

DESCRIPTION OF A PROCESS DEVELOPMENT PROJECT

Terho Uusitalo
University Vaasa, Finland
terho.uusitalo@fi.abb.com

Abstract:

Purpose - The purpose of this case study is to create a competitive operating management system to improve efficiency and quality performance in a mid-sized electronic manufacturing company. Research has been carried out in a case study manner with the objective of increasing the economic value of the case company by streamlining its processes to create a more customer-focused organisation and thereby more value for the customer.

Design/methodology/approach – The action research method is used in this study to define the most critical development areas in a business process redesign and increase customer closeness and perceived quality by the customer. A qualitative research method with interviews and workshops has been created and utilised to collect data through in-depth expert interviews. The case also applies some features of the constructive research method and weak and strong market tests.

Findings – Customer closeness and added value creation were key development areas of the implemented BPR actions.

Practical implications - Business process reengineering (BPR) has been implemented and processes have been renewed and implemented into practice.

Originality/value - This paper presents a BPR method which complements the existing BPR theory.

Keywords: *perceived quality by the customer, competitive advantage, added value creation, business process reengineering, business process management.*

1. INTRODUCTION

The purpose of this study is to define the business process reengineering (BPR) method, design and implementation in the case company. This study is a continuation of the research TIIM2012, a study whose objective was to identify the most critical areas of the workflows and processes needing improvement and create an appropriate method to implement a BPR project in the case company (Uusitalo, 2012, pp. 1-2). This study is based primarily on empirical research with a research focus on the practical implementation of the BPR project. The TIIM 2012 study focused more on BPR theory based on a literature review.

The author of this paper is a project manager in a process reengineering project that was carried out in the case company. A good starting point for the study is describing the empirical aspects of the work. The study is an empirical report of the process reengineering project carried out in the case company. A strategic approach is taken into account in the project itself and in this report as well.

The research has been carried out in a case manner. The purpose of the research is to increase the economic value of the case company by streamlining its processes to be more customer-focused to create more added-value for the customer. The primary research method is the action research method based on process reengineering to improve case company competitiveness. The case study also applies some features of the constructive research method due to its process development methods. The research further includes features of weak and strong market tests by defining and implementing a developed BPR method. The results of the implemented development actions in the case company affect the long-term that can be indicated on a time scale of one to three years.

As a result of the successful execution of this project, BPR has been implemented and processes have been renewed and implemented in practice. This study consists of the following sections: 1) Introduction, 2) Theoretical framework, 3) BPR framework, 4) Project implementation, 5) Results and discussion 6) Conclusion. The following research questions have been defined:

RQ1: How can the case company move towards more customer-focused actions in order to strengthen added value creation for the customer?

RQ2: How can the required growth in response to turnover be enabled?

2. LITERATURE REVIEW

Quality is one of the key issues in the electronics manufacturing business. The competitive advantage of the case company depends on the quality of the manufactured Intelligent Electronic Device (IED), design of the electronics and software of the IED, and the interface between other parts of the electric power network or power system devices (ABB, 2011). The Certified Quality Handbook categorises quality in management and leadership, the quality system, product and process design, product and process control, continuous improvements and quantitative methods and tools (Kubiak & Benbow, 2008). Quality is a diverged concept in a general point of view. Sometimes a simple question such as "What is quality?" is presented. Nowadays customer satisfaction is one of the paradigms that drive company actions. The research literature indicates that quality conformance has a significant impact on customer satisfaction (Maiga, 2004, p.1). Therefore, quality can be defined through customer satisfaction. Kumar et al. represent in their article that better customer satisfaction and business profit can be achieved through a high level of product design, effective manufacturing and high level of service quality (2009, p. 3). On the required organisational capacity to support quality, Gordon writes: "*product delivery is the culmination of all of the business processes, and output is a measure of system capability*" (2008, p. 2). To deliver high quality products and services, the optimisation of all processes has to be taken into account instead of settling for sub-optimisation (Uusitalo & Takala, 2011, p. 2).

3. BPR FRAMEWORK

The case company management identified that its customers sometimes encounter unwanted quality issues and variations in on-time delivery (OTD). It was also identified that current operations models do not perform in an optimum manner. Besides variation in OTD, the case company identified the need to improve customer closeness and be more aggressive in the market to meet the sales turnover goal set by the senior management.

As a result of an identified lack between expected and experienced capability that the customers sometimes meet, the case company management made a decision to prioritise the allocation of resources for a survey to analyse the case company's current status. A preliminary interview study was carried out and after that a sense and respond multi-criteria decision making method was applied to find more detailed information about the current situation of the case company.

Based on the findings, the case company senior management defined preliminary expectations of how daily business should be carried out. The following steps were to consider the concrete BPR actions in order to improve customer closeness, perceived quality by the customer, and product quality.

The process reengineering project carried out in the case company consisted of two main steps: BPR framework and BRP project implementation. The BPR framework consists of the following steps: preliminary study of the company capabilities, identification of organisation development actions, process development objectives, BPR development method, and project objectives. The BRP project implementation consisted of the following steps: work breakdown structure (WBS), pilot projects, and IT development.

3.1. Preliminary study of the company capability

The preliminary study was carried out in four independent phases. In the first stage, a key person of the organisation was interviewed in a manner of thoughtful discussion to give the interviewee an opportunity to convey his/her opinion on the status of the case company organisation. Based on these opinions, he/she offered suggestions for developing the most critical areas. Secondly, a sense and respond multi-criteria decision making method was carried out and applied to collect data through in-depth expert interviews with a questionnaire. In the third stage, the management's expectations of the processes are presented, and in the fourth stage the guidelines of the strategy are presented.

The preliminary interviews were carried out by conducting discussions between the researcher and individuals. Based on the discussions, the following important items were indicated as potential areas for development.

The operations of the case organization identified based too much on functional departments instead of following the guidelines of process-based approach. Communication was also identified to be inadequate between the functional departments and the core and sub-processes.

Considering customer closeness, the following development needs were identified: customer quality in case handling needed a more effective and systematic way of taking action in order to meet customers' expectations; service delivery and customer support processes needed more systematic ways of taking action to find the root causes of product failures that customers sometimes identify. Furthermore, added value creation for customers was indicated to be one of the key requirements.

In product portfolio management, there was a need for improvements to identify customer requirements and then provide this information to the product and service creation (PSC) process. Pricing, mostly based on general market pricing, required more feedback on profitability, contributions to margins and customer expenses. More systematic procedures were required to link different kinds of product variations to profitability identification in the product creation phase.

Customers sometimes experience unwanted variance in on-time delivery (OTD). Therefore, OTD needed to be developed to provide greater predictability and stability (less variance). Transporting and warehousing conditions did not always meet the general requirements of sensible electronics devices. The case company sometimes encountered problems in transporting and warehousing conditions and was forced to take responsibility for mistakes of third parties and dereliction of duty.

Sense and respond, a qualitative research method applying a multi-criteria decision making tool was created and utilised to collect data through in-depth expert interviews. The performance measurement and improvement system developed was implemented in practice in the case company (Uusitalo, Takala, 2011, p. 1).

Management expectations for organisational capabilities have been identified from two perspectives: current status of process capabilities; and identifying important imperatives for successful operations.

The current status of process capabilities was estimated through mature process steps with all together 10 steps, whereby the first step indicates process ownership and the highest step indicates world class operations. The current processes in the case company were shown to be between steps 2 and 5.

The case company strategy emphasis focused on the following important issues: growth, profitability, flawless operation by operational excellence, and perceived quality by the customer.

3.2. Identification of organisation development actions

Based on the case company's strategy, the case company made a decision to start a business process reengineering project to improve processes with the intention to move from the current functional way of operating towards a process-oriented way of operating. Other fundamental changes to the current situation include a strong motivation to move towards a more customer-focused way of operating in order to create added value for the customer by increasing perceived quality by the customer.

The impetus for defining the case company's current situation was based on the estimation that its operations ran too much in functional silos. In this context, the silos refer to the organisation's vertical structure. Important development areas were identified and categorised as: strategic issues, processes, quality, customers, R&D, products, and cross-functional issues.

- Strategic issues include business planning; product positioning; product pricing; and service delivery and customer support processes; which were considered important improvement areas.
- Process-related issues that needed improvements were identified as mostly related to: customer relations management and product portfolio management.
- Quality-related issues: Quality feedback from customers and from the supply chain management process were identified to need more systematic procedures. The maintenance process was identified as needing a process owner and integration with other processes. The service delivery process identified the need for R/D support and the customer support process was identified as needing a performance?? boost.
- Perceived quality by the customer: Customer closeness, good practices in customer relationship management, smooth customer complaints handling, and field returns were identified as the most important areas.
- Research and development activities were identified as needing more systematic information sharing partly in the early phase of new product introduction (NPI) and also in all other life cycle phases. In addition to the above, the role of research in the product and service creation process needs more clarification.
- Life cycle time maintenance: Core processes and roles in customer relationship management (CRM), portfolio management (PM) and product delivery management (PDM) required clarification. PM identified the need for more systematic procedures and the products and services creation process was identified as needing more focus on customer support; and to work in a more proactive manner.
- The customer was identified to be the most important matter and issues like customer requirements, requirement specifications, product features, technical solutions, life cycle time maintenance, and product engineering were considered to need systematic procedures during the whole life cycle. Products: Product offering, product delivery and after sales service were identified to be performing at a reasonable level while improvements were needed in the communication of customer claim issues, HW variation optimisation, and ownership of the product support process.
- Development actions between functions: Total value chain management was considered to be the starting point of processes and functions. Information sharing between processes was identified to need improvements. Service delivery and customer support processes were identified to have a great potential to commercialise services.

3.3. Process development objectives

The case company carried out BPR development identification very carefully and all results achieved were documented as part of the necessary scope of the project. The next step was to consider BPR development objectives.

To develop a more customer-oriented business, the case company needed to identify customers' needs and improve its ability to generate added value for the customer. Process development actions needed to be based on the facts. Specifically, the organisation was required to continually develop its processes based on: the measurements, customer needs and changes in the environment. Processes exceeded the boundaries of the functions and the departments. Therefore, process development needed to improve the interaction between the functional departments and the processes by streamlining the processes to operate more efficiently.

Processes are described in such a way that the documentation is readily available for all of the organisation. Training, communication, change management and the deployment of the new procedures are an important part of the BPR.

The above-presented BPR objectives were quite general and thus it was necessary to identify more specific targets:

- The steering group had to be established for the BPR, in order to take responsibility for guiding and monitoring the BPR activities. A systematic follow up had to be performed by regular BPR steering group meetings.
- A current process map had to be identified.
- Managerial practice, guidance and measuring needed to be defined.
- Enabling and hindering preconditions of the current IT system had to be identified.
- Added value creation for the customer had to be improved.
- A high level process description for the three core processes based on suppliers, inputs, process, outputs and customers (SIPOC) method had to be made. After SIPOC, more detailed information about sub-processes was needed. To gain more specific information, a sub-process breakdown had to be done to identify activities performed in each sub-process and sub-processes' steps, and also identify if there were some activities missing.
- Descriptions had to be defined, including a BPR Road Map, BPR development plan, coherent terminology, and roles of different stakeholders as the process owners and the process developers.

BPR was considered to cover development of core processes including the sub-processes. BPR's purpose was to challenge the current core processes and how actions were performed, and to evaluate and make needed development actions.

Besides the above-presented development targets, senior management provided objectives to the BPR development team:

- The BPR plan required strong and visible support from senior management and their commitment to BPR objectives.
- The main tasks and expectations of the strategy and processes were identified.
- All critical processes were identified.
- The case company's worldwide market share varies in different market areas. The target during the 2014 strategic session was to achieve a market-leading position.
-

The following general imperatives and objectives were identified for the BPR in the case company:

- Growth: It was a challenge to gain enough production capacity and retain OTD at a reasonable level.
- Quality: Perceived quality by the customer had to be improved
- Global responsibilities had to be identified in portfolio management and the product and service creation processes. This was a challenge for product and service development and the product maintenance activities.
- The total productivity management (TPM) actions had to be intensified. In the case company, the purpose of TPM is to improve operational excellence.
- Sales had to be expanded to cover solutions and services to move ahead in the value chain.
- The capability of the processes had to be identified in order to differentiate its products and services from competitors.
- Intensify the capability of the processes in order to differentiate from competitors.
- The processes had to be based on the customers' requirements and the company's main task is to create added value for the customer.
- Information sharing had to be done through an effective and appropriate manner.

- The processes' capabilities had to be measured and maintained through regular procedures.

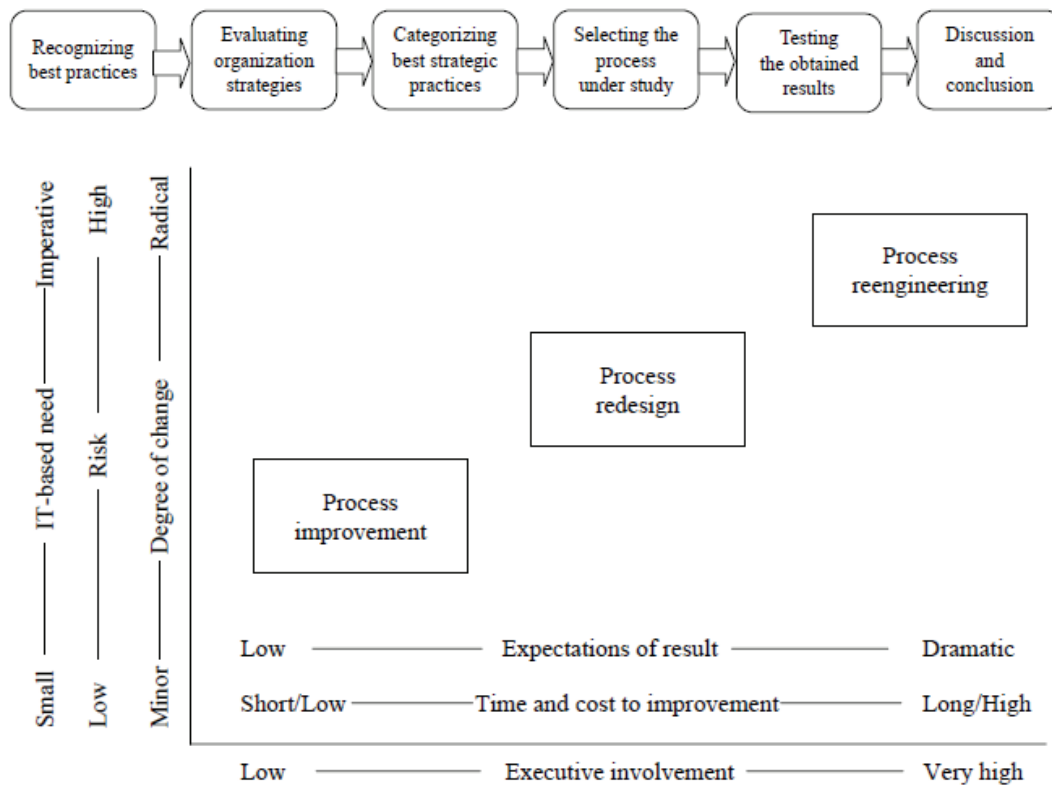
3.4. BPR development methodology

After the case organisation had defined both BPR identification and BPR development objectives, the next step was to define the BPR method and BPR project plan. The senior management guided the development team to adapt an agile way of working, which here meant a straight working method to go onwards step by step. According to Kiiskinen et al., BPR means radical process reengineering. In the case company context, this means a radical change from current ways of doing business in order to challenge the old functional ways of thinking, which in the worst case may lead to functional silos (Kiiskinen et al, 2002, 27; Uusitalo 2012,15). Everyone has responsibility in cross functional processes and the task to create added value for the customer.

BPR methods in the literature

The first and most important step in the BPR is to identify the content of change. Almost equally important is to define the reengineering concept. In figure 1, the difference between process improvement, process redesign and process reengineering are presented

Figure 1: Differences between process improvement, process redesign and process reengineering.



Source: Hanafizadeh et al, 2009, p.3.

The organisation has to consider how dramatic a change is needed. There are three important aspects to be considered: IT-based needs, risk level that the organisation intends to take and degree of change that the organisation is expecting. Each of these aspects has to be considered separately and carefully. Besides the above-mentioned aspects, an organisation has to consider how dramatic of results it is expected to achieve and the time scale of improvement and change, as well the level of executive involvement has to be ensured (Hanafizadeh et al., 2009, 3; Uusitalo 2012, 15).

The case company set a target of radical change to renew its processes. IT-based needs were estimated to be at an adequate level; meanwhile, the company sought to keep the risk level as low as possible, but it was also recognised that the required change could not be achieved without risk-taking.

BPR actions have to be performed systematically and divided into clear phases. Satu Kiiskinen has divided BPR into five steps as follows:

- Step 1: Managerial expectations and project coordination planning.
- Step 2: Analysis of organisation's current situation.
- Step 3: Defining BRP objectivities.
- Step 4. Designing new BPR models and action plans.
- Step 5 Implementation new BPB models and action plans (Kiiskinen et al, 2002, 3; Uusitalo 2012, 16).

BPR development method in the case company

The development team defined a practical BPR development method in order to perform BPR activities in a systematic manner. The defined BPR development method consists of the following steps:

- Step 1: Establishing a three core processes model
- Step 2: Identifying all activities and all sub-processes
- Step 3: Identifying which sub-processes belong to which of the three core processes
- Step 4: Identifying and evaluating improvement actions needed in each sub-process
- Step 5: Prioritising above identified improvement actions
- Step 6: Defining a project plan for BPR
- Step 7: Implementing the BPR project
- Step 8: Implementing BPR continuous improvement

The three core processes model has been established in the case company. Presentation of all sub-processes in the same large picture helped to understand the processes as a whole, as well as the mutual activities and the interaction between them. Moving from a five core processes model to a three core processes model required identification of which core processes each sub-process belongs to. This identification was made on the basis of what core processes each sub-process mostly represented.

Improvement actions were first identified and then evaluated by the important factors of quality and customer closeness. The following steps prioritised the identified improvement actions. As a result, a priority order of development actions was defined and utilised in the BPR project plan.

3.5. Project objectives

The first step was to move fast to establish a three core processes model. The new three core processes model instead of the earlier five core processes model was based on a management decision. Another important driver for the BPR method was its agility in carrying out the action plan.

Management expectations for process-based approach

Management set objectives for process-oriented organisation:

- The processes must be based on customer requirements.
- The processes work in a cross-functional manner by crossing through the functions and the departments.
- The process descriptions and the documentation are easily available to all personnel.
- Education and communication ensure that all personnel understand the process-oriented organisation's operations.
- Continuous process development actions have to be based on measurements, customer requirements and changes in the environment.

The case company established a three core processes model: customer relationship management (CRM), portfolio management (PM) and product delivery management (PDM).

The development project needs adequate resources to perform the required definition, planning and implementation actions. The following resources have been identified to perform the process development actions:

- Process owners: responsibility of process functionality and capabilities.
- Process developers: responsibility of implementing process development actions.
- Project managers: coordinates the development project in its entirety and ensures the overall optimisation between core processes.

Project description

The following issues were identified in the rough project description.

- (1) The process status was identified by the SIPOC method:
 - The sales channels and end customers identified a need for active customer relationship management in order to improve customer closeness.
 - The process map renewing is a large undertaking and therefore adequate resources have to be ensured.
 - All concerns and problems in the past have to be documented in order to utilise them while establishing the BPR actions.
 - The SIPOC shall be done separately for all core processes and later for all identified sub-processes.
- (2) Interconnections between the core processes
 - The main objective is to identify the most important connections that exist between the processes, at first between the core processes and then, in more detail, between the sub-processes.
 - The second target is to prepare a plan to establish a new process map with three core processes instead of the earlier five core processes.
- (3) CRM process detailed definition
 - The CRM core process was identified as the most critical and the process needs more detailed SIPOC. This deeper CRM core process identification has to be done together with other processes such as customer support and product and service delivery processes.
- (4) Guidance and monitoring
 - Project guidance and monitoring are to be performed by the senior management and steering group.
 - The senior management of the case company provides the general guidance and all practical guidance is managed by the steering group.
- (5) Terminology
 - A general glossary of the most frequently used terms related to BPR has to be defined in order to ensure the consistency of the terminology used in the case company.
 - Process owner and process developer roles have to be defined.
 - Sub-processes have to be defined, and those that already exist and those that will be established during BPR.
- (6) Personnel information and training
 - Process-related information and training are planned to be a part of change management.
 - A detailed plan has to be made.
 - The BPR needs systematic process documentation, which can be utilised in information sharing and training.

4. PROJECT IMPLEMENTATION

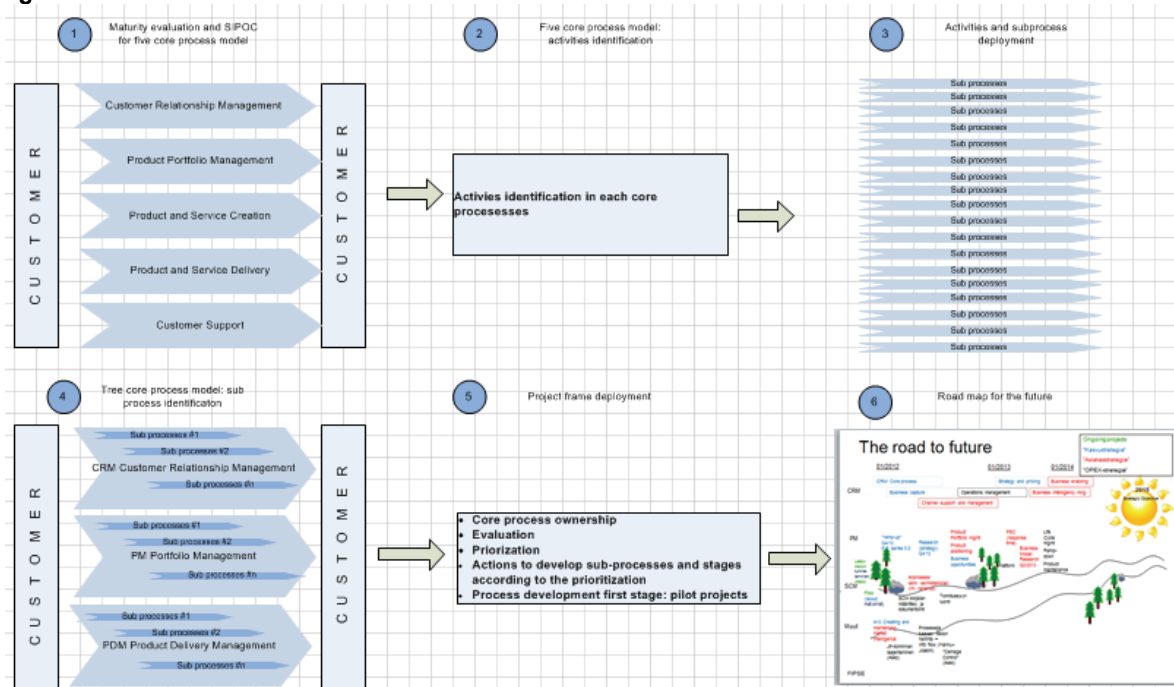
In the first step the current overall process status was considered. The second objective was to obtain more detailed information about the processes, their interconnection and how the processes work together as a whole. The third target was to consider the next step of the BRP project and to guide the project group to move forwards with the BPR project.

Process maturity was identified, followed by the SIPOC procedure. Then, focus was placed on sub-processes activity identification, sub-process and activity deployment, and establishment of a new three core process model. Finally, a BPR project frame and a BPR roadmap for the future were defined.

4.1. Work breakdown structure (WBS)

Because of the large scope of BPR, it was necessary to draw up a work breakdown structure (WBS) to develop a systematic approach to the BPR project. The WBS is presented in figure 2.

Figure 2: Work breakdown structure.



1 The maturity evaluation of the five original core processes and SIPOC procedure were carried to identify the current status of the core processes. The current process maturity was evaluated with a scale of 10 steps: 1) process ownership is defined; 2) process description is defined; 3) objectives are defined; 4) measurements are implemented; 5) continuous improvements are implemented; 6) cooperation within the organisation is achieved; 7) global cooperation is realised; 8) trend analysis is implemented; 9) benchmarking by others; 10) best in class. The results indicated that the maturity of the processes was between levels 3 and 5. Furthermore, important development areas were indicated; customer closeness, perceived quality by the customer and cross functionality between the processes.

The current status of the processes was identified by the SIPOC method. The CRM processes main target is: “To create and develop mutually beneficial, long running and deep customer relationships to improve competitive strength.” The following important key findings by SIPOC were identified in order to develop CRM sub-processes:

- CRM development actions have to be identified more precisely.
- The added value creation to the customers is one of the most important areas when considering the development of the processes.
- Identified interconnection between the customers processes and the case company processes provided a lot of new information to BPR.
- The business relationship between the customer and the case company must be based on confidence in the partnership in order to enable a profitable business.
- Time response in communicating between the customer and case company has been identified as an important development area.
- Customer support identified that it must be more active in earlier product life cycle phases in order to promote its services and increase service demand in later product life cycle phases.
- Funnel-based sales follow up is identified to be an important development area, which includes a lot of potential in establishing proactive sales.

The PM processes’ main target is to: “enable profitable growth by developing and managing customer oriented, high quality and competitive products and services at the right time.” The following important key findings by SIPOC were identified in order to develop PM subprocesses:

- The case company’s products have a very long life cycle time. There is still demand for a product series that was launched in the 80s.
- Product requirement specification has to be based on customer needs.
- Quality is a self-evident issue related to competitive customer-oriented products. The PM and product and service creating-process (PSC) have an important role in order to fulfill the quality and other customer requirements of the products and services.

- Time to market is an increasingly important competitive factor and therefore requires continuous improvement. Time to market pressure sometimes creates the temptation to make rectifications in product development projects, but unfortunately this kind of quick win may cause problems in the long run.
- The case company faces challenges fulfilling customer requirements such as the usability of products.

The PDM processes' main target is to: "fulfil the commitments to our customers by consistently delivering high quality products on time." The following important key findings by SIPOC were identified in order to develop PDM subprocesses:

- Customers sometimes meet deviations in OTD
- PDM meets challenges while taking care of: a wide ranging product portfolio; the large scale of product variants; ensuring material availability according to strong demand variation combined with optimising the inventory level.
- Sales forecast is an important factor that provides necessary information for material procurement and production planning.
- Because of strong sales demand change, it is a challenge to maintain OTD and product lead time in reasonable level and inventory levels in agreed target level. From the customer point of view, both product lead time and OTD are important competitiveness factors.

Service delivery and customer support processes were considered separately even though they are not a separate core process. Service delivery and customer support processes are a part of all other core processes – CRM, PM and PDM – and its main task is to provide services and technical support to the customer. Service delivery and customer support development actions are identified mostly to be in the early and late phase of product life cycle phases.

2 Activity identification was started with sub-processes identification. Each sub-process went through an identification of all existing activities. Sub-processes were renewed with sufficient accuracy. Some sub-processes were combined with each other and accordingly some new sub-processes were identified. One other important aspect that was considered was the mutual interconnection. It was identified that sub-processes engage in a complicated interconnection with each other. Interconnection herein means cross functionality. The interactive relationship varies a lot between activities and sub-processes. Cross functionality consists of information or material movements. Information consists of numerous different content: text, numbers, drawings, design documents, customer related documents, and so forth.

3 After sub-processes and activities of each sub-process have been identified, the next step is to perform more detailed identification of activities and sub-processes. Customer closeness, perceived quality by the customer and added value creation for customers were identified as the most important drivers in order to perform sub-process deployment. Sub-processes were considered in their entirety and the target was to ensure that all sub-processes work together in order to optimise added value creation to the customer, and respectively avoid activities that do not create added value.

4 Three core process model deployments were done in the following steps. Other important issues that were considered were: process owner and process developer roles identification; BPR terminology used in the case company; process description model; and IT solutions and tools that are needed in the processes renewal. Process owner and process developer roles were identified. The case company made a decision to establish the following core processes: customer relationship management (CRM), product management (PM) and product delivery management (PDM).

Process description is defined to be an interactive hierarchic model presented in the IT environment, where the highest level represents the three core process model, and by an interactive manner users can drill down in the process hierarchy first to the sub-process level, then to the sub-process stage level and finally to swimming lane type block diagram. BPR terminology in the literature is complex and due to this, it was necessary to define and specify the BPR terminology used in the case company project. The terminology definition helped the case company personnel to support mutual communication and decrease misunderstandings.

Currently used IT tools did not fulfill the future needs of the renewed process description and process operating site. The process IT requirement specification was done and clarification of suitable IT solutions for the process portal were considered. Sharepoint and Visio Professional were identified to fulfill the requirements of the IT tool. Going forward, it was recognised that the IT Sharepoint portal development needs a separate development project.

5 In the following steps, development actions were evaluated and prioritised. The following key drivers used in the evaluation and the prioritisation were defined: customer closeness, perceived quality by the customer, and added value creation for the customer. The project frame deployment was made in each sub-process according to the prioritised development actions. As a next step, the project frame was deployed as the road map to the future.

6 The development road map time period was defined to be the same as the existing strategic time period. Development actions were presented in the road map. One of the most important issues was to consider the adequacy of resources in parallel-moving development projects. It was recognised that BPR actions need a lot of time and people to take part in BPR development projects, in addition to their own work. Due to the limited time of the participants in the development projects, these parallel-moving development projects were interlinked with each other to allow smooth progress of the parallel-moving development projects.

4.2. Pilot projects

The identified BPR method provided a good starting point for the implementation of the following steps of the BPR project. It was decided that the BPR project implementation was to be carried out in two steps:

- (1) The ramp-up and the business capture processes have been renewed as pilot projects.
- (2) Thereafter the rest of the sub-processes will be renewed.

The targets set for the pilot project were to develop both the sub-processes to a reasonable level and further to create an appropriate process development method. The developed process development method was used in the remaining sub-processes' development actions. After the pilot projects reached a reasonable level, the following step was to start renewing other sub-processes. The entirety of the sub-processes renewal will be implemented according to the road map.

4.3. IT development

The need for a new IT system was identified in the early phase of the BPR. The identification of the technology choice was the first step when considering the IT portal. The target of the IT project was to create an IT environment called Sharepoint Process Portal, which provides all necessary services for process description and process operational use. The starting point for the IT environment was that all the process-related information would be centralised in one place. Another important issue was the presentation of a hierarchical description of the processes in which the user drills down from process top level to levels further down. After considering the various options, the Microsoft Visio Professional and Sharepoint were chosen as IT tools. The Sharepoint portal design was completed as separate project.

The IT development project was carried out in about 10 weeks. The project was completed in four steps: specification, design, test and implementation. The project implementation was carried out successfully in the designed time. The IT projects covered the implementation of the Sharepoint Process Portal and functionality for two sub-processes: CRM / Business Capture and PM / Ramp up. The entire process system consists altogether of about 20 sub-processes. The required IT design of these remaining sub-processes was implemented in connection with the sub-process renewal.

5. RESULTS AND DISCUSSION

Life in the electronics manufacturing business is a battle to eternally develop better and better approaches to doing business. BPR is the most effective approach to business recovery when it is done at the right time. There is a significant difference between performing BPR actions in a company which is in crisis compared to a company which is doing business in an adequate manner.

A company's development efforts are not always straightforward. A company must be sensitive to actions, be able to identify development areas and always consider better practices. This conditions were present in the BPR of the case company. Open discussion and identifying actions in the processes that were not working well and did not create added value to the customer led to BPR renewal. It is noteworthy that the case company's competitive position was good before starting to consider future BPR action. The case company renewed its business processes in a strategic manner to ensure the ability to retain its competitive advantage in the long term, 3 – 6 years ahead.

In the beginning, it is a challenge to an organisation to recognise which processes need business process renewal, and furthermore to change the whole organisation into a positive culture for doing BPR. It also seems quite difficult to make an accurate assessment of BPR, not to mention the method that has to be implemented. It is recommended that the company use external BPR experts at the beginning of the project to ensure the appropriate scope for the BPR.

Once the company has recognised the need for BPR, the visible commitment of senior management is an important factor for getting started. Early success is also important to strengthen the company atmosphere and motivation to go further. In the later steps of BPR organisation, commitment is needed to implement the new concepts into practice.

As a result of BPR activities a process portal, which consists of a process description section and an operational section, has been designed and implemented. The processes are presented in a hierarchical manner allowing users to drill down from the core process level towards each sub-process. The operational section of the process portal provides all necessary functionality to run sub-processes in an operative manner.

Solutions to the three research questions are:

RQ1: Customer closeness and added value creation were the key drivers in BPR; those were the most important evaluation and prioritisation criteria; and the key development areas of the BPR actions. It is remarkable that all core processes are equally responsible for customer relationships, not only CRM. The added value creation serves not only the customer; it is equally important for the company itself to retain its competitive advantage.

RQ2: Enabling required growth in turnover is an extremely big challenge to a company. It is obvious that both internal and external elements of competition affect this. The most important development actions to ensure and make required growth in turnover possible are: CRM core process strengthening; systematic portfolio management in PM; and production capacity and effectiveness in PDM.

The next study is to consider all remaining sub-process development in a continuous improvement manner.

6. CONCLUSIONS

The pilot project was implemented in three different projects: the CRM / Business capture sub-process development project, the PM / Ramp up sub-process development project and the IT / Sharepoint site IT development project in the first step. These three parallel development projects were considered as pilot projects, whose purpose was to test the BPR development concept in practice. The experiences gained from the pilot project are to be utilised in later steps, in which the remaining sub-processes will be renewed. All three pilot projects were carried out in the given time. The other objectives of the pilot projects were also achieved.

The case organisation made fundamental changes in practices while moving from a functional approach towards a process organisation. This new approach was necessary to develop such strategically important key issues as customer closeness and perceived quality by the customer. The case company utilised some new and activated some old key performance indicators (KPI) to monitor the results achieved. A BPR project of this magnitude requires strong and visible leadership from senior management. In addition the organisation must have the ability and the resources required to design, implement and put into practice the necessary changes to the organisation's operation. It should be noted that such changes affect the organisation with a delay. The effect of the implemented changes will be shown in the performance measurements from two to five years' time.

Methodological reflection on the research may consider in terms of the case company's individual situation, type of business and from a clockspeed point of view. The individual situation of the case company can be considered from two important viewpoints: personnel motivation and capability to change; and the structure of the organisation. As earlier mentioned, to make change possible in the organisation, the visible support of the senior management is required, as is the capability to define the appropriate BPR method and apply it in practice. The company structure has a significant effect on the implementation of BPR. The structure of the organisation such as: its size, business, and whether it is an engineer-oriented office environment or heavy mechanical engineering industry has to be considered in the BPR.

It makes a substantial difference if the organisation consists of 80 percent white-collar workers and 20 percent blue-collar workers, or vice versa. The type of business reflects at least two of the viewpoints: how technology oriented the products and services that the company provides are; and the clockspeed of the business that the company is running.

Technological challenge is related to the complexity of the products and services, and what kind and how many different expert resources are required. Charles Fine has defined the term clockspeed to mean the time between product renewals. He mentions for example a jumbo jet whose clockspeed is about 30 years; on the other hand, computer CPU renewal is measured in months (Fine, 2009). Time must be considered in terms of the company's age and from the present time point of view. Knowledge and available resources of the company increase cumulatively with the company's age, which can be utilised while performing BPR.

The development and implementation of the BPR method in the case company complements the existing BPR theory from the following perspectives:

- (1) The case company's situational factors have to be considered when defining BPR actions. Factors such as: company age, type of business, organisation capability for change management, structure of the organisation, degree of technology level, and the clock speed of the case company's products and services have to be taken into account.
- (2) The presented BPR method has been tailored for a case company that designs, manufactures and markets LEDs in a competitive global market.
- (3) The relationship between core processes, sub-processes and individual activities are taken into account in more detail.
- (4) BPR has been expanded to include a new IT system design and implementation. A process description has been presented in an interactive manner in the developed IT environment, in which users can drill from up to down in the process structure.
- (5) BPR project implementation has been divided into two steps: in the first step sub-processes are renewed, and then the process development will be shifted to the continuous improvement mode.

The next study is to consider all remaining sub-process development issues in a continuous improvement manner.

REFERENCE LIST

1. EPM (2009). Management Accounting: Enterprise Performance Management. The Institute of Cost and Works Accountants of India. India, Kolkata:12, Sudder Street.
2. Fine, C. (1999). *Clockspeed: Winning industry control in the age of temporary advantage*. Cambridge, MA: Perseus Books Group.
3. Gordon, K. D. (2008). Product vs. system quality. *Quality Progress*, 41(1), 83-85.
4. Hanafizadeh P., Moosakhani M., & Bakhshi J. (2009). Selecting the best strategic practices for business process redesign. *Business Process Management Journal*, 15(4), 609-62.
5. Hannus, J. (1994). *Prosessijohtaminen: ydinprosessien uudistaminen ja suorituskyky*. Gummerus Kirjapaino Oy. Jyväskylä. ISBN 951-96708-0-7.
6. Kiiskinen, S., Linkoaho, A. ja Santala, R. (2002). *Prosessien johtaminen ja ulkoistaminen*. WSOY. Helsinki. ISBN 951-0-27418-6.
7. Kotler, P. (2003). *Marketing management*. Upper Saddle River, NJ: Pearson Education Inc.
8. Kubiak, T. M., & Benbow W. D. (2008). *The Certified Quality Engineer Handbook (3rd ed)*. Milwaukee, WI: ASQ Quality Press.

9. Kumar, V., Choisine F., Grosbois de D., & Kumar U. (2009). Impact of TQM on company's performance. *International Journal of Quality & Reliability Management*, 26(1), 23-37.
10. Laamanen, K. (2001). Johda liiketoimintaa prosessien verkkona. ISBN 952-5136-16-7.
11. Laamanen K ja Tinnila M (2009). Prosesijohtamisen käsitteet, Teknoliogiateollisuus OY. ISBN 978-952-238-001-1.
12. Maiga, S. A., & Jamar, J. (2004). Effects of management control systems on manufacturing performance: A path analytical model. *JAMAR*, 2(1), pp. xx-xx.
13. Martola, U. ja Santala, R. (1997). Liiketoimintaprosessit: BPR muutoksen johtaminen. WSOY Kirjanpainoyksikkö. Porvoo. ISBN 951-0-21673-9.
14. Sumanth D.J. (2000). *Total productivity management*. Boca Raton, FI: CRC Press LLC.
15. Uusitalo, T., & Takala, J. (2011). Proceedings from TIIM2011: *A Competitive Operative Management System in the Electronic Manufacturing Business*. City, ST: Publisher.
16. Uusitalo, T. (2012). Proceedings from TIIM2011: *Business Process Reengineering in the Electronic Manufacturing Business*.