

PROCESS ORIENTATION: AN APPROACH FOR ORGANISATIONS TO FUNCTION EFFECTIVELY

Christian T Lindfors¹

ABSTRACT

Managing the complexity of construction, in terms of controlling, handling and directing large organisations and projects to achieve success, forms part of the current work in the research project 'value chain management in construction', being undertaken in collaboration with a major Swedish construction company. Some of the early work has pinpointed deficiencies in current management thinking and practise within the subject company. One hypothesis is that project success is linked to the extent to which an organisation is able to manipulate and develop its processes to add value for the customer, whilst improving its internal management. A programme has therefore been initiated to systematically identify processes within the organisation and particularly the interaction between such. The work of identifying processes and their numerous interrelated and interacting processes has therefore been the focus of this research. To visualise the processes, extensive functional models have been created. From this a new process management approach has been derived, by the development of a project management system. The paper addresses the introduction of process orientation and process management to improve organisational efficiency and a structured way of making a systematic representation of processes.

KEY WORDS

Value chain management, process modelling, process management, process orientation

¹ Researcher, Department of Construction Management and Economics, The Royal Institute of Technology, Drottning Kristinas väg 30, SE-100 44 Stockholm, Sweden, lindfors@recm.kth.se

INTRODUCTION

Changing demands and needs in housebuilding from customers, owners and employees, have made the importance of controlling the internal processes a key issue. These changing demands affecting the areas of quality management, environmental management, project cost and project cycle times, demanding improvements and reductions in all areas affected. Organisational efficiency is what is needed. As a consequence of this, information and communication flows are becoming more and more important to control. Delivering or collecting the right information at the right place and at the right time will undoubtedly increase organisational efficiency. These new demands and needs necessitate an improved and transparent housebuilding process; to reduce project time; to reduce project cost; to improve quality and environmental management; to increase customer focus; to improve knowledge management and to stimulate development within the organisation. Being able to perform these changes and stay one step ahead of the competition will be necessary to survive in such a competitive market. A focus on processes, or collections of tasks and activities that together transform inputs to outputs, allows organisations to view and manage materials, information, and people in a more integrated way (Gavin, 1998). Systematically identifying processes within an organisation and particularly the interaction between such are therefore essential for these purposes. Mapping of today's processes is also relevant from a knowledge capture perspective. This perspective is highly pertinent and should not be neglected. Demand for fast deliveries and customised products as well as rapidly changing market preferences are forcing companies to become more process oriented in order to survive (Nilsson, 1999). The hypothesis is that organisational success is linked to the extent to which an organisation is able to manipulate and develop its processes to add value for the customer, whilst improving its internal management. To systematically identify processes within an organisation and particularly the interaction between such has therefore initiated a process orientation programme within a major Swedish housebuilding company. The work of identifying processes and their numerous interrelated and interacting processes has therefore been the focus of this research. To visualise the processes, extensive functional models have been created. From this a new process management approach has been developed creating a new way of managing the information and communication flows in the organisation.

The need for effective access to information and communication channels is the motivation to the research presented in this paper. This paper aims to show the importance of process orientation within the Swedish housebuilding sector. The second and third sections of this paper will try to explain the need for change and the concept of process orientation. The fourth section describes the concepts of process management within a housebuilding company and how the process orientation work has affected the organisation. The final section presents the conclusions and current and future challenges.

NEED FOR CHANGE

The increasing availability and use of information and communication technologies have triggered the need for change. Sources like the Internet has made the customers more aware of what they can expect, and what alternatives to chose from, increasing customer leverage in negotiations and trade-offs. As people has to cope with larger quantities of information through sources as the Internet, it also becomes increasingly more demanding for people to identify and utilise the specific information that will help them in their daily work. For a company to increase its competitiveness against competitors, and its ability to satisfy

customer needs and expectations, it is essential to look at its internal capabilities. In an effort to respond to these new expectations companies must be willing to examine themselves and focus their attention to process improvement and customer satisfaction.

In the housebuilding industry the need for change is even more apparent. Due to the increased use of the Internet, the customers (the final consumer) have full access to comparable data between similar housing projects, decreasing the advantage of good marketing. The only way to gain that advantage again is to beat the competition by being better, faster, cheaper.

The research project 'Value chain management² in construction' intends to examine and re-evaluate today's housebuilding process and, together with a major Swedish housebuilding company, produce and develop an improved housebuilding process. During the early stages of the research project a number of problems concerning organisational inefficiency have been identified and recognised:

- Numerous control and support systems inherited from several improvements efforts and mergers were drowning the organisation in paper work.
- Poor communication and information channels between processes within the organisation as a result of poor co-ordination and the lack of structure.
- Cut up internal project (value chain) processes, rendering the possibilities of shared goals and all-embracing project management efforts.
- Difficult and time consuming to search and retrieve information as a result of too many paperback systems and databases organised in an ad-hoc manner.
- No active knowledge model.

By understanding the problems and the organisational inefficiencies they create, the needs for change become quite apparent. This is what occurred within the subject company due to the mapping of the processes. They saw the approach of process orientation as a way of dealing with these problems.

PROCESS ORIENTATION

Process orientation of an organisation can be explained by a change of focus, i.e. from functions to processes. Also when an organisation's different workflows and processes are identified and modelled. The characteristic for a process is that it is a repetitive standardised flow, i.e. it is performed multiple times. Due to these mappings of processes the dependencies between activities become clearer, forming a foundation for organisational development and strategic management decisions. Process orientation then deals with designing and improving the standardised flow. Being standardised, also making it easier to measure. (Nilsson, 1999) Process orientation is often a big change and demands a full commitment from the management. Without this commitment process orientation initiatives often fail to deliver the expected results. By centring ones attention on processes the focus is also transferred from the finished result to the activities forming them. Since the processes create the result, they are also the first things that have to be controlled and developed. By focusing on core processes, the process view can be applied on an all-embracing level in the organisation, seeing the whole organisation as one system (see figure 1). Looking at the organisation as a system of integrated and interrelated processes is vital for this kind of thinking. The system including core processes, management processes,

² Defined as "the manner of controlling, handling, and directing a sequence of activities a company carries out to create products/services that increase profit, decrease time and cost, and improve quality for the company and generates profit/value for the customer (Lindfors, 2000)

support processes, inputs, outputs, knowledge-capture, knowledge-feedback, resources, controls, information and communication flows. Thus, the organisation should be seen as a system of processes, satisfying owner, personnel and customer demands and needs. The following results may be achieved through a process orientation:

Organisational engagement - With process orientation the employee, and not only the manager, becomes more focused on the processes and the internal and external customers, and relatively less focused on the task (Nilsson, 1999). A process orientation contributes to clarifying the personnel's roles and to engage them into improvement work. Gain commitment of the people who work in the process and the managers who oversee it that is the key.

Organisation management - From the processes the management can optimise the organisation from an overall picture. The risk for sub-optimisation is greater in a traditional function oriented organisation. A process orientation helps personnel to understand the organisation and where/how their own processes connect to the bigger picture.

Customer focus and value focus - By analysing the process from a customer perspective, the internal capabilities to increase customer value will be enhanced. By doing so the company will increase its competitiveness against competing companies and its ability to satisfy the customer. A mapping of processes is also a prerequisite to be able to minimise non-value-adding activities and maximising value-adding activities. The goal is to optimise the value for both the personnel and the customer, by visualising the different parties needs.

Process transparency - Making the processes transparent, deviations and problems are made visible. From these results the process can be changed/improved/developed to eliminate the causes for deviations.

Process integration - When processes are identified and mapped, the work of integrating these are highly pertinent for organisational success. Working with the processes without addressing the integration issue would not be considered as process orientation (Nilsson, 1999).

Process efficiency - The process definition is the foundation for development and improvement-related work, which leads to improved or new working methods. The results are often shorter cycle times, better quality, faster results and less defects. By decreasing cycle times, improving quality, improving environment, and increasing customisation, process orientation is intended to satisfy customer demands.

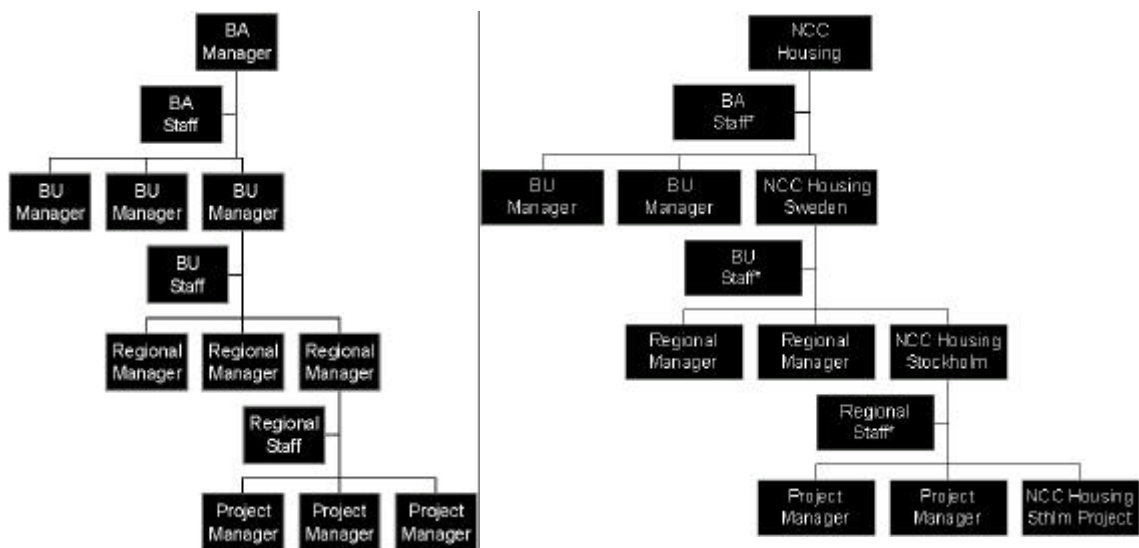
PROCESS MANAGEMENT – AN IMPLEMENTATION CASE

This case will describe the implementation of a process management approach at, NCC Housing, a large Swedish housebuilding company. NCC Housing is a business area of the NCC Group, a multi-billion dollar construction corporation, primarily located in the Nordic region. The business area had a turnover of \$540 million in 2000 and employs approximately 1400 employees distributed in six countries. The organisational structure consists of four levels: business area (BA) – international; business unit (BU) – national; region – regional and project – project related (see figure 1). NCC Housing's business idea is to develop and perform construction (where own production resources exist) of attractive housing with high competency from the customer's wishes and needs. With the

guiding starts ‘freedom of choice’ and ‘security.’ All housing developments are performed according to the Total Package Concept (TPC) process. The Total Package Concept is NCC Housing’s name for development/construction ‘promises’ covering the process from the project idea to customer support. NCC Housing is certified according to ISO 9001 (since 1997) and ISO 14001(since 2000).

Figure 1: Left: generic organisational structure of a business area at NCC.
Right: exemplified organisational structure of NCC Housing with staffs *

The decision to process orient the business was taken by the management in the late 1990’s. A contact was therefore established with the Royal Institute of Technology in Stockholm, Sweden. The collaboration project ‘value chain management in construction’ was the result



of this contact. The following description is the joint effort of these two organisation to improve organisational efficiency within the subject company. The implementation stages involving a pre-study, modelling the project processes, the development and implementation of a project management collaboration tool and modelling the organisational processes at multiple levels in the organisation.

PRE-STUDY

The first phase of the research project ‘Value chain management in construction’ was aimed to create an ‘as-is’ process model describing the housebuilding process as it appears today. The aim of the model was to clarify information and communication flows (inputs and outputs); process-related resources and process related control and support documentation (routines, checklists, factual documents, templates and examples). The programme started with a pre-study of the process modelling area and available management systems within the subject company. Project process activities were derived from company specific documentation (management system, quality management system, environmental management system, project control system and operation control system) creating a gross list with over 350 activities. This list then formed the foundation in the creation of the process model. The process model was to be built using the IDEF0 technique, relationship matrices, the design structure matrix (DSM) method and interviews

* Project development, Organisational development, Housing development., Purchasing, Economy, Information, Personnel , Cost estimation

with relevant practitioners. Alternative modelling methods were considered, i.e. the scheduling method, the simple flow method and IDEF3, but were found to meagre for the purpose. (Karhu, 2000; Malmström et al., 1998; Pikosz and Malmqvist,1998)

MODELLING THE PROJECT PROCESSES

The initial process model was developed using the input obtained by the analysis of available company specific documentation and by interviews carried out with process actors. The model was later modified according to the information gathered from an extensive case study of the actual 'as-is' scenario. To be able to transform this information into an IDEF0 process model, both ICOM's (input-control-output-mechanism) and dependencies between activities had to be clarified and specified. The inputs and outputs were defined to explain changes in the information/communication exchange/flow, the controls to cover company specific control and support documentation, and the mechanisms to cover the involvement of the company's process actors. Using the ICOM's in this certain way made it possible to capture a number of process model perspectives in one single model.

To be able to map the ICOM's for each single activity, two different matrices were created to capture mechanisms and informal inputs-outputs. The first matrix was created to capture the participation of process actors (mechanism) in activities and the other one to map dependencies (DSM) (informal inputs and outputs) between activities. Both matrices were then distributed to relevant practitioners directly engaged in the project process, who were given a free scope to describe how they carry out their work. By compiling the results mapped by the matrices an 'as-is' model was created, displaying over 350 main activities belonging to the project process of a TPC. The mapping stopped at this decomposition level, because the modelling objectives were reached. The main stages in the project process being: the project idea , the land acquisition, the plan process, the product and economy process in the project, sales, production, occupation and service (see figure 2).

A PROJECT MANAGEMENT COLLABORATION TOOL

Concurrently to the modelling of the 'as-is' project process the housebuilding company was in the process of launching a new project management system [Lotus Notes]. After having realised the benefits of basing the structure of the PM system on the project process appearance, the decision was made to develop a project management database with the same structure. The system was developed to include activities and to them related control and support documentation (routines, checklists, factual documents, templates and examples). The users in the organisation, due to its simplicity and usability, easily adapted the system. It was not had to sell in a tool which:

1. Integrates all project-related systems (management system, quality management system, environmental management system, project control system and operation control system) into one tool.
2. Helps the user to co-ordinate, manage and retrieve information necessary for project progress.
3. Mediates and guides the right information and documentation to the right place in the process and creates an easy adaptability throughout the entire project.
4. Enables experience-exchange between projects.

You can say it is a customised ASP (application service provider) solution, making it more useful to the user. At NCC Housing, all projects are working in this PM environment

making quality control almost undemanding. Suppliers and subcontractors are invited to use pieces of the system relevant to their need and process. Since the first introduction of the system some changes has been necessary. One step was to make the system web-based. This makes it possible to connect to the project site by the availability of a web-browser. To tackle the problem of unstable Internet connections, at work sites, one is able to go offline. The structure of the system is not static; instead it has been developed to be fully dynamic, making it possible to change the structure, content and language. Creating the possibility for continual improvements and developments to increase the usability of the tool. Feedback from projects has served as an important input to enhance and improve the PM system.

MODELLING THE ORGANISATIONAL PROCESSES

As a result of the initial mapping efforts, and the development work surrounding the new PM system, it became apparent that it was important to understand the whole picture not only the project. By focusing on the core processes it became apparent that it not functions by it self, it needs management and specialist skills to perform smoothly. A similar approach to the earlier mappings was taken to identify and map the different processes apparent in the organisation. Resulting in a generic representation of the organisation, showing the processes of management, core (project) and support (functions) (see figure 2).

The main stages in the management processes being: the business idea, strategy, organisation management, and analysis and evaluation. For the support processes being: project development, organisational development, housing development, human resource management, economic management, information management, purchase management and cost estimation management. Using this same model at all levels in the organisation made it possible to clarify information and communications flows in the organisation.

Atkin (1998) states that “ just how much improvement is possible will depend on the extent to which the value stream can be identified and manipulated to deliver against customer demands.” That is why it is so important to have a holistic understanding of the entire value chain and the organisation that surrounds it. This argument can also be strengthened by Porter’s (1985) comment that the value chain is not a series of independent activities – it is a system of interdependent ones.

The structure is now being developed and implemented in a new process management (web-based extranet) collaboration portal for the entire organisation. This new system was made possible by the work being conducted in the creation of the project management collaboration tool. The process management collaboration portal, gathers all processes in one common place, elevating the same features presented by the PM tool to an organisational level.

INPUTS

PROCESSES

OUTPUTS

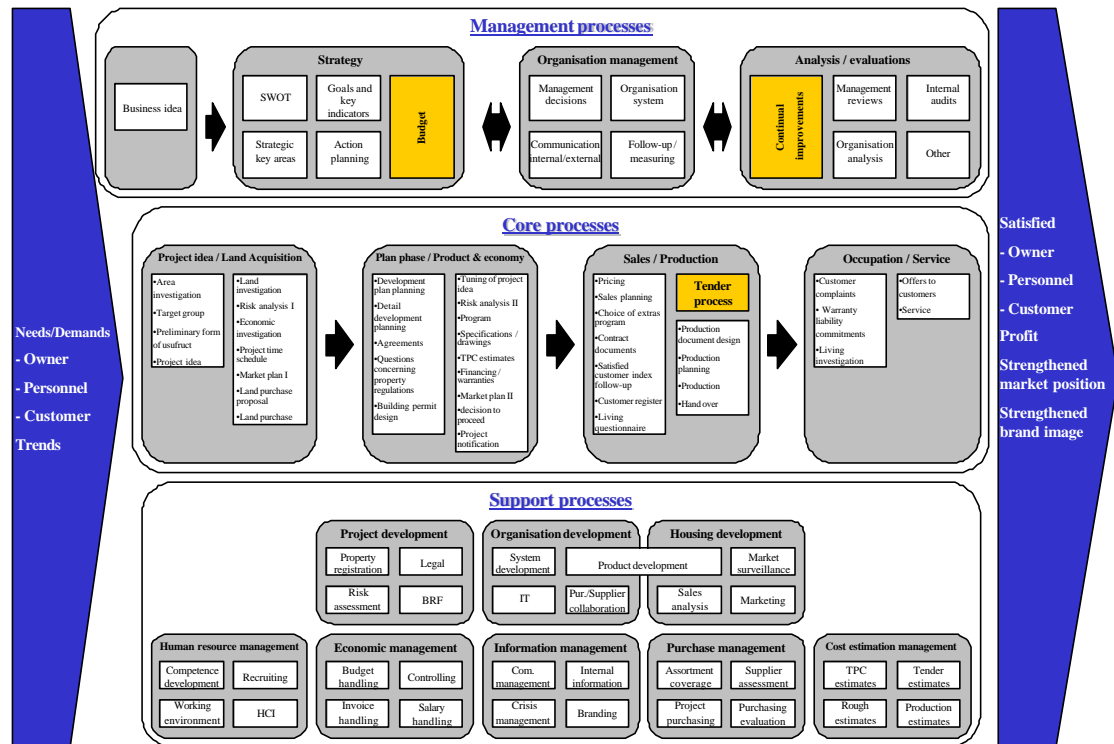


Figure 2: The generic organisational structure at NCC Housing

By using the models as a base structure for the entire organisation system, the flows become very transparent and clear for the actual user. Such a system guides the daily work and facilitates information and communication exchange throughout the entire organisation. A project manager may use the system to communicate with the rest of the project participants and the president to publish directives to sub-managers. Feedback from the organisation is then used to enhance and improve the system. Applying the parameters of private, open, readable and writeable helps the organisation to structure and control the information/communication flows in a more stringent manner. The system can then easily become extended with activity dependencies showing information exchange, relationships with other activities and process actor participation.

An improvement and development effort, of the process management portal, is already in place and is leaning toward a taxonomic approach. In the taxonomy³, activities are identified and divided into sub activities, just like in IDEF0, but they can be sub taxons with multiple parents. Making it possible to move from one process to another. Every activity is also assigned a couple of searchable attributes, e.g. tools, resources, process, organisation, information and communication attributes. The taxonomy could be built with the project process as the core of the system with other main taxons joining up. The

³ "A taxonomy aspires to be: A correlation of the different functional languages used by the enterprise; To support the mechanism for navigating, and gaining access to the intellectual capital of the enterprise; By providing such tools as portal navigation aids, authority for tagging documents and other information objects, support for search engines, and knowledge maps; And possibly, a knowledge base in its own right (Gilchrist and Kibby, 2000)"

organisational maps will work if a taxonomic approach is taken. The taxonomy should be dynamic, thus it should be changeable in both appearance and function, and thus one should be able to subtract and add activities without creating dead ends and black holes in the organisation. According to figure 2, the enterprise could consist of 9 main taxons, i.e. the processes of management, project, project development, organisational development, housing development, human resource management, economic management, information management, purchase management and the cost estimation management. This creates 9 different entrances to the taxonomy and makes it possible to retrieve the same data but from different points of view. Creating a stable corporate net with a dynamic interface to a project management collaboration tool one can enable the user to gain an understanding of available information and how to find it. Gilchrist and Kibby (2000) says “ The corporate taxonomy at the level of information management connects people to documents (pull technology) and documents to people (push technology), but also at the knowledge management level by connecting people to people.”

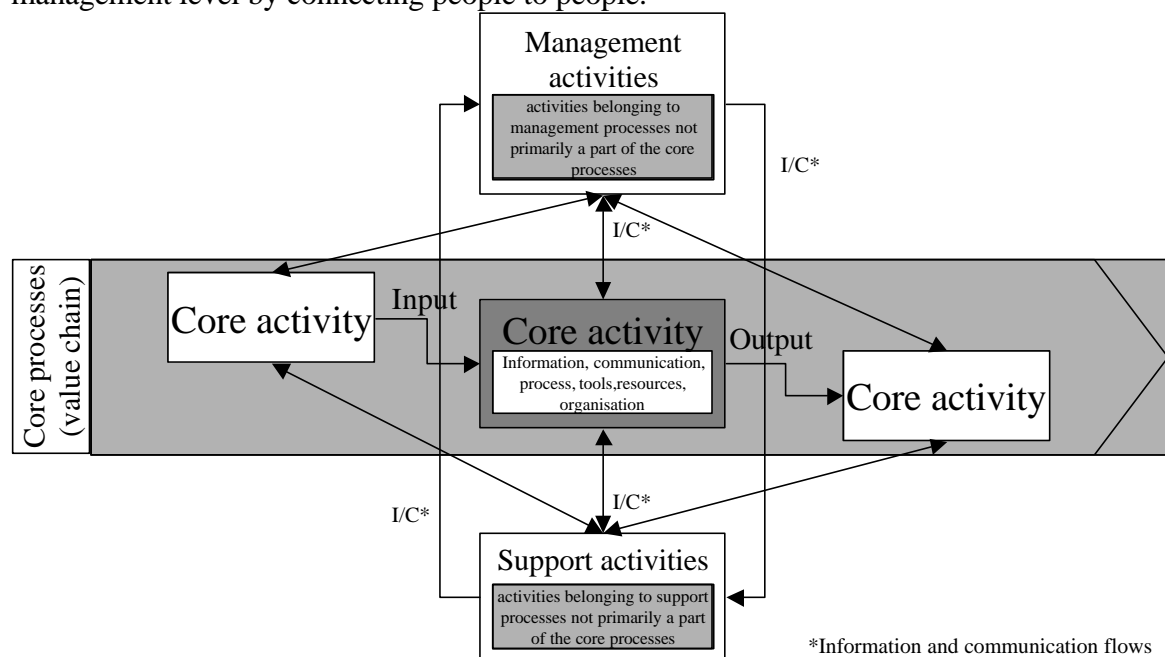


Figure 4: An illustrative example of the inter-relationships of activities needed to create a corporate taxonomy

EFFECT ON THE ORGANISATION

Going from a traditional functional management to a process management is not done over a night. It has to do with cultures, perceptions of reality, traditions and so forth. You do not take away your employees believes system without a reaction. At NCC Housing the first step for process management was to have the process management system become more process oriented. This is to be followed by the process management portal. An important note to all this is that a system like this has to be available to everyone involved in the process. Without this openness the overall understanding of the process will disappear. The main objective when launching a new process management system is to make things simpler, not simple. When the processes start to become apparent to the organisation the need for a new kind of managers becomes apparent. “A new management role would be created to oversee the process, the process owner (Hammer and Stanton, 1999).” A process owner “is a manager with responsibility for a specific process and the reengineering effort

focused on it” (Hammer and Champy, 1993), i.e. maintaining and developing the process. Each and every process should have a manager assigned to develop and maintain the process.

The process orientation programme has affected the organisation in a number of ways. The organisation was relatively fragmented, before the mapping, resulting in multiple hand over situations. Applying the overall responsibility of each project to a Program Manager made it easier to realise the project idea and to co-ordinate specialists in the effort to produce a successful project. After the mapping, the production also was outsourced to a different business area within the NCC Corporation. Understanding the processes made it clear that the main business was not to produce housing as efficient as possible, but to develop as attractive housing/living as possible for the customers. Instead of decreasing cost, adding more value to the customer. The focus changed from a product centric to a customer centric behaviour over night. One have to understand that product centric thinkers today dominate the organisation, the transformation time will therefore be gradual rather than direct.

CONCLUSIONS – CURRENT AND FUTURE CHALLANGES

This paper’s content indicates that the use of an accurate representation of the housebuilding process, with the help of process models, will help a construction company to improve significantly its value chain. A process orientation approach is presented as a solution for organisation effectiveness. Thus, a clear allocation of activities in processes facilitates or is a condition for development work to be carried through in an effective manner. One can conclude that one of the main prerequisites for a drastic improvement of an organisation is to understand the bigger picture. Focusing on the details might just cause problems somewhere else in the organisation. The use of IT as an implementation vehicle for process orientation initiatives is also highly crucial, when trying to handle enormous amounts of information. As an example, the representation of the TPC process was visualised using a computer-based tool supporting the IDEF0 methodology. Without the tool it would have been almost impossible to structure all the information. The same thing can be mentioned about the web-bases PM collaboration tool. Many of these methods will probably start to clear up the complex picture of the housebuilding process, but large improvements are still to be made. Thought about future research is feeding out of the question; how do we organise to perform the best possible results in the future and what measures do we have to take to realise them?

APQC (American Productivity and Quality Center) suggests that an integrated, holistic and systematic approach will be essential to organisations of the future. In this new age, quality will finally be used, as it was initially intended - as an integral part of the business management philosophy and organisational fabric. (Cates et al., 2000) According to Gilchrist and Kibby (2000), all the major enterprises are looking for greater business effectiveness through improved information access; or efficiencies in information retrieval, which free time for more productive use. One of the answers to information overload might be the corporate taxonomy providing a ‘knowledge map’ for information and communication channels and a road-map to the intellectual capital of the company.

ACKNOWLEDGEMENTS

The author gratefully acknowledges the financial support of the Foundation for Strategic Research (SSF) and NCC AB, as co-sponsor, for the project, "Value chain management in construction", which forms part of the Swedish national graduate school and research

programme, Competitive Building. The author also wishes to acknowledge Brian L Atkin, Professor in Construction Management and Economics at the Royal Institute of Technology in Stockholm, for the supervision of the research project, and the management at NCC Housing.

REFERENCES

- Atkin, B. L. (1998). Unravelling the value chain in construction, Proceedings IGLC '98, Guaruja, Brazil
- Cates, C and Demery, A and Hunzeker, R (2000). *Quality approaches for the new millennium*, APQC, Consortium benchmarking study, Best-practice report, Texas, USA
- Gavin, D. A. (1998). *The process of organization and management*, Sloan Management Review, Summer 1998, Volume 39, No. 4 [Online].
<http://mitsloan.mit.edu/smr/past/1998/smr3943.html> [5 January 2000]
- Gilchrist, A. And Kibby, P. (2000). *Taxonomies for business: access and connectivity in a wired world*, TFPL ltd, London, U.K.
- Hammer, M. and Stanton, S. (1999). *How process enterprises really work*, Harvard Business Review, November-December 1999, Cambridge, Massachusetts, USA, pp. 108-118
- Hammer, M. and Champy, J. (1993). *Reengineering the corporation – a manifesto for business revolution*, Nicholas Brealey Publishing, London, U.K.
- Karhu, V. (2000). *Formal languages for construction process modelling*, Proceedings of International Conference on Construction Information Technology CIT2000, The CIB-W78, IABSE, EG-SEA-AI, Reykjavik, Iceland, pp. 525-534
- Lindfors C. (2000). *Value chain management in construction: modelling the process of housebuilding*, Proceedings of International Conference on Construction Information Technology CIT2000, The CIB-W78, IABSE, EG-SEA-AI, Reykjavik, Iceland, pp. 575-583
- Malmström, J. and Pikosz, P. and Malmqvist, J. (1998). *The complementary roles of IDEF0 and DSM for the modelling of information management processes*, Proceedings of the Fifth ISPE International Conference on Concurrent Engineering: Research and Applications, Tokyo, Japan, pp. 261-270
- Nilsson, G. (1998). *Process orientation, integration of work teams and management control*, Proceedings of the 4th International Seminar on Manufacturing Accounting Research, June 10-12, Kolding, Denmark
- Pikosz, P. and Malmqvist, J. (1998). *A comparative study of engineering change management in three Swedish engineering companies*, Proceedings of DETC98 ASME Design Engineering Technical Conference, September 13-16, Atlanta, USA
- Platinum BPWin. *Bpwin 2.01*, Logic Works, Graphic Layout Toolkit © 1992-1997 Tom Sawyer Software, Berkeley, California, USA
- Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*, NY: The Free Press, New York, USA