps, collar, patches, ...)
- **Second hand.** Similar to traditional second hand, i.e. with repair etc but organized by the original manufacturer.

**Subscriptions** imply the development of new **revenue streams**. They also change the **customer relationship** from a one-off sale to a continuous activity. The **value proposition** can include a higher degree of seasonal fashion. The manufacturer will now own the clothes rather than sell them, having implications on the **cost structure**.

**Almost-new garments** for sale will require new **key activities** (assess, wash, re-condition) achieved either through own new **key resources** (local “manufacturing” centers) or new **key partners**. The value proposition will include a stronger emphasis on value-for-money.

**Repair and remanufacturing** will partly imply the same changes as “almost-new”, but the **revenue stream** will be based on a initial purchase price plus maintenance income. Also, it will go deeper regarding the new key activities, resources and partners. The **value proposition** can include a stronger sustainability argument (the customer buys the garments with the intent of keeping them for a longer time). Remanufacturing can be extended to imply a further degree of individualisation, e.g. through change of colouring (**value proposition**).

**Re-use of cloth** will affect the **key activity** of product development (assess what existing cloth can be re-used in what products). It will also affect the **value proposition** (garment partly made of recycled cloth).

## 7 Course learning outcomes (4 p)

Account for in text and graphics for what you know about the following course learning outcome:

*“Assess technology readiness and use that to develop strategic product and technology development plans”.*

### **Solution**

As this question can be answered in multiple ways and formats, a detailed solution will not be presented.

However, a high score on this question will require inclusion of accounts for both methods for assessing technology readiness (such as S-curves and TRL/MRL scales) and for methods for planning (product plans, technology roadmaps, product-process change matrix etc ..), as well as outlining the relationships between the two groups of tools.

