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INVESTORS AND USERS: NEED FOR A HOUSING FACILITIES SCENARIO

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Abstract

In many cases, facilities managers in enterprises have a background in the construction or the planning sector. As a consequence they deal with the day to day demand for facilities, but with the exploitation of buildings as well. In fact they have to serve two masters: cheap facilities for the using process, but a high return on the building which generates housing facilities.

The demand planning and supply of facilities have to be distinguished. Decision making has to be based on cost price calculation for each facilities producing process. Decisive is the possibility to produce at cost below market price.

In some cases two types of decision have to be taken: the production of the investment good (furniture, building) and the operation of the investment. Most of the time only two options exist: renting cq. leasing the facilities or buying and operating the durable means of production. In the case of (office-)housing services the third option of self-developing of the building usually was preferred. Just because of speculative reasons. This has to be avoided in the future.

Short term demand planning for housing services has to be disconnected from the exploitation of a building. They concern two different processes with significantly differing planning horizons. Facilities management (demand) and building management (supply) have different goals and as a consequence different responsibilities as well.
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I. INTRODUCTION

Facilities to be used in primary processes are produced in secondary processes. The secondary processes can take place in the organisation of the primary process or outside; in some cases a choice is possible. The choice has to be made on the basis of cost price and market price; in such a way that the secondary process may act as a profit centre.

In the case of housing facilities the secondary process concerns the exploitation of a building. Unfortunately, especially in this case the planning horizon of the primary process is much nearer than the horizon of the secondary process. Because of that reason we should be aware of the fact that factors influencing the demand for housing facilities only 'have a short life' while the building as main mean of production in the supplying process has a very long life span.
II. PRODUCTION AND COST OF FACILITIES

Each facility has to be produced in a production process. On the basis of the cost price and market price of a facility has to be decided to which extent it will be produced in the organisation of the using process: the total process, renting or leasing of the facilities or buying the durable production good. In case the production of the facility needs a substantial investment in a durable production good, it has to be decided whether the operation of the durable good is the responsibility of the supplier or the user.

II.1. Building Exploitation and Other Facilities

In most circumstances the survey of all facilities needed in the primary process is not clear. Quality and quantity of demand are not well defined as well as the maximal affordable price and the cost price in case of production within the enterprise of the primary process.

<table>
<thead>
<tr>
<th>Production Process</th>
<th>Facility/ Unity</th>
<th>Production Process</th>
<th>Product/ Unity</th>
</tr>
</thead>
<tbody>
<tr>
<td>building exploitation</td>
<td>office space m2/year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>furniture exploitation</td>
<td>fum. service chair/year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>office equip. exploitation</td>
<td>copy service page A4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>office cleaning</td>
<td>cleaning hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>security production</td>
<td>guarding hour</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

fig. 1 A range of secondary processes additional to a primary process

It is necessary to distinguish as many processes as facilities demanded for. Figure 1 illustrates the secondary processes complementary to the primary process of a consultant. The product of the primary process is an advice with a cost price and a market price on the basis of an hour's work.
It is important to emphasise, that the secondary processes mentioned take place to some extent closely connected to the primary process. They concern services for which an investment has been done, to be used in or in the environment of the office building. This is contrary to services which are consumption goods (like paper and pencils) which will be bought in quantities appropriate to the changing demand within a relatively short period. In reality the choice of self production does not exist. We will focus on processes generating facilities for which an investment could be done by the user of the facilities depending on the quality and quantity desired. For each of such a process a cost calculation should be available as well as a demand planning.

II.2. Production and Use: Conflicting Goals

Each facility has a relation with two production processes: the process generating the facility and the process using the facility. The generating process tries to generate an acceptable return on the investment over the life of the investment, for which a gap between cost price and market price is necessary. So to some extent the market price is as high as possible. The using process however, wants to use facilities as cheap as possible to have a low cost price of the product of the primary process. So, a market price as low as possible.

This has been illustrated in figure 2. The cost price of the facility should be higher than the market price, while the indirect return on the facility by using it in the primary process should be higher than the market price. The conflict in fact is that the total margin between cost price and indirect return has to be split in two parts, resulting in a profit in the secondary process and a profit in the primary process.
II.3. Profit Centre in the Using Organisation

Consequence of the preceding paragraph is, that the production of facilities has to be disconnected from the primary process. Each process has to survive on the basis of its own cost and income. Income has to be related to the market price for a producer whether or not connected to any other process.

Each process - core activities or non-core activities - should be considered as a profit centre. In this way could be prevented that a primary process only survives because of the profit of a secondary process gained by the primary process because of the low internal calculation price. On the other hand the secondary process should stop in case in the long run cost price will be higher than the market price (figure 2).

Calculation price of facilities in the final product should in all circumstances be the market price. Loss and profit of generating and using processes become clear: processes profitable in the long have to survive.

II.4. Demand Planning and Supply Planning

Essential for decision making about the production of facilities is the planning of the flow of facilities needed and the flow to be produced. From the point of view of the primary process the facilities needed per period of e.g. one year have to be planned over several years. Depending on the supply on the
market and the cost of self-production may be decided. In the case of facilities to be sold on the market counts the possible market share and the scale of production to have efficient use of durable investments. The production process will be designed in such a way, that cost price per product is minimized to reach the goal of continuity of the production process. In this way the supply is planned: the production will be realised at minimum cost and sold at the market at the probable market price.

Only in the case of comparable flows of demand and production of facilities "self-production" really will be an option. But, it still has to be decided about production and operation of the durable investment.

II.5. Operation by Supplier or by the User

The decision to have the facilities produced in fact is a two-stage decision: the production of the durable production good necessary to generate facilities and the operation of the durable production good (figure 3). Three examples may clarify these two stages.

![Diagram](attachment:fig3.png)

fig.3 Choice of operation of investment good by user of facilities or in separated secondary process.

In the case of copying facilities one needs a copying-machine and the maintenance of it. About the first stage in fact one does not have the option to produce such a machine, because of two reasons: market demand gives the option to produce these machines in series for many clients and the production is too complicated to produce such a machine at a reasonable price by the user in the primary process. But the user still has the option to buy the durable good - copying-machine - and to operate it himself or to rent
or lease it. Depending on the period of use of the investment good one will decide on buy-and-operate or lease.

Office furniture usually will be bought by the user in the primary process, while maintenance will be organised by the using organisation as well. Leasing these facilities is not common, but a realistic option. So, in this case as well, one decision is to produce furniture in the organisation of the primary process or not, while the second decision is (in case of not self-production) to operate the investment good or to lease the facilities.

Office space facilities can be rented, maintenance of the building included. The second option is to buy a building and have it operated (maintained, and possibly adapted to changing circumstances) by the primary process. Because of several reasons one may choose the third option: develop a building and have it built according special desires based on the primary process. It will be realistic that operation of the building is now a responsibility of the primary process as well (fig.4).

![Diagram](https://via.placeholder.com/150)

**fig.4 Three options in the case of the production of office-housing facilities.**

**II.6. Trends in Facilities Production**

In the last three decennia we have seen, that a lot of secondary processes have been disconnected from the primary process. Company-owned cars have disappeared and have been replaced by lease cars; the secondary process of producing cars always has been outside the using enterprise, but now the operation as well.

The case of cleaning and catering is the same, but the total organisation of this service could have been incorporated in the firm as well. Now, most of the time, the total of services will be rented.

The last stage is not to have built buildings tailor made for the user, and not operating it by the user, but lease or rent of the building services.
This change has been illustrated in figure 5: the demand planning will remain the responsibility of the primary process, but the production of the investment goods needed in the secondary process as well as the operating will leave. Decisions will be made on the basis of the cost price of the facilities. This particularly is important to emphasise in the case of office-housing services, since mostly decision makers seem to decide on the basis of the cost price of the investment good (the building), not on the basis of the cost of the facilities (m² office space per year).

III. PLANNING OF OFFICE-HOUSING FACILITIES

As stated in part II, on the one hand we have the planning of the demand for facilities and on the other hand the planning of the supply depending on the market and production cost. In the case of housing facilities this means, that the demand for facilities has to be distinguished from the exploitation of the building.

Important now is the significant discrepancy between the period over which demand can be planned and the life span of the building as durable investment in the secondary process. The building is a complex durable production good with - over a long period - a changing flow of facilities.

The only way to realise an acceptable exploitation of the building in the long run and the availability of the best facilities at the lowest price for the primary process is to have a "marginal" housing facilities scenario. As a consequence, facilities management in the primary process has to be distinguished from building management which by definition is a secondary process.
III.1. Operation of Buildings: To Keep Them Usable

Buildings have to be kept usable at minimized cost.

In the short run the demand is of constant quality and well defined in the program of requirements. An equilibrium has to be found between expenditures for materials and for maintenance. This can be considered as a static goal (fig.6): generate facilities of constant quality at minimized cost. The cost of maintenance activities are - as an average over the useful life span - a constant amount.

![Diagram](https://example.com/diagram.png)

**To keep buildings usable**

- **Maintenance activities**
  - statical goal
  - predictable expenditures
  - Fund-creation for future expenditures

- **Adaptation activities**
  - dynamic goal
  - not-predictable expenditures
  - Depreciation on past expenditures

**fig.6** Predictable and not-predictable activities to keep buildings usable.

In the long run demand will change, which results in an adapted program of requirements. The components concerned will be replaced not-identically or will not be replaced at all; totally different components may be added to the building.

New components need an extra investment, without any connection to the past. This should be the same in case of replacement: the component to be replaced should be earned back out of internal or external rental income; the replacing component is just a new investment.

Components only may cause cost in the period in which the component will be used. The way to allocate the investment expenditure is to choose for the most adequate depreciation policy (fig.6).

The difference between maintenance and adaptation can be defined by stating, that maintenance activities can and have to be planned within the life of a component, while adaptation activities depend on changing demand at the end of the life of the component.

Cost of a component is composed of capital cost (depreciation and interest cost) and maintenance cost. Demolishing expenditures to make replacement possible have to be allocated to the component to be demolished.
III.2. Costs of a Changing Flow of Facilities

Adapting a building to changing demand means, that part of the building will remain unchanged, while some components will be replaced not-identically. As a consequence we have to face various lifes of components. Investment expenditures and maintenance expenditures are connected to components with different lifes: e.g. support structure, shell components, inside walls, mechanical equipment, electrical equipment. The problem now is to find a clear picture of the cost of housing facilities within a rental period.

The starting point for the cost calculation is, that a component supplies facilities at a constant level of quality over its usable life span. When demand for these facilities remains unchanged (usable life in fact equals economical life) it is obvious that the cost price should be constant as well. Investment, demolishing and maintenance expenditures have to be allocated to the facilities supplied over the usable period. The facility is the use of a component - or a combination of components with the same life span - during a year.

Using the annuity calculation, the expenditures will result in a constant amount of money (cost price) each year (fig.7); enough to cover all expenditures during the life of the component.

<table>
<thead>
<tr>
<th>Annual cost</th>
<th>demolishing</th>
<th>maintenance</th>
<th>new construction</th>
</tr>
</thead>
</table>

life of component

fig.7 Annual cost of a component based on three types of activities.

The rental contract between user and owner concerns all housing facilities rented during the contract period. Annual cost of components with different lifes have to be added, which is no problem since the calculated cost is on a yearly basis for all components. Yearly rent is a composition of sub-rents concerning various components (fig.8). After replacement - point A - The new rent is composed out of the sub-rent of the non-replaced components (support, shell, general infl) and the new infl components. The rent after point A can only be calculated as soon as the program of requirements for period A-B is available. The new rent can be lower or higher than the former of future rent.
**III.3. A Housing Facilities Scenario?**

Demand for housing facilities varies over time. Each building can be adapted for changed demand, however depending on construction and materials used; adaptation expenditures may be very high or rather low. This depends on the investment in flexibility concerning general infill (to facilitate adaptations after a change of tenant) or specific infill systems (for changes within a rental period, e.g. inside walls). Whether the investment is meaningful or not, depends on the use that will be made of the investment in the future. Balancing of initial investment and adaptation expenditures needs an idea about the future changes of demand (fig.9).

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**Dynamic Programme of Requirements**

- **Scenario of Activities**
  - Initial Investment
  - Adaptation Expenditure
  - Adaptation Expenditure
  - Demolishing Expenditure

**Average Annual Cost**

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**Fig. 8** Annual cost by addition.

**Fig. 9** The influence of a dynamic program of requirements on annual cost, through a scenario of activities.

Need for a flexibility scenario means, that the program of requirements should incorporate future demand for housing facilities. This description of the future does, however, not have to mean detailed information about all changes wanted, but a general idea about possible changes. The information needed is the frequency of change and the components that will be influenced. On this basis a choice can be made about reuse of components and simple
assembling systems.

fig. 10 Adaptation scenario in a dynamic programme of requirements.

In figure 10 has been illustrated, that a building can be composed of three groups of components:
- the support structure, lasting the total life of the building;
- the general dressing of the support structure, concerning the shell and infill components usable for several succeeding users;
- the specific infill, concerning components usable for one specific user, not neglecting flexibility within that group of components.

The point now is, that we need to have information about the life of the various groups of components. This means, that after that life the investor should be "free" in technical and financial science to remove these components and assemble other components. It does not mean that we have to know the design after adaptation. This has been illustrated by dotted lines describing the future composition of the building.

III.4. Risk of Investment: Residual value

The user's period of interest for a building is short; without any consequences he can leave the building after the contract has expired. The investor has to reckon with the consequences of the long life, even when his investment period covers only ten or fifteen years. The residual value of the investment - the moment of selling or buying is only one of these moments - depends on the location and on the building. A fact is, that the value of a building itself only depends on the value of future facilities generated by the existing investment.

A future investor - the buyer - only will pay for those components which probably will generate facilities demanded for. Other components have to be removed which means an extra investment without direct return. The more flexible a building, the higher the resale value can be. But even in that case components will loose value: general infill components have a limited usable life. Selling the building means that components will be sold which have lost
already a part of the 'stock' of facilities. The value of that stock has to be calculated carefully, which is possible if the value of the flow of facilities has been calculated well.

The value of a building on an arbitrary moment is composed out of the value of the stock of facilities incorporated by components (fig 11). This value has to be diminished by the expenditures to remove components for which no demand exists anymore. Most of the time the components with value are part of the support, shell and general infill. Specific infill components will have to be removed and have consequently a negative value. In case general infill components have to be removed, they have a negative value as well.

In the past most of the time the depreciation on the building was over-compensated by a "speculative" increase of the value of the plot. This speculation was the main reason to invest and to add this profit to that generated by the (primary) using process. As stated above, these profits should be distinguished to get a good basis for decision making about the production of housing facilities.

**IV. FACILITIES MANAGEMENT VERSUS BUILDING MANAGEMENT**

Primary and secondary processes have - to some extent conflicting - goals. In the case of office-housing facilities the return on the investment in the building is different in character compared with the goal of the primary process. Because of this reason it may be argued, that at the moment of planning and decision making two responsabilities have to be recognised. However, this does not mean that the two types of planning are totally isolated.
IV.1. "Meeting area"

The three levels of components in figures 8 and 10 differ from the point of view of usable lifetimes, as well as the interest of investor and user. Components of the support structure are just of interest for the investor; of course the support structure has to be designed in such a way that components with shorter lifetimes (because of technical or flexibility reasons) may be removed and assembled easily. Components with shorter lifetimes connected to the support structure are as well connected to specific infill components with an even shorter life. The demand for specific infill facilities has to be defined by each user. This user benefits from general infill components, which facilitate the assembling of special components.

General infill components are partly influenced by the support structure - which is of interest for the investor - and partly by specific infill components - of interest for one user. Attractiveness of a building will to a large extent be based on the possibilities of the general infill. These components are the "meeting area" of investor and user (fig.12). Of course the attractiveness depends on the location as well.

IV.2. Building Management versus Facilities Management

Investors and users of buildings have different goals; as a consequence different responsibilities as well. The investor's goal is maximum return on the investment in the long run, while the user wants cheap facilities in the short run. As has been shown, the meeting point for negotiations is located around the general infill. The user
just invests in the specific infill; the investor in support structure, shell and general infill.

In present practice a facilities manager has to deal with the day to day availability of facilities as well as with the planning of new buildings. It is mostly far from sure, that the new building will deliver facilities in the long run for the enterprise which initiates the new construction. The goal of speculative investment in a building usually will conflict with the supply of housing facilities in the short run. Responsibilities have to be separated.

In enterprises with several buildings, two markets and two types of responsibilities are important. On the housing facilities market the enterprise will demand for facilities needed by the primary process and will supply facilities generated by the buildings owned. If the buildings fit well into the primary process, the enterprise will use their own buildings. Otherwise two rental contracts will be signed, with a supplier and a renter from outside the enterprise.

On the second market the enterprise will sell the building as soon as the building will not be used anymore by the primary process. The enterprise tries to make a speculative profit.

In practice the two responsibilities have to be separated, but can in smaller enterprises be combined in one group or person.

V. CONCLUSION

The shortest description of the goal of an enterprise is: continuity. This means, that the company tries to survive, which is only possible when the production process generates an income enough to cover all expenditures. Since an enterprise may consists of several processes - core processes and additional process - each process should be able to survive by its own.

Facilities are produced in secondary processes. These processes may take place totally outside the organisation of the primary process. The facilities are rented or leased.

An alternative is, to buy the investment good and to have it operated by the user. E.g. furniture, catering facilities.

It the case of office-housing facilities the enterprise may develop its own building and operate it. This may be argued when the facilities are special of character and of special importance for the user. Most of the time however, the investment only can be argued because of an expected - speculative - profit at the moment of the selling of the building.

It is necessary that the investment in and the exploitation of a building concerns a decision to be taken far away from decisions concerning the core business. Facilities management (the demand for facilities and finding the best offer within the planning horizon of the using process) differs totally from the management of the building (exploitation in the long run by generating a heterogenous flow of housing facilities).