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EVOLUTIONARY PRODUCT DEVELOPMENT IN WORKING-CLASS HOUSING

Arthur O. Eger

SUMMARY

The well-known economical product life cycle describes the typical pattern of a product's turnover over time. Although it has become a central concept in product development and marketing, it has severe practical limitations. Probably one of the most important limitations is that it is a purely quantitative, descriptive relationship. It describes the most probable pattern over time in the relative growth and decline of the numbers sold of a successful product from its incubence until its extinction, but it does not say anything about the qualitative changes that the product undergoes during the different phases of its life cycle. In other words: it is impossible to explain the nature of a product's renewal or the change in users' demands and wishes during the different phases of the product life cycle. In this paper, the six phases of the product life cycle are complemented with a set of six *qualitative* 'product phases', which allows us to explain in what phases of the product life cycle functionality, design, pricing, production technology, promotion strategies and presentation, as well as the service level and the social behaviour of a company are important. It will be shown that, to a certain extent, the model can be used in architecture.

INTRODUCTION

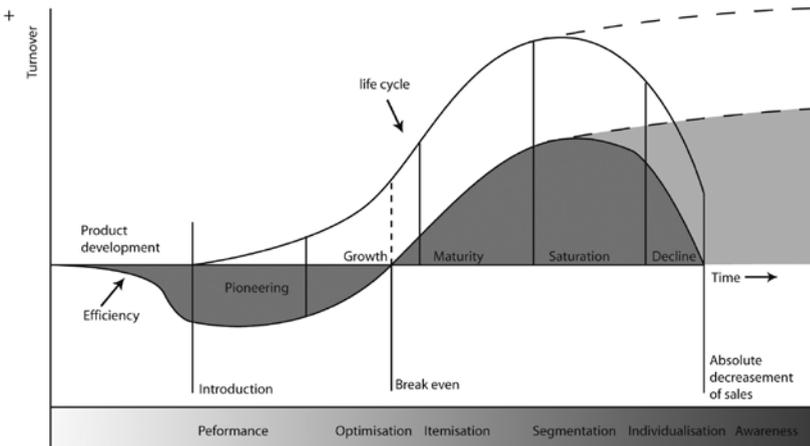
On January 23 of 2007, I visited Professor Richard Foqué — who was a member of my PhD -committee — to discuss my thesis on Evolutionary Product Development that I was going to defend on May 29 of that same year. One of the things he remarked during this meeting was, that he thought it possible that my theory would be valid in architecture as well. The invitation to contribute to his Liber Amicorum formed an excellent opportunity to study this possibility. It became soon clear that 'architecture' was a conception that was too wide, so I scaled it down to working-class housing.

Industrial designers have a number of methods and techniques at their disposal that are helpful with their design task, but for some tasks (for instance, the choice for the overall direction in which product innovation should proceed), they have to rely for a large part on experience and intuition. In an earlier study (Eger, 2007), it was shown that this way of working, however seemingly intuitive, nonetheless displays certain regularities that can be generalized into a model of six consecutive qualitative product phases, in which each phase can be described by means of ten product characteristics. Generally speaking, products will follow these product phases in the same order. The aim of the model is to improve insight into a product's life cycle.

PRODUCT PHASES

Economic product life cycle

The concept of product phases is related to the economic product life cycle. Both consist of six phases. The first phase of the product life cycle, product development, shows (essentially R&D) costs of the product before its introduction. The second phase, the pioneering phase, starts immediately after the product is launched on the market. If the product is not rejected, a growth phase will set in, leading to an increased turnover. From now on, imitation by other producers will lead to increasing competition. Next comes the maturity phase, characterized by decreasing growth in sales rates and the elimination of weaker competitors. During the next two phases, saturation and decline, turnover will reach its peak, after which sales will decrease in absolute terms. This is caused, for instance, by the emergence of substitute products. During the last phase, the product will gradually disappear. Sometimes a residual market will remain and another phase will follow: ossification [1]. It should be noted that most, but not all products precisely follow this pattern, and that the pattern itself may be influenced by all kinds of external factors. For example, the mandatory wearing of safety belts in the back of cars may result in doubling sales of safety belts during a short period of time, even if the product itself has reached its maturity phase.

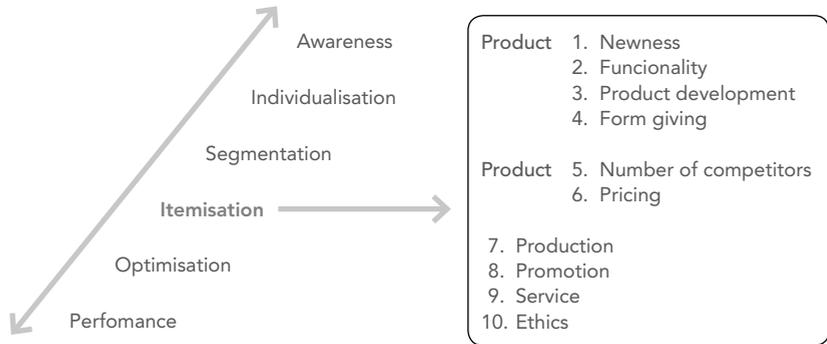


1. The economic product life cycle and the product phases.

How qualitative product phases can map the status quo of a product

Introducing product phases opens up the possibility to analyze the relationships between the different fields of industrial design engineering: ergonomics, marketing, construction and styling. The form giving of a product can be analyzed in relation to its (primary and secondary) functionality, its ergonomic qualities, its production technology and the marketing techniques that are used to sell the product. To demonstrate this, we propose six qualitative product phases — performance, optimisation, itemisation, segmentation, individualisation, and awareness — complementary to the (essentially quantitative) phases of the

product life cycle [1, 2]. Placed in chronological order, a more or less general pattern reveals itself, which enables — to some extent — the possibility of explaining a product’s development.



2. The six product phases with their product characteristics. To keep the figure simple, the product characteristics are only shown at the Itemisation phase.

Each product phase can be described in terms of ten product characteristics of which four apply to the product itself; two of them to its market, and the others to its production technology, its main promotion instruments, the services that accompany the product and the ethical aspects of the product in question. The ten product characteristics that we propose are:

1. Newness;
2. Functionality;
3. Product development;
4. Styling;
5. Number of competitors;
6. Pricing;
7. Production;
8. Promotion;
9. Service;
10. Ethics.

CHARACTERISTICS OF THE PRODUCT PHASES

We state that each of the six product phases displays a typical pattern of product characteristics. In this section, these product characteristics will be made explicit for each product phase.

Performance

New products — that is: products based on new technologies — normally suffer from teething troubles for some time when they have been put on the market. By implication, improvement of primary functionality (i.e., the technical performance of the product) is the most important aspect of product development in this phase. Christensen (1997) states that, in the beginning, new products (‘disruptive innovations’, as he calls them) perform generally less well than the products they will replace at a later stage. Technically new products often start

as status symbols, and usually perform worse than the existing alternatives. The first cars, for example, were much less reliable than the contemporary horse drawn carriages, but despite these shortcomings, some people still wanted to own them (Baudet 1986). The product characteristics of the product phase 'performance' can be summarized as follows (Eger, 2007). The product is technically speaking new and results from a 'technology push'. The performance of the product is often poor. Product development is primarily aimed at improving the performance. Design in the limited sense of 'overall form giving' is unimportant, and therefore, product aesthetics are of minor concern. The product is put on the market by a monopolist or a small number of heterogeneous oligopolists, so competition is low. As a consequence, the price per unit can be relatively high. The product is frequently produced by standard machinery equipment; it often has more parts than the number that would be technically feasible, and assembly is mostly done by hand. The product is promoted through fairs, free publicity via public media, brochures in retail shops, et cetera. There is no properly organized service organization set up by the producer, and the ethical behaviour of the producing company is of no concern to the customer.

Optimisation

In the second phase, product development is broadened to include ergonomic aspects and issues of reliability in use and safety. The product phase 'optimisation' is characterized as follows. Although the product is technically speaking still new, consumer awareness of the product starts to develop. The performance of the product is reasonable, but product development is still aimed at improving performance. Other aspects, like increased reliability, improvement of aspects of ergonomics and safety are becoming serious considerations. The number of competitors starts to grow. The price per unit is still relatively high, but increasing competition creates a tendency towards lower prices.

Itemisation

Both Windermere Associates (Christensen, 1997) and Mann and Dewulf (2002) find that, when producers have improved their product to the point that they satisfy generally accepted standards of functionality and reliability, the edge of competition shifts to convenience. Buyers will prefer those products that are the most convenient to use and — especially in the business to business market — sellers that are convenient to deal with. With mass produced products, personal selling becomes impossible. The growth of the market is less than 5% and the number of competitors increases. As the product range grows, prices fall and promotion costs increase. Communication channels change from personal selling strategies to direct marketing, and (paid) print-, TV- and radio-advertising. Product development is aimed at improving performance, reliability, ergonomics, human interfaces and safety. An endeavour sets in to develop extra features and accessories, including special editions of the product that are developed for different trade channels and target groups. Design becomes more important, and product aesthetics become a major concern. The number of competitors is still growing, but the market has usually not yet developed into a perfectly competitive market (homogeneous polypoly). The number of

product parts decreases, and mechanic and/or automatic assembly becomes more important. If needed, well-organized service organizations are set up to support the product.

Segmentation

In the first three product phases (i.e., performance, optimisation and itemisation) the focus was on improved functionality, reliability, ergonomics and safety. An endeavour to add extra features and accessories in order to differentiate the product from its competitors, sets in somewhere in the third stage. However, there is an end to this kind of developments. Actually, there comes a time when the performance offered is actually more than the performance required. For relatively uncomplicated products, such as furniture and trinkets, the possibilities to add features or accessories are limited. Moreover, for innovators and early adopters, products become less attractive during the latter product phases. The market share is such, that the product is considered to be 'accepted'. Owning the product is no longer distinctive, as it does not offer any form of status. Adding emotional benefits to a product is now a possibility.

Characteristics of the product phase 'segmentation' are: almost all members of the target group know the product from their own experience or have at least heard of it. As the product, technically speaking, enters the domain of some 'dominant design' (or, a limited number of 'dominant designs'), product development is aimed at adding extra features and accessories, including special editions of the product for different trade channels and target groups. Design has reached a stage of complete integration of the different parts of the product into a completely unified and recognizable form and design focus shifts from form giving proper to expressive features, aimed at increasing emotional benefits. The market approaches perfect competition. As prices approach average total costs, price decreases come to a halt. Promotion and advertising are often intensive and costly, by intensive advertising in various mass media.

Individualisation

Extrapolation of segmentation (continuous fine tuning of products on ever smaller target groups) ultimately leads to a product well tuned upon one individual. Recent developments in information and production technology make this kind of individualisation even more possible. These developments imply the following changes in characteristics in the product phase 'individualisation'. In order to make the product discernible from its competitors (i.e. to escape in some way from the 'dominant design'), product development is aimed at extra features and accessories, including special editions of the product for different trade channels and target groups, and on top of that, deliberately geared to mass customisation and co-creation, allowing the customer to influence the final result. The market starts to shift from a homogeneous polypoly into a heterogeneous polypoly. Although prices approach average technical production costs of the dominant design, co-creation and mass customisation offer possibilities to realize higher prices. Interactive media are used to customise the product to the needs of the individual customer.

The ethical behaviour of the producing company starts to become of some importance to the customer.

A problem with this product phase is that individualisation is not possible for each product. Complicated products, such as cars, are already customised to some extent, but choice so far is limited. A system whereby a customer can submit a RAL-number for the desired colour of his car has yet to be developed. For less complicated, low-priced and mass produced products, such as diaries, spectacle cases, writing utensils, etc., possibilities are even more limited — although it is possible to order these products with one's own name printed on them, for example.

Awareness

In 1997, market research bureau Inter/View studied aspects of so called 'responsible entrepreneurship' (Sikkema, 1997). The results suggested that consumers are willing to contribute to a better environment and are willing to help solving societal problems by changing their consumption patterns, but only if this can be done without much effort, and only if it does not lead to decrease of consumer satisfaction and to an increase in financial burden. On the other hand, this research also showed that people do expect companies to play an active role in solving common societal problems. According to Hafkamp (1997), a company can successfully tempt consumers — especially those who are committed to purchasing luxury products — by offering them the possibility to show their ethical involvement by acquiring products that claim in some way to be more environmentally or socially beneficial than their competitors. This leads to slight changes in the characteristics of the last product phase, 'awareness'. The addition of extra features and accessories, including special editions of the product for different trade channels and target groups, has not stopped, but becomes of secondary concern. Design is focused upon the enhancement of expressive features, aimed at increasing emotional benefits, but when these benefits start to include ethical concerns, this can lead to a sudden leap into ascetic and sober forms. The market approaches a heterogeneous polypoly. Co-creation and mass customisation offer possibilities to realize higher prices. This tendency is reinforced even more by product claims on societal and environmental issues. The producing company explicitly communicates company ethics in its promotion campaigns. The ethical behaviour of the producing company does influence — to some extent — consumers' choices. The company can for instance be successful with products that become more attractive during use ('positive aging').

WORKING-CLASS HOUSING

In this section, a retrospective case survey of working-class housing in the UK, Belgium ('Sociale woningbouw') and the Netherlands ('Volkshuisvesting') will be described. The UK was chosen because the problem — housing many people that came to the cities after the industrial revolution — started there. Belgium was chosen because Richard Fouqué lives there, and the Netherlands were chosen because I live there, which means the information was easy to access. It is

supposed that the history in other countries will not differ much, but this has not been verified.

Performance

One of the conditions of the theory of product phases is that there is competition. Before the Public Health Act of 1848, working-class housing was, in the doctrine of *laissez-faire*, left to the free market. Tarn (1973) describes the situation in the cities in England as follows.

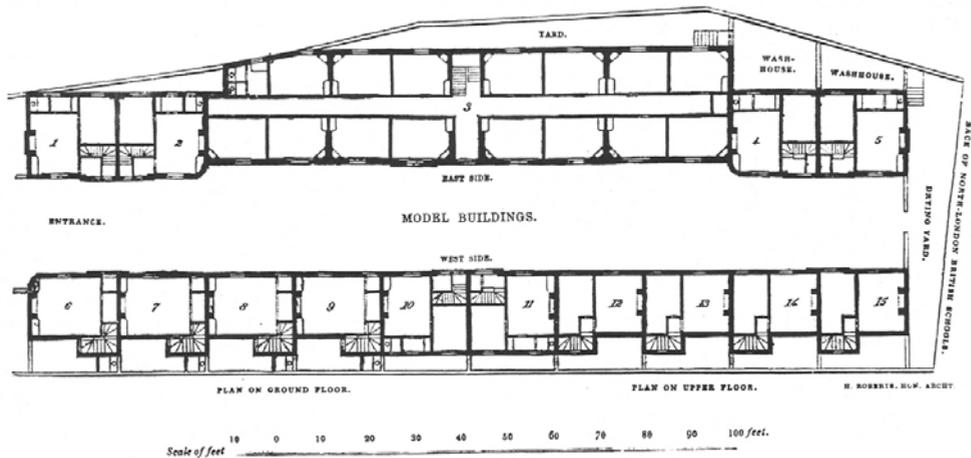
England led the industrial revolution, its towns were larger and uglier than those of any other country, they were filled with great mills and factories belching forth acrid smoke and fumes. (...) Now, for the first time, they constituted a separate recognisable and articulate class, living together in well defined ghettos either newly run up by speculative builders around the gates of the works, or in old courts taken over and over-occupied (...) to leave the town was like escaping from hell itself. (Tarn, 1973, p. xiii)

By mid-century, towns were places of poverty, ill health, disease, inadequate water supplies, non-existent drainage and garbage collection. The severity of the situation speaks from an official account by a city missionary.

On my district is a house containing eight rooms (...) the parlour measures 18 ft. by 10 ft. (...) in this one room slept, on the night previous to my enquiry, 27 male and female adults, 31 children, and two or three dogs, making in all 58 human beings breathing the contaminated atmosphere of a close room. (Hansard, 1851)



3a. The Bagnigge Wells estate, the first development of the S.I.C.L.C. Architect: Henry Roberts. (Source: Tarn, 1973)



3b. The Bagnigge Wells estate, the first development of the S.I.C.L.C. Architect: Henry Roberts. (Source: Tarn, 1973)

The large quantity of houses that were built in England in this period resulted from speculative developments that were — most of the times — totally uncontrolled. Before 1850, there were a few examples of public concern, financed from philanthropy and often fostered by a sense of guilt. An example was the Bagnigge Wells estate, built by the Society for Improving the Conditions of the Labouring Classes [3a, b].

The history of public housing (Volkshuis-vesting) in Belgium started halfway the nineteenth century. Cities were growing rapidly due to the industrial revolution. The number of inhabitants of Brussels (and its surroundings) grew from 260.00 in 1850 to 760.000 in 1900 (De Pauw, 2006). The consequence was an enormous housing shortage. In 1868, a group of private persons started a charitable organisation — the Société Anonyme des Habitants Ouvrières dans l'Agglomération Bruxelloise — that built working-class housing in Sint-Gillis, Anderlecht, Vorst, Molenbeek and Schaarbeek [4]. In 1889, the first Law of Public Housing was passed. Based on this law it was possible to lend money at a low rate of interest. Thanks to this law, over 60.000 rather basic housings were built in Belgium, between 1890 and 1914.

In the Netherlands, the development of public housing started with the housing act (Woningwet) of 1901. This law was an answer to the miserable situation in the working-class quarters at the end of the nineteenth century (Anon, 2001). The motivation behind this law was mainly the public hygiene. At first only small changes were carried out in the houses that were constructed. It was no longer allowed to build places without fresh air, such as alcoves and cupboard beds. In the first years after the passage of the law, only few houses were brought about. It often depended on the personal efforts of civil servants or statesmen whether

it was possible to build. The appearance of the houses was sober and traditional. To the extent that the performance of the product was often poor, and that prices were relatively high, working-class housing followed the theory of product phases. One can even say that it resulted from a ‘technology push’, although it was not one in the building industry, but it was the industrial revolution itself. The request for housing was so high, that any square meter could be used and that people renting them could be (and were) exploited.



4. Linthoutwijk, Schaarbeek (1870). (Source: De Pauw, 2006)

Optimisation

On March 30, 1847, Lord Morpeth introduced the first version of the Public Health Act in the UK. The Bill showed evidence of hasty preparation and faced a rough passage. On July 8, the government withdrew the Bill. The following year, on February 10, Morpeth introduced a revised Bill, which was intended to have — amongst others — the following effect: to make public sewers, to require owners or occupiers to provide house-drains, to cleanse streets, to cleanse, cover or fill up offensive ditches, to provide sufficient supply of water, to alter drains, privies, water closets, and cesspools built contrary to the Act, to make bye-laws with respect to the removal of filth, and the emptying of privies. The battle for the passage of this Bill was as great as in the previous year. During the debate, the following, rather shocking passage appeared in *The Economist*.

In our condition, suffering and evil are nature’s admonitions; they cannot be got rid of; and the impatient attempts of benevolence to banish them from the world by legislation, before benevolence has learned their object and their end, have always been more productive of more evil than good. (*The Economist*, 1848)

Although the Bill was passed, it should be emphasized that the degree of success was small. Until 1875, most buildings for working-class housing that were ‘better’ in the sense that they were well built, had good ventilation, drainage, and an ample supply of water and were sometimes designed by an architect, were initiatives from (personal) charity, or from organisations like the S.I.C.L.C. However, in 1890, Tarn (1973) speaks of houses with a ‘variety of types and standards of

accommodation (...) on the ground floor were shops with living accommodation arranged in the rear around small yards.' (Tarn, 1973, p. 101) The buildings became more visually attractive and there were experiments with the façades. For instance, cast iron balconies were constructed to avoid the monotonous regularity of the barrack-like buildings of earlier decades. After 1905, some architects adopted a modified classic style in an attempt to get away from the rather ponderous and oppressive quality of the earlier housing blocks.

The 1920s were the most important years for the working-class housing in Belgium. In this period, garden quarters, such as Logis-Floréal in Watermaal-Bosvoorde [5], Cité Moderne in St. Agatha Berchem, and Kapelleveld in St. Lambrechts Woluwe, were built, but also cheap, compact buildings in the city centres emerged. But from 1926 on, the building activities slacked, because the construction of garden quarters was considered to be too expensive, and to consume too much space. Another reason was that the liberal government strived for private possession of houses (De Pauw, 2006).

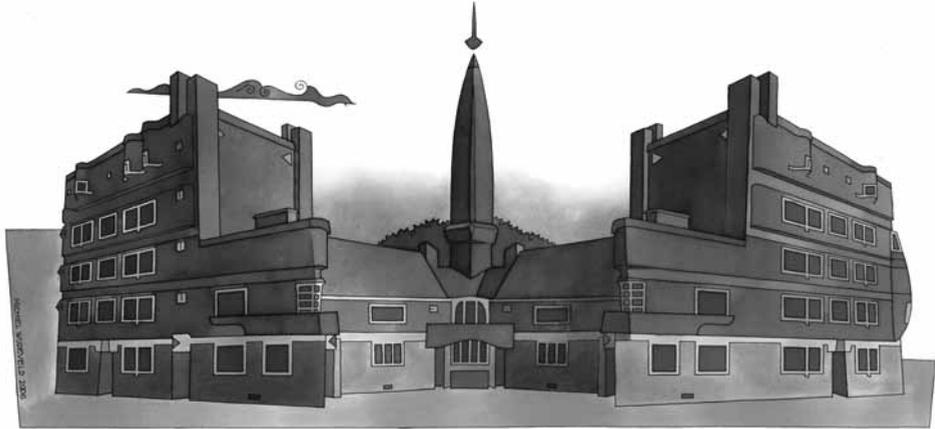


5. Floréal, Watermaal-Bosvoorde. (Source: De Pauw, 2006)

In the Netherlands, the housing construction almost completely stopped during the First World War. When the construction of buildings started again, the government exerted a lot of influence. Typical projects were large scale building blocks. Examples are the buildings of Berlage in Amsterdam, Van Elmpt in Groningen and the first buildings of the Amsterdam School [6]. The most important aspect was not the floor plan, but the façade and the way it matched its surroundings. During the depression, the number of projects decreased, but two important developments started just then: row-building and multi-storey building. Both developments were continued after the war, but because of the poor quality of these buildings, many have been brought down or thoroughly renovated.

Itemisation

It looks like that in the beginning of the twentieth century in England, a 'dominant design' became discernible: a cottage with two levels, three bedrooms and, for the larger types, a bathroom.



6. 'Het Schip', Spaarndammerbuurt, Amsterdam, architect: M. de Klerk (Illustration: Michiel Wijdeveld).

Development continued until 1911, but latterly the demand was for smaller houses at rents which the poorest class could afford, since private enterprise catered very adequately for the artisan who could afford a normal house with three bedrooms. (Tarn, 1973, p. 138)

In the 1950s in the Netherlands, the emphasis was increasingly put on building fast and cheap, as well as building as many houses as possible. The keywords were 'increase in scale' and 'standardisation'. Complete residential neighbourhoods were set up, including playgrounds and parks for recreation. This tendency continued in the 1960s. In this period, large scale projects such as the Bijlmermeer (Amsterdam) and Hoog-Catharijne (Utrecht) were developed (Anon, 2001). The result was uniformity. Architects started to break through this trend by trying to create — within the limits postulated by the Dutch rules — variations by designing unusual housing types, by creating public gardens and by adjusting the plan of the area to the existing situation.

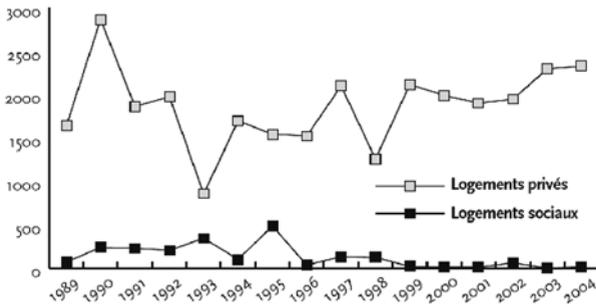
Segmentation

Already in 1885 there is some awareness of segmentation. Tarn (1973) mentions a publication that says: we must take the working-class as of various degrees; the upper, middle and lower of the labouring classes.

In the 1970s, the attention 'on the continent' shifts to more attention to the individual. The development projects become smaller. The Dutch government makes funds available for experimental building. In public housing, experiments are carried out with regard to the design and use of materials. Examples are Kasbah (in Hengelo) and the Bolwoningen (in 's Hertogenbosch) [7]. Suitable housing is developed for elderly people, for singles and for small families. In Belgium the number of working-class housing seems to remain low, although it is difficult to find detailed information (De Meyer, R. en M. Smets, 1982) [8].



7. Spherical houses ('Bolwoningen') built in 's Hertogenbosch in 1985. Architect: Dries Kreijkamp.



8. The number of private houses compared to the number of public houses built in Brussels between 1989 and 2004. (Bron: De Pauw, 2006)



9a. Two (originally identical) housing blocks in Enschede ...

Individualisation

At the end of the nineteenth century, already the first signs of individualisation can be perceived.

The identity of the individual had been lost in a Georgian terrace behind reticent, similar façades, designed to produce a harmonious street or square, rather than to glorify the separateness of each house. The rising class who possessed the money to own and build such houses were now no longer content with this reticence; they required that their social advancement should be more ostentatiously paraded by a showy individualistic house. (Tarn, 1973, 153)

In the Netherlands in the 1980s and 90s, more attention is paid to architecture. The consequences of the energy crisis of the seventies become noticeable in building projects. In many projects, both private and social houses are effected to create a good social mix of residents. The rising costs of the social tenement houses are compensated by the benefits of the private houses. A new development is the building of shells that offer the inhabitants to influence the plan of their future home. It looks like there is almost a century between individualisation in England and in the Netherlands. Figure 9 makes it very clear that the wish to individualise one's house exists [9a, b].

In recent years in the Netherlands, 'wild building' ('Het Wilde Bouwen') has been introduced. 'Anything goes' in certain areas, as long as people stick to the legal regulations concerning construction, ventilation, isolation, etc. Roombeek (in Enschede) is an example of such an area [10].

Awareness

As already mentioned in section 4.5, the energy crises led to renewal in the building of houses, for example by isolation and other energy saving measures. In the last decade of the twentieth century, special 'green building' quarters ('Milieuwijken') were developed in the Netherlands. Examples are the Eco-wijk in the district Westerpark (Amsterdam) [11] and Oikos (in Enschede).

CONCLUSIONS

The market of private and social housing is different in several ways from the market of products. First of all, there is the location of the house. This is an aspect that is not relevant for products, but very important with houses. It means, for instance, that people sometimes don't have much to choose unless they are willing to accept long travelling distances to and from their work. Then, there are more governmental rules and regulations for housing than for most other products. And finally, it is easy to individualise a house; most of the times easier than to individualise a product. Despite all these differences, on the basis of this limited study, it can be concluded that it looks like the product phases also appear in working-class housing. As is the case with most products, the findings reveal that it is difficult to draw a fine line between the end of one product phase and the beginning of the next, and that some product phases overlap one another for long periods of time. It would be interesting to further study the product characteristics, and to investigate if the theory applies — for instance — to business premises as well.



9b. and what people did to individualise them.





10. Examples of 'Het Wilde Bouwen' in Roombeek, Enschede.





11. The 'green building' quarter Westerpark in Amsterdam. Urban architect: Kees Christiaans.

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