

Objectives – Updated

We have completed the search for literature, as was planned. After discussing the findings in a meeting with our clients at Nokia, we have revised the objectives of this project and defined future tasks more specifically.

The main objective of the project is to find external indicators that would correlate with the replacement demand of cellular phones. The indicators we plan to test can be classified in three categories: 1) the development of consumer wealth, 2) subsidy policy of the operators and 3) degree of technological change. The third category might prove too difficult to measure; the aim is to speculate on possible proxies.

Besides this qualitative correlation analysis we will present the few key findings from the literature search. We will look further into a couple of models to see if they can be applied to the case of Nokia. If the models turn out to be too complex or not directly applicable we will not pursue them any further. If some model looks promising we will try to estimate the parameters of the model with the help of the external indicators that correlate with the replacement demand (if there are any). Also, one target of interest is the measuring of technological development. We will put some effort in trying to compile a technology index.

Actions and results so far

When comparing our situation with the project plan we have now completed the phase 1, and we know what to do in phase 2. We are just on time.

It was found that articles on replacement are very rare. However, we found four relevant studies. Short descriptions of them are presented below.

1. Environmentally friendly replacement of automobiles
 - Survey on 100 automobile owners in Sweden
 - Variables: aspiration level, perceived level of quality, replacement purchase intention, actual replacement purchases, sociodemographic factors, environmental concern, factors related to car and its usage
 - It was found that
 - Replacement purchase is related to the difference between owner's assessment of the current quality of their automobile and their aspiration level.
 - Aspiration level is affected by environmental concern.
2. Observable and unobservable determinants of replacement of home appliances
 - Builds a model for replacement demand of two household appliances, space heating equipment and central air conditioning systems.
 - Duration model is used to describe the replacement demand. The model is based on hazard function.
 - Regressors used: age of the household, monthly income, urban area dummy, natural gas availability, house square footage, monthly operating costs, poor credit rating dummy
3. Modelling diffusion and replacement
 - Article examines combined diffusion and replacement models and compares their strengths.

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- Replacement sales can be predicted using known distributions such as triangular, poisson, gamma, rayleigh, weibull or distribution free models.
 - Two-parameter models seem to explain data better, but their weakness is the bad accuracy in parameter estimation.
 - Gamma distribution, which is currently used in Nokia, was found to be the best two-parameter method.
4. A choice-based diffusion model for multiple generations of products
- Model that incorporates both diffusion and choice effects to capture simultaneously the diffusion and replacement processes for each successive generation of durable technology.
 - The model differs from previous diffusion models: effects of the exogenous variables are incorporated into the diffusion process through the choice behaviour of the consumer.
 - Two models are presented.

Planned actions

In table 2 below the planned actions are presented with the modifications listed next to them.

Table 1 Phase 2 – Application

Original Plan for Phase 2	Modifications to Plan for Phase 2
<ul style="list-style-type: none">• Figuring out Nokia's data and model; finding out factors affecting the replacement demand of cellular phones (20h per Hanna, Riikka and Veera)• Testing theoretical findings with Nokia's data (20h per Lari and Timo)• Meetings with our clients at Nokia (3h per person)• Discussions with forecasting and marketing experts at Nokia (3h per person)• Phase 2 is finished by Apr 7th 2003• Total Hours: 26h per person	<ul style="list-style-type: none">• Figuring out Nokia's data and model is not emphasized.• Instead, analysis of other data received from Nokia against historical replacement numbers, in specific correlation testing of indicators of replacement behaviour, of three categories:<ul style="list-style-type: none">○ the development of consumer wealth○ subsidy policy of the operators○ degree technological change(20h Lari, Timo and Veera, 17 h Riikka and Hanna)• Some further study on<ul style="list-style-type: none">○ duration model (Riikka)○ the replacement behaviour of automobiles, especially the applicability of using difference between owner's assessment of the current quality of the product and their aspiration level (Hanna) (3h each)

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In table 3 below, plan for phase 3 – recommendations and writing – is presented. There are no changes to the plan.

Table 2 Phase 3 – Recommendations and Writing

Plan for Phase 3 (no changes)
<ul style="list-style-type: none">• Discussions and forming recommendations (5h per person)• Writing the final report (30h per person), report is finished by Apr 25th 2003• Presentation of the project and listening to other presentations (5h per person), presentation on May 5th 2003
Total Hours: 40h per person

Risks of the Project

Even though the project has successfully proceeded to the second phase, significant risks still exist. One of the biggest implicit risks relates to the literature study: Were all the significant methods found? After an exhaustive search we believe that the case is so. The risks of the application phase can be divided in to two categories: risks related to the study of external indicators and risks related to the study of different models.

The first risk about external variables is the existence of multitude of possible indicators that one could use. The challenge is to study all of these and in addition, if the time allows, find an adequate model that would also prove to be valid. All of the models studied during the literature search do not allow these exogenous indicators. Some significant indicators might be dismissed. It might also turn out that any of these indicators isn't alone statistically significant as an explanatory variable for mobile phone replacement sales. Then the problem is to find a good pattern of indicators, which is highly dependent on the model used. To overcome these problems our group has to work rigorously and make sure all the important factors are considered. Obtaining the external information shouldn't be difficult, since Nokia's own databases are available for this purpose.

The second risk is related to the study of the different models. The real challenge is to understand the ideology behind different approaches and see their applicability to Nokia's situation. One could for example go through all the models quickly, which would cause a superficial understanding of different methods and a lack of knowledge to apply them. On the other hand examining a model too deeply will waste a lot of time and might cause the group to focus on wrong issues. It has already come out that any of the studied models doesn't fit directly to our problem. Making the necessary modifications and examining their impacts would probably need too much effort keeping in mind the objectives of the project. To overcome these risks the project leader will make sure that the main focus is kept on the indicator research and only part of the resources are directed towards different methods.

The risks about measuring of the project's success mentioned in the project plan have significantly become less significant. The discussion with our clients at Nokia has sharpened the idea of the final outcome and we now know better the goals of the project.