# STRATEGIC WORKPLACE PLANNING

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## ABSTRACT

This paper presents a methodology for developing a workplace strategy through understanding and formalizing the relationships between the purpose of the organization and the performance of the physical facility. Effective strategic workplace planning is a facilitated process that engages multiple stakeholders in a dialogue between their wants, organizational objectives, and available resources. The process underlines stakeholder accountability and commitment between decisions and outcomes. By studying the need for facility resources from the perspectives of the company operative management and of company strategic management simultaneously, it is possible to build up a collective group process.

The process is introduced as a project management concept for programming workplaces in relation to facility user's strategy and operations. The concept includes

- The theory of strategic workplace planning. It describes workplace production as part of the organizations strategy. A spatial investment in an operation competes for the same recourses as the other investments in the operations (salaries, education of staff…). Strategic workplace planning brings spatial investments and the values of the spaces into line with the other factors of client's production. It is allocating resources in relation to the working environment, its users and organization's strategy. The driver of allocation is value for operations and value for strategy.
- Workplace planning product model which defines spaces and their utilization in relation to business operations, user functions geometry and temporal needs.
- The target costing product model that defines the life cycle costs of working environment basing on spaces needed and spatial performances

Strategic workplace planning has been used to wide range of lines of business; offices, hospitals, churches, assembly halls, universities, day care centres etc. After observing the workplace planning management system in action on a number of projects, there is evidence of collaboration to generate client and stakeholder purpose. In generally the building costs have been reduced 15…20% during the process without losing important activities. It is possible to deal with values, money and activities during strategic workplace planning and to create the best architectural quality.

## KEYWORDS:

Project management, knowledge management, workplace planning, target costing, customer needs

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## VALUE GENERATION

A primary objective of workplace production is to generate value. In Koskela's (2000) Transformation-Flow-Value theory of production, value generation is viewed as a process where value for the customer is created through fulfillment of his requirements.

Project stakeholders include anyone who has a stake in the project. They can include both customers and producers along with other interest groups. Stakeholder values and their value judgments are the dominant influence on how purpose transitions from needs to requirements. Value systems influence the way customer needs are construed and represented. Hence, value generation is not a simple process and requires subtle management action in order to be successful. The opportunity to create customer and stakeholder value through collaboration has been well recognized in the practice of value management. Barton (2000) views value management as "a structured, facilitated process in which decision-makers, stakeholders, technical specialists and others work collaboratively to bring about value-based outcomes in systems, processes, products and services".

"The result of business is a satisfied customer" (Drucker 1989). Conceptualization of production must incorporate the customer. Workplace production is linked to a complex social system. In the initial stage of programming in a multi-user organization the customer is divided into many departments all having an operative responsibility linked to the organization's strategy. These departments compete for the same resources. In the initial stage of workplace planning the outcome is not known, nor is there any quality specification against which success can be measured in a deterministic way.

If value for customer will be created through fulfillment of customer's requirements, then, who's requirements will represent the customer requirements? Is there a framework in which the stakeholders commitment to common values in a specific production case can be achieved? The purpose of the organization is determined by the organization's strategy. The identification of valuable requirements must be done in the context of the organization's strategy.

## COMPLEXITY MANAGEMENT

There are two inductive problem areas in construction; programming problems and design problems. If in a building process a problem "do we need to invest in an activity?" is dealt with simultaneously as a question "where would it be located in a plan?", there are limitless possible alternatives. If we first answer "no" to the first question, there are no alternatives left. Does a "Where it would be" answer create more valuable information to the question "do we need it"? If not, the variables are orthogonal. Combining those variables causes more iterations, more waste and more rework as initial assumptions appear to be wrong. In reality there are numerous solutions for each programming problem and design problem and mixing those problems will expand complexity enormously. Combining orthogonal variables cause more iterations and can be called unnecessary complexity (Pennanen 2004). In Suh's axiomatic design this is formulated "customer needs and functional requirements must be determined in a solution-neutral environment (Suh 1990)". Programming and sketch design should be separated (Pennanen 2004).

Before and during programming the building as a physical object can not be predicted. We might sell the present building and build a new one, we might renovate the existing building, we might rent spaces or we might find out that we simply don't need more spatial resources. The activities that require spatial investments, the extent of the building, mass and equipment are unknown. The variables that often are known are the customer, the customer's business strategy and the customer's business environment. There are numerous stakeholders and decision makers in the building process. Therefore, in the initial stage of programming, there are a lot of values, specifications and wishes. Most of them can be considered "right" or "entitled to", many of them are in contradiction to each other and, when combined, they are generally in serious competition for the resources available (Pennanen 2004).

In programming we deal with inductive complexity, there is no optimum but numerous right (and bad) solutions; two random groups in the exactly same business field would define different briefings. There are numerous solutions in a socio-economical inductive system that can be considered acceptable. What is the criterion that differentiates the chosen solution from the bad ones and from the other good ones? It is the commitment of the participants to something achieved. We need a methodology to weight participant's values and identify common values. The product of the value identification process for the rest of production is the stakeholders' commitment to common values and requirements. It is a crucial part of production (Pennanen 2004). If we define that the stakeholders commitment is the first functional requirement of the social system, it seems then that to reduce complexity of socio-economical systems we have to concentrate on adaptive systems management and learning processes. Following variables have been found to be important in commitment making: (Meyer & Allen 1991):

- support and stimulate strategic and operative mangers to participate in decision making
- decentralize the decision making to the levels where responsibilities are met
- be transparent in terms of information handling
- treat all information equitably, regardless of its origin

These characteristics must be constructed in an iterative steering model because previously committed stakeholders need an opportunity to commit to common goals.

## THEORY OF STRATEGIC WORKPLACE PLANNING

The Concept of Strategic Workplace Planning (Pennanen 2004) links workplace production to client's general strategy. Workplace planning is a process where valuable requirements for workplace production are determined through observing and evaluating the values of stakeholders against the organization's strategy.

A spatial investment in an operation competes for the same recourses as the other investments in the operations (salaries, education…). Strategic workplace planning brings spatial investments and the values of the spaces into line with the other factors of client's production. The theory is in concordance with Koskela's TFV theory of production (Koskela 2000); transformations are described as customer operations, operations temporal flow is

followed within spaces and, finally, value of a space is weighted in relation to importance of the operation and in relation to the utilization degree.

The size of a space is determined by the operations taking place within that space (working at table, sleeping, teaching, playing tennis…). Spaces are a scene of temporal flow of operations and non-use time. The number of spaces is determined by the temporal utilization of the spaces. The concept of workplace planning defines value adding spatial investment (and non-value-adding) as follows:

- Investment to the operations' time is value adding and the non-use time is non-value adding with regard to the strategy
- Spatial investments in operations that are not needed for the organization's strategy are not value-adding.

If waste of space for unneeded operations and waste of non-use-time can be reduced, more resources will be available to the other investments for operations, spatial or non-spatial. Seeking for alternatives in value generation is an allocation process. Allocation deal with the questions

- can activities be combined within the same spatial environment?
- can spaces be more flexible to support diverse activities.
- is the activity (and the space) really needed ? Compared to the others ? Are other activities needed ?

## METHODOLOGY

Strategic workplace planning consists two computer-aided models: the Workplace Planning Application and the Target Costing Application

### THE WORKPLACE PLANNING APPLICATION

Workplace Planning Application is based on the Strategic Workplace Planning concept that was developed in Haahtela Group project management in the 1990's (Pennanen 2004). In the workplace planning process the client does not dictate the spaces and areas that he or she requires but describes the operations that he or she needs. The Workplace Planning Application supplies dimensions for the working environment and describes the temporal flow of the operations within the spaces.

The Workplace Planning application describes spatial environment

- as activities that require spatial resources for strategic management
- as working environment for operations for operative management

Application computes the spatial need and their temporal utilization degrees basing on the factors shown in the table 1.

As the application uses only client activity information as initial input, and the spaces and utilization degrees are the outcome, the client knows who or what activities use a certain

space, why they use, why it is that size and is there temporal resources left in a space. This information enables Activity Based Costing, as the costs of the spaces are known (next chapter: target costing application). The application is continuously tested in market. Performance results are tested, but against reference books, against reference buildings. Outcome utilization degrees are tested by post occupancy evaluation. Space lists are tested to already made buildings.

Table 1. Space Quantification Example

| **Quantification Factor** | **Description** | **Example of Education Institution** |
|---|---|---|
| **The total volume of the sector.** | No. of Customers or Products. | Two hundred design students. |
| **The activity bill programmed for the sector.** | Core Activities<br>Supporting Activities | Learning & Research.<br>Administrative activities. Dining. |
| **The temporal strain of functions and goals for the use of time in the space i.e. utilization degree.** | Temporal Strain.<br>Operating Degree. | Teaching Design Theory 4 credits, 30 h/ credit equals 120 h temporal strain/ student during 3 years.<br>Facility management sets a 75 % utilization degree target for learning environment spaces. |
| **The people working and the geometrics of the objects to be placed in the space.** | Each function requires space expressed as a performance result. | Lecturing requires 10sq. Meters of lecture area.<br>Students require standard seating and 1,2 sq. meter workspace.<br>Material shelving require… |
| **Regulations.** | Regulatory society defines the quantification of space. | A basketball court have certain dimensions |

## TARGET COSTING APPLICATION

Target costing management require reliable methodologies to describe customer needs and to price customer needs. The methodologies must be descriptive in customer language and tested with market information. The Target Costing Application (Haahtela 1980) has been developed in Haahtela Group project management. At the moment it is widely used among

project managers, contractors and facility owners in Finland. The Target Costing Application calculates the life cycle costs of a project based on the rooms and the requirements for those rooms. The Target Costing Application is a mathematical model that creates the link between the requirements the client sets on the rooms and the possible distribution of elements + use of resources connected to running costs (energy, cleaning…). The budget can then be addressed back to the activities by tracing paths back in the Workplace Planning Application.

Target costing must be based in market information, not design information (Haahtela 1980 and Cooper & Slagmulder 1999). It is easy in component-level target pricing (e.g. air exhaust apparatus) but somewhat difficult in product-level as the buildings tend to be unique and complex in regard to client needs. Suh's Axiomatic Design concept (Suh 1990) states an axiom: "A good design is made up of design parameters that result in the independence of the functional requirements from each other". It means that unnecessary complexity can be reduced if each design components satisfy only one functional requirement. Let's have a look at two requirements for internal climate: CO2 content and air cooling. They both can be controlled by

- variable air volume system (VAV) or
- CO2 content can be handled by constant air volume (CAV) system and the air temperature by water circulation system and cooling beams.

Suh's axiom argues that latter solution reduces complexity of whole system. Haahtela's Target Costing Application have similarities to Suh's axiom (Pennanen & Haahtela & Väänänen 2005). It is modeled to link one widely used design solution, "reference solution", for each client requirement, as far as possible. By that means it has been possible to price each requirement by market information. This kind of modeling can describe the cost differences between the client requirements, but not the cost level as whole. It is hard to describe the entity by means of little pieces and on the other hand, the contractor's tenders are influenced, but by the costs of components, also by their current situation in the markets. Therefore Target Costing Application used also black box modeling (Beer 1966): differences between the client requirements are modeled by reference solutions, the level of target cost is calibrated by comparing continuously the modeled result to the actualized tenders. If these two results act regular, the difference is stored in black box. If not, model has to be improved.

■ TOTAL RENT ON ROOM SCHEDULE

| Sec. | User | RoomN | Function area | m2 | Capital (8%) €/m²/a | Maintenance €/m²/a | Total rent €/m²/a |
|---|---|---|---|---|---|---|---|
| A | | | Clinical treatment | 60 | 126 | 86 | 286 |
| A | | | Operating theatre | 35 | 306 | 261 | 861 |
| A | | | Martins room | 15 | 93 | 43 | 143 |
| A | | | Car parking hall | 3 000 | 27 | 7 | 42 |

*Figure 1 : Sample of output data of life cycle costs, expressed as a rent of a room.*

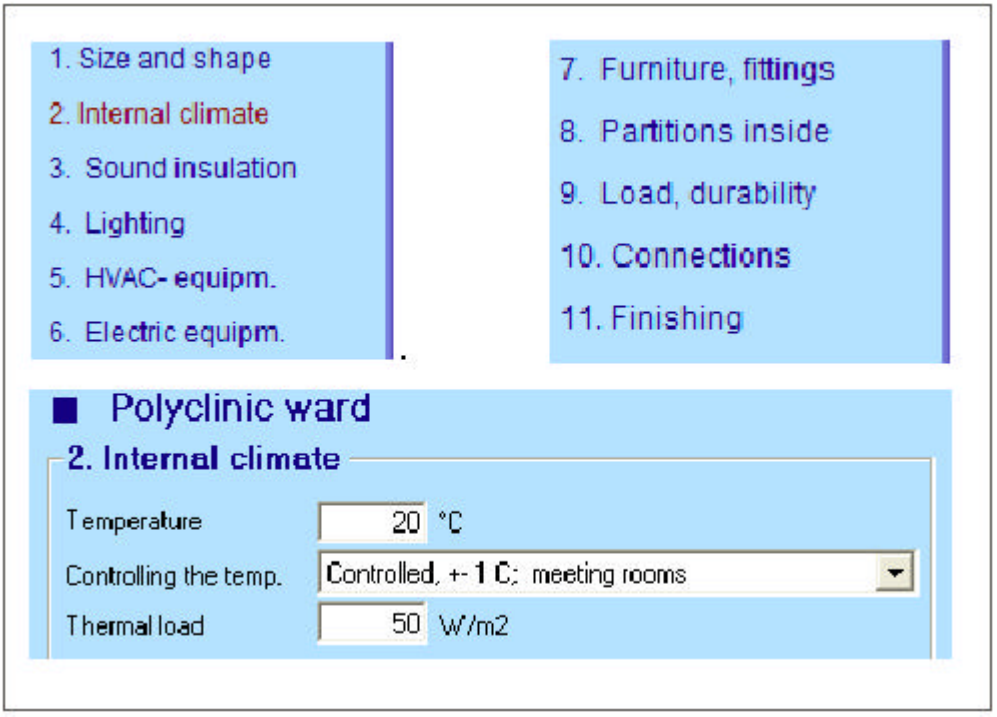


*Figure 2: Classification of criteria of the application and sample criteria for internal climate*

## NON-QUANTITATIVE CRITERIA AND TARGET COSTING

One reason why a socio-economic inductive system easily moves into a chaotic state is that some of the driving functional requirements are measurable (internal temperature in a room must be 24 +-1 degrees) and some are based on "soft" values, e.g. beauty. As soft values (or evaluating them) are culturally bound in time and space and among individuals (Pennanen 2004), it is very usual to produce sketch- design proposal while defining functional requirements. There are numerous design solutions for each set of hard functional requirements; evaluating soft values of design proposals (applicability, beauty…) together with stakeholders' opinions is very complex and variation in design solutions affect to one important functional requirement, namely life-cycle costs. It is very complex, slow and expensive iteration. To decrease such unnecessary complexity we have to study the correlation between hard and soft values and try to find an area in where the hard functional requirements could be defined without affecting the soft requirements.

Architect Niukkanen has studied the correlation of architectural quality and building costs (Niukkanen 1980). The population of the study was design & build competitions in Helsinki City residential building production. The competitors competed with architectural

design solutions and price tenders. The architectural quality (external beauty, internal comfort, habitability) was analyzed by a delphi-group and value analysis matrix. The result of the study can be seen in the following figure.

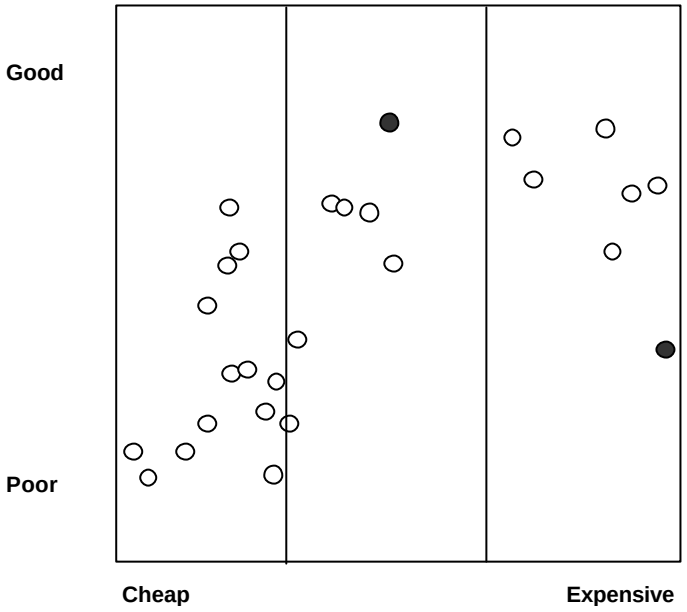


*Figure 3: Architectural quality and building costs in Helsinki City residential building production (Niukkanen 1980).*

If we set the life-cycle cost target (capital + maintenance) in the minimum-cost area, it might lead to poor quality (soft requirements). But in average price production, there is no correlation between quality and costs. Target costing is a method to set the target cost by using quantitative functional criteria and to set the target cost in a reasonable area. Then the costs can be considered in design as a fixed variable (one criterion among the others) and the architectural quality is the variable that is managed. And upside down, it is not necessary to pay regard to future design solutions to in programming.

## DIALOGUE

Strategic workplace planning is resource allocation in relation to the working environment, its users and organizations strategy. It is possible to plan the allocation through a transparent dialogue process between strategic and operational management that is supported by feedback of information of need of spaces, life-cycle costs traced to the customer activities and utilization degrees due to wants and wishes of operative managers (Pennanen 2004). The management system can be understood as a knowledge management architecture that supports knowledge creation for project definition. After observing the workplace planning management system in action on a number of projects, there is evidence of collaboration to generate client and stakeholder purpose (Whelton 2004).

Strategic workplace planning operates in a complex area. It does not aim for an optimum because an optimum does not exist in a complex system. There are numerous working environment solutions that can be considered acceptable. It aims for a "good" solution. Once the workplace planner has presented the workplace measurements, the facility owner develops an understanding of the present or desired state of the system; i.e., what kind of working environment the owner groups need and value, and what the subsequent consequences will be to their resources. The information presentation allows transparency in that the client stakeholder can trace spaces and costs to the organizational activities.

The result of dialogue is commitment of the stakeholders to common values and a single specification. The commitment can be described in a measurable way, e.g.

- **customer activity description**: library for 15 000 volumes is valuable for strategy
- **workplace requirement description**: library requires 240 m2 spaces, including shelving areas 125 m2, pc:s for inquiry 12 m2…
- **performance requirement description**: internal temperature within +- 2 degrees, load 10 kN/m2…
- **use-of-resource description**: the library will be in good use (utilization degree 75 %), life-cycle costs of the library will be 54 000 €/year. Library is still valuable for the strategy.

## CONCLUSIONS

Target costing and Workplace planning applications have been made to clarify and intensify internal customer relationship management, particularly between strategic workplace planning and designing. Target costing application enables pricing the rooms needed. Workplace planning application enables the definition of needed rooms on the basis of client activities. When combined, the enable target costing in client activity level; ABC management.

Target costing application has been widely in use for two decades. It has been proved that it is possible to price the requirements the client sets on the room before design, and it is possible to steer the design to targets.

Workplace Planning application combined with Target Costing has been in use for five years, and the results have been encouraging. In recent cases the life cycle costs have been reduced during the process without losing important activities among new construction cases and facility management cases in existing buildings. In Cygneaeus high school case and Jyväskylä Polytechnics case the "traditional programming" had already been done when the customer asked for workplace planning process. In both cases life cycle costs were reduced more than 15 %, decisions were made both by operative and strategic management and stakeholders committed to the result. In Cygnaeus case the process led to so low costs that operative management could add spatial investments. They did not add anything that was removed during the process; discovered waste remained waste. Both the cases has been designed to the targets (Whelton 2004).

Workplace planning and target costing have been used to wide range of lines of business; offices, hospitals, churches, assembly halls, universities, day care centres etc. At the moment a medium sized Finnish city, Lahti, is doing strategic workplace planing to all the city activities and buildings in order to create more efficient built environment. The concepts have been universal. Better understanding of client values and costing them have not prevented good architectural quality as it has been shown in Synapsia- rehabilitation centre case (Pennanen 2004). The building was named "one of the best pieces of Finnish architecture during 1998…2002". It is possible to deal with values, money and activities during workplace planning and target costing and to create the best architectural quality

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