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# Customer-perceived Value in Residential Developments: the Case of Hornsberg Strand, Sweden

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This paper presents a new model by using a structural equation technique. This model integrates the productivity theory and customer-perceived value to identify key features that residential customers seek when making their decision to buy or rent a residential apartment. A theoretical structural equation model is confirmed by using a dataset based on 283 respondents, those who are potential tenants of an ongoing residential construction project in Sweden that consists of 402 rental apartments. The results show that expectations of being able to relax in the immediate neighborhood as well feeling safe in the neighborhood have a high impact on customer perceived value. Moreover, analysis of a two bedroom apartment, used as a show apartment, reveals that an apartment with plenty of natural daylight and a well proportional layout has the highest impact on customer perceived value. Professional developers and municipalities could use the proposed residential customer perceived value model (RCPV-model) to increase their understanding of customer-perceived values by verifying key drivers in successful residential projects and acting on them when planning new development projects.

**Keywords:**

Customer perceived value; Productivity analysis; Structural equation modeling; Residential construction project

## 1. Introduction

The use of a customer value hierarchy model to improve the understanding of organizations on how to deliver increased customer value has been demonstrated by Woodruff (1997). The customer value hierarchy model provides a framework for exploring the linkage among desired value of customers, evaluation of received value and overall customer satisfaction (CS). The concept of customer-perceived value has been widely discussed in the marketing literature (Zeithaml, 1988; Patterson & Spreng, 1997; Woodruff, 1997; Ulaga & Chacour, 2001; Lin, Sher & Shih, 2005). Despite the importance of customer-perceived value, there has been relatively little empirical research to develop an in-depth understanding of the concept (Sweeney & Soutar, 2001). The aim of this paper is to present a theoretically grounded structural equation model (SEM) (Bollen, 1989), implemented by using LISREL (Jöreskog & Sörbom, 1993) which can be used to identify locational and physical attributes that affect customer-perceived value in a residential development project. If we can validate direct and indirect relationships in the SEM-model by using empirical data, we have made the first step in developing a reusable model. The SEM model is based on the productivity theory (Ratcliff, 1961; Lancaster, 1966) and the customer value hierarchy model (Woodruff, 1997).

Before advancing to a confirmatory factor analysis by using the conceptual SEM-model, an exploratory factor analysis is used to reduce 31 items derived from a qualitative study to a number of factors. Since the productivity theory predicts that locational and physical attributes have an effect on the attractiveness of a residential development, the theoretical SEM-model is used to search for items that maximize the nomological value of the model. Items used in the SEM-model are entered into a second factorial analysis (principal component analysis, varimax rotation) to verify that they only load on the constructs of locational and physical attributes, respectively. By using this approach, items that have the highest effect on customer-perceived value can be identified.

## 2. Background

The object in this study is an ongoing multi-family housing project that has three main buildings, which comprise 402 rental apartments located in the western part of Kungsholmen, within the vicinity of the City of Stockholm, see Figures 1 and 2.

**Figure 1 Overview of the Project Site in Hornsberg Strand, Stockholm.**

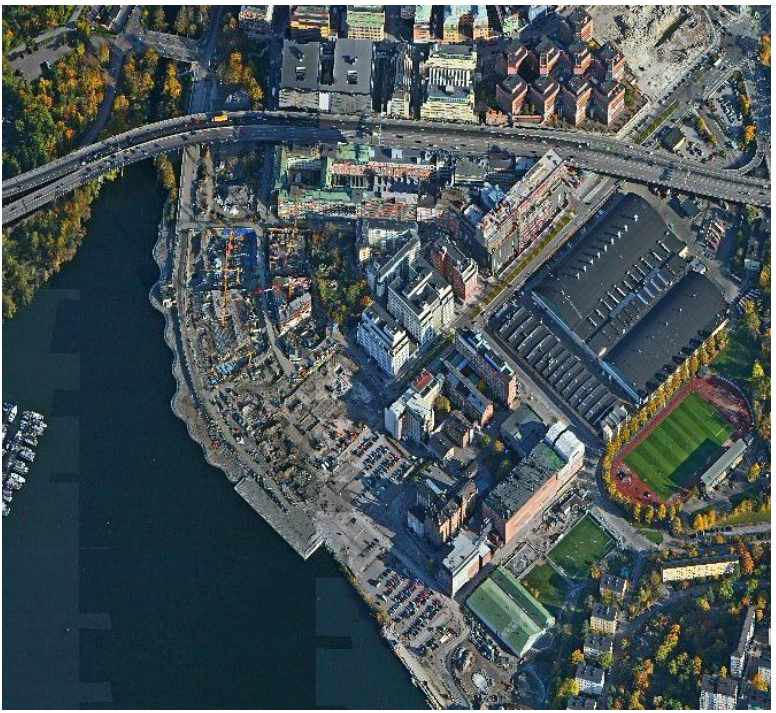
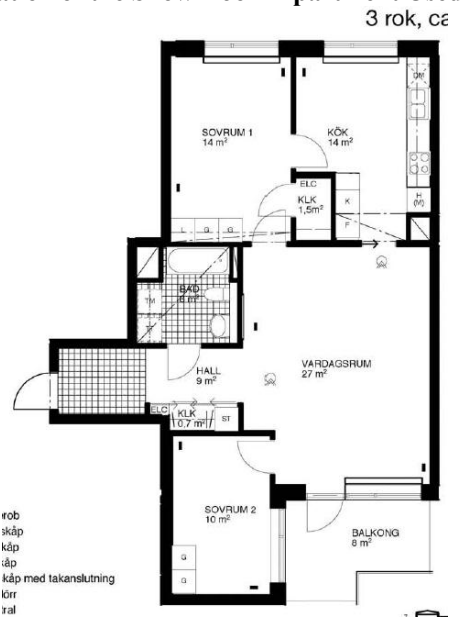


**Figure 2 Illustration of the Completed Project by Familjebostäder.**

The project, Hornsberg Strand, is part of a new neighborhood close to the waterfront of Lake Ulvsundasjön as well as to the highway, Essingeleden, which conducts most of the traffic that passes from the northern to the southern parts of Stockholm. Retail stores, small cafés and restaurants are established in the neighborhood which had previously been dominated by industrial and office buildings. When Hornsberg Strand is completed in 2014, nearly 20,000 new residents will be living in the neighborhood. All of the rental apartments have high-quality kitchens and bathrooms, and a balcony that faces the court-yard or towards the local street, see Figure 3.

**Figure 3 Illustration of the Show Room Apartment Used in this Study.**




However, it is well recognized that real estate is different from other commodities in several aspects since each parcel of land is unique in its location and composition, the land is physically immobile and durable, cost of ownership is high and the search process in itself is complex. The decision-making process for consumers who are looking for land to buy or an apartment to rent differs from that used for other commodities, such as a can of Coca Cola or a car. Consumers who are looking for a newly built apartment have ex-ante limited information on how the development will look when completed and have to sign a contract before moving in. However, a detailed understanding of the search process for residential construction customers is still missing and residential customers tend to develop a mixture of objective and subjective beliefs about the completed development due to complexity of the product (Forsythe, 2007).

It is likely that the residential customer develops an overall value judgment as to whether or not a property could be considered, with regards to the physical and social dimensions related to the location of a property, and reflects upon whether the price or rent in relation to the standard of the home and amenities in the neighborhood provide them with good value for money (VFM). For example, if the property is located in an area where crime is known to be high, this would, in most cases, lower their interest in becoming buyers or tenants if the price for occupancy did not compensate them for the inconvenience. A potential buyer or tenant may base his/her decision on what s/he discovers from a showroom at the site, previous experiences, drawings, animations or pictures to imagine how it is going to be like to live in the new development when completed. During the completion of the development, his/her expectations will develop based on what s/he observes and informed about. Factors that may contribute to the development of his/her expectations are, for example, the image of the neighborhood (Clow et al, 1997), location of the development, public amenities such as parks and town squares, public transportation and services such as restaurants and retail service, existence of waterfronts and access to leisure activities, and quality of schools.

Some important insights are raised by Woodruff (1997) which may improve our understanding of ways to deliver customer value to potential residents: first, what exactly do customers value; second, of all the things that customers value, which ones should be given focus to gain advantages; third, how well do customers think we deliver value, and lastly, how will customers value change in the future? The customer value hierarchy model, in Figure 4, accounts for the psychological effects on value statements through desired consequences in use situations and shows how these factors are related to the goals and values of customers. According to Woodruff (1997), consequences in use situations are far more important to consumers than product attributes and should therefore be in the focus to achieve customer value.

In real estate theories, the productivity theory provides a framework for the analysis of factors that are important for real estate value. Productivity analysis includes psychological satisfaction which is generated by amenity factors, such as a scenic view or other natural features (Fanning, 2005). Both qualitative and quantitative studies were undertaken to investigate the factors that affect customer-perceived value. The study began with qualitative laddering interviews which is an interview technique used to capture beliefs about benefits and disadvantages which potential tenants believe exist in the Hornsberg Strand residential construction project. Beliefs of potential tenants about the development were used to identify product attributes, functional and psychological consequences, and personal values, according to the customer value hierarchy model. The results from the laddering study were successively used in the design of a quantitative survey to investigate structural relationships between latent constructs that represent physical and locational features, which according to the productivity theory, have an effect on people's decision making.

By using a structural equation modeling approach, I identified key features and the relative importance of physical and locational attributes that potential tenants believe are important for providing perceived value. However, market studies of residential developments are not without obstacles as a housing project is a truly multidimensional product and the difficulties in acquiring useable information from consumers as input to developers in the conceptual design phase are well known. Bookout (1994) provides an example of the difficulties that developers face: "(o)ne of the most interesting and consistent findings is the inability of tenants and residents to isolate the design feature they value highly". Residents and tenants almost universally perceive a residential project as a whole, not as a series of parts that could be individually measured and rated. A similar idea has been presented by Psilander (2004), who refers to the inability of consumers to separate the characteristics of a housing project into its different parts, instead interpreting the project as a complete whole. An important question for real estate market analysis is thus to increase our capability in identifying design features that are separated from the whole which create value to different customer segments and help managers improve their understanding of their customers.

## 3. Literature Review and Hypotheses

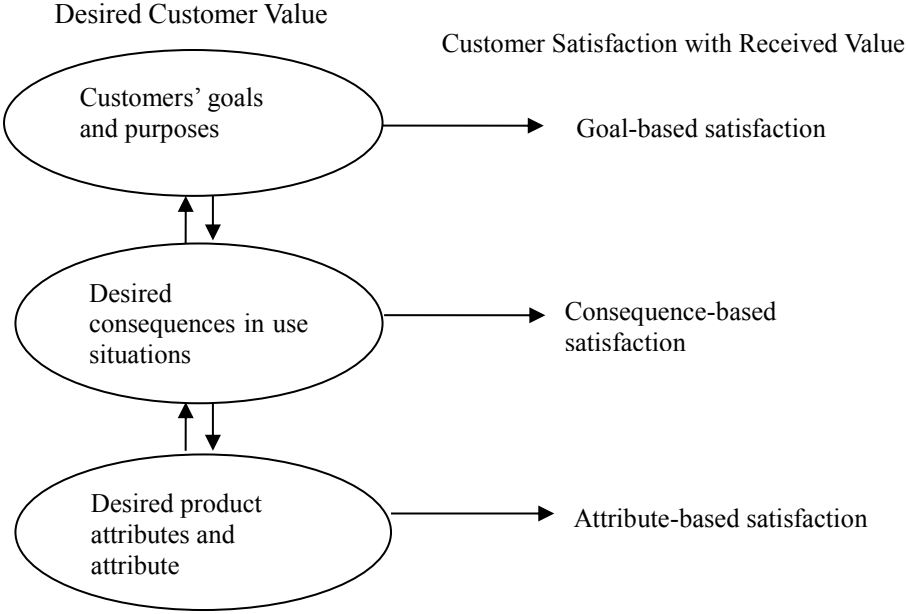
Real estate is certainly a high involvement product which we need to consider while specifying a theoretical SEM. In specifying the SEM model, a theory that connects real estate with its users – the productivity theory – was used. This theory rests on the belief that the productivity of a property depends on how different attributes are combined and how potential customers react to those attributes (Ratcliff, 1961; Lancaster, 1966). Analysis of productivity involves an examination of how the market perceives physical, legal and locational dimensions of a property. Physical attributes are categorized as man-made or natural, which are located either off- or on-site. The legal dimension exercises control by zoning, for example, over negative external effects, such as traffic noise, as well as for the location of building structures, roads and green areas such as parks. Locational attributes are static or dynamic features. Static features include linkage and land use associations where linkage refers to the movement of people and includes roads and utilities, and land use associations define how land use supports a development. Dynamic locational features refer to changes of the growth direction of a city (Ratcliff, 1961; Fanning, 2005).

The value construct has been widely researched in different disciplines, such as economics, accounting, finance, strategy, production management and marketing (Wilson & Swanti, 1997). However, customer-perceived value is a concept found within the discipline of market research (Zeithaml, 1988; Monroe, 1991; Patterson & Spreng, 1997; Woodruff, 1997; McDougall & Levesque, 2000; Ulaga & Chacour, 2001; Lin, Sher & Shih, 2005). Since

value is a construct with multiple aspects, there is no universal single agreement on the definition of value, thus the definition of value varies depending on the specific research discipline (Sweeney, 1994). To make the concept of value even more complex, respondents tend to vary as well in their own personal interpretation of perceived value, as discussed by Zeithaml (1988), who found four different categories of perceived value: "value is low price", "value is whatever I want in a product", "value is the quality I get for the price I pay" and "value is what I get for what I give".

The definition provided by Zeithaml implies that consumers make a trade-off between the perceived benefits of having a product or receiving a service vis-à-vis the perceived costs for acquiring the same. VFM is the relationship between the costs and quality of a product and the perception of perceived value which directly influences willingness to buy (Doods, Monroe, and Grewal, 1998). The perceived value construct is operationalized as a VFM statement in this study, which is common when investigating perceived value (Grewal, Monroe, and Krishnan, 1998; Sweeney, Soutar, & Johnson, 1999). The definition of customer value used in this study is adopted from Woodruff (1997): "(c)ustomer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitates (or blocks) achieving the customer's goals and purposes in use situations". This definition follows the means-end chain (MEC) model (Gutman, 1982; Woodruff & Gardial, 1996) and is anchored in a conceptual framework (see Figure 4).

**Figure 4 The Customer Value Hierarchy Model by Woodruff (1997).**



The MEC theory and the laddering technique are used to elicit MECs from consumers and provide an explanation for the rationale behind the decision making process of consumers. The MEC approach defines hierarchical relationships between lower level attributes and the consequences that consumers believe exists from having such relationships. The theory is based on the belief that consumers make a purchase decision that will lead to an important personal outcome (Gutman, 1982; Olson and Reynolds, 1983). Consumers are not merely interested in product attributes; instead, they are interested in the experiences that they can gain from having the product. These experiences are defined as consequences, the importance of which is directed by personal or social values that the person holds. In everyday life, values act as a compass that directs a person to different choices without him or her being aware of such, since the choice criteria that represent values are silent. Desired consequences are thus influenced by values held by the consumer to be instrumental; for example, a certain desired behavior such as having the opportunity to exercise in a park located in the neighborhood, which is triggered by a terminal value, that is, a desired end state such as well-being or a long, healthy life. For an extensive presentation of the MEC approach and the laddering technique in the real estate context, see Lundgren (2010) and Coolean & Hoekstra (2001).

A concept related to customer-perceived value is CS, which focuses on obtaining competitive advantages in the market place (Cronin & Taylor, 1992). The dominating paradigm within CS research is the disconfirmation model which measures the difference between the performance of a product or service vis-à-vis consumer expectations. The disconfirmation paradigm is used in different sectors, such as the service industry (Parasuraman, Zeithaml and Barry, 1988; Cronin & Taylor, 1994) or to evaluate product performance (Oliver, 1977, 1980, 1997). CS is also measured within industry sectors by using a CS barometer (Fornell, 1992; Fornell et al., 1997).

CS in residential construction has been studied, for example, by Forsythe (2007, 2008). Patterson & Spreng (1997) have shown that customer-perceived value has a strong causal impact on CS. However, CS measures the evaluation by consumers of a product or service ex-post when customers have acquired experience by using the product or the service provided, which make the CS construct less suitable for ex-ante studies. In reviewing the existing literature, no studies were found that empirically investigate perceived value by using the customer value hierarchy in a residential construction project.

An established theory can a priori define latent variables that have causal relationships and a hypothesis can be tested by specifying causal relationships in an SEM by using empirical data (Bollen, 1989; Hayduk, 1987; Jöreskog and Sörbom, 1993). An SEM in LISREL is represented by indicators, relationships and latent variables. Indicators are often numerical expressions that capture a measurement of an attitude or a number which represents, for example, a profit margin, or a sales figure. Indicators are part of a latent

variable or constructs which represent the latent, common properties of indicators. A latent variable is thus an abstract entity that, defined by its indicators, represents a specific phenomenon in the real world.

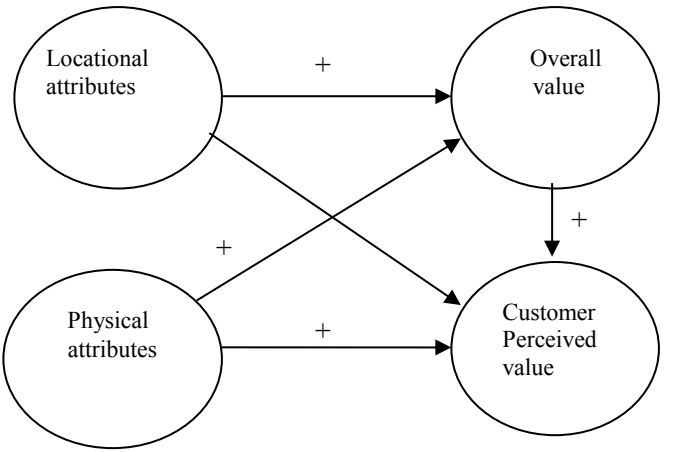
In our study of customer-perceived value, perceived value is an example of a construct, which represents a VFM statement from the perspective of a customer. Lastly, relationships between different constructs represent a causal consequence between two latent variables. LISREL derives causal structures by analyzing both regular correlation and error covariances. By using LISREL, it is possible to analyze both direct and indirect causal relations simultaneously (Jöreskog & Sörbom, 1993). The first option in specifying customer-perceived value in an SEM context is to define the construct as a unidimensional and global measure of overall customer value perception (Baker et al., 2002; Sweeney et al., 1999, Grewal et al., 1998; Cronin et al., 1997; Patterson & Spreng, 1997, Varki & Colgate, 2001), or a formative and reflective second-order construct (Lin, Sher & Shih, 2005). The latter authors criticize the former approach for not taking into account the complex nature of the perceived value construct. However, the authors approve the use of a unidimensional first order construct when the objective is to access overall value perceptions at the component level of a product. A description of how to use SEM and LISREL in strategic theory testing is found in Kotha, Vadlamani & Nair (1997).

### 3.1 Formulation of Hypotheses

The starting point for the formulation of the hypotheses is the argument that the perceived value of the location of a property and physical features of a home can be represented by attributes, consequences and goals perceived by potential residential tenants, and held by residential customers according to the customer hierarchical value model (Woodruff, 1997). As previously discussed in relation to the customer hierarchical value model, it is likely that customers first of all formulate an overall judgment that is concerned with whether a location is acceptable or not; if not, the search process will continue until a match between their needs, expectations and budget constraints are met. If the location is accepted, the apartment has to be acceptable as well; if not, the search process for a substitute apartment within the neighborhood is likely to start again. I hypothesize that, by using the SEM model in Figure 5, the overall value construct serves as a mediating construct on the construct of locational attributes, as well as on the construct of physical attributes for perceived value. I also hypothesize that a positive evaluation of the constructs of locational and physical attributes will cause a positive direct effect on both overall and customer perceived values.

**Figure 5 The Hypothesized Effects of the Constructs of Locational- and Physical Attributes on Overall and Customer-perceived Values.**

Hypotheses
The proposed residential customer-perceived value model (RCPV-model)




**H1:** The greater that residential customers value the location of a property, the greater the overall value.
**H2:** The greater that residential customers value the location of a property, the greater the customer-perceived value.
**H3:** The greater that residential customers value the physical features of a property, the greater the overall value.
**H4:** The greater that residential customers value the physical features of a property, the greater the customer-perceived value.
**H5:** The greater the overall value, the greater the customer-perceived value.
**H6:** Locational features have a positive indirect effect on perceived value through the overall value.
**H7:** Physical features of an apartment have a positive indirect effect on perceived value through the overall value.

## 4. Method

*Laddering Study and Analysis*

The data collection for the laddering study was made during a period of three weeks from late September to mid-October 2010. The group of potential tenants who were asked to participate consisted of 32 respondents aged 28–62 who had been randomly selected by the residential agency, Stockholm Stads

Bostadsförmedling. This agency is a non-profit organization owned by the Stockholm municipality and acts as a broker of residential apartments in Stockholm. The respondents were selected before and soon after their actual decision to sign a contract. Twenty respondents accepted the request to participate in the study and were asked to perform a walk-through evaluation (Ambrose & Dyregaard, 1993) of the residential site and its surroundings (approximately 400 meters from the buildings), as well as visit the two-bedroom apartment used as a show apartment (see Figure 3). In the walk-through evaluation, the respondents were asked to write down three positive and three negative observations and indicate their importance.

These observations were later used as the starting point in the laddering interviews, which were held during a telephone interview conducted by the author shortly after the walk-through evaluation of the development. A total of 20 walk-through surveys were handed out and 16 were subsequently returned in a prepaid envelope, which meant a response rate of 50 percent. The answers from the respondents were then classified into a certain type according to the MEC theory and the customer hierarchical value model (attributes, functional or psychological consequences, instrumental or terminal values). The laddering analysis resulted in 102 ladders, which rendered six hierarchical value maps that cover the MECs of potential tenants. Hierarchical value maps were made by using MECanalyst software, version 1.0.14. For an explanation of hierarchical value maps, see Lundgren (2010).

*The Questionnaire*

The most frequent beliefs found in the hierarchical value maps and from analysis of respondent answers in the laddering interviews were used in the creation of 34 cognitive attitude statements. These statements were pre-tested by using 6 staff members (4 males and 2 females) from the School of Architecture and the Built Environment, The Royal Institute of Technology, Stockholm. Thirty-one attitude statements were included in the final questionnaire; 3 statements were discarded due to high correlation with other statements. The questionnaire consisted of street maps and photos for each of the locations in Hornsberg Strand, 31 statements and a final section with questions to capture perceived-value statements, as well as questions to obtain contact information, and socio-economic and socio-demographic information (see Appendix). Respondents were informed of the monthly rent of the two-bedroom apartment, which was representative of the standard for other apartments in the development, as well as additional costs, such as electricity and insurance. The perceived value construct is operationalized as a VFM statement instead of asking if the show apartment was affordable, since potential tenants might believe that the apartment is affordable but does not provide good VFM. The strength of the respondent beliefs was measured by using both positively and negatively formulated statements on a seven-point scale Likert scale (1 = absolutely disagree to 7 = absolutely agree).

*Data Collection*

The recruitment of respondents for the quantitative survey was made at two open showings of the show apartment arranged by the developer, Familjebostäder. Only potential tenants who had been pre-registered, which indicated their interest in an apartment in the 402-apartment project, were invited. Approximately 500 people visited each open showing per day. In total, 523 individuals accepted the request to participate in our study as they left the apartment and a survey was sent by mail to these respondents. In total, 297 surveys were received by mail, and after a review, 15 surveys were excluded as incomplete, resulting in 283 valid questionnaires and a response rate of 54%. There were 254 females (91%) and 24 males (9%) who answered the questionnaire. The mean age of the respondents was 45 and the standard deviation was 14.8 years.

*The Structural Equation Model*

The RCPV-model that is presented in Figure 5 defines two independent unidimensional latent first-order constructs, such as the constructs of locational and physical features adopted from the productivity theory. Two second-order dependent latent constructs are defined as the constructs of overall value and perceived value. Standardized solutions are presented in the model. Listwise deletion was used to treat missing values and estimates were made by using the robust maximum likelihood method, LISREL version 8.7.

*Constructs and Items*

The Kaiser-Mayer-Olkin test that was used to determine the suitability of the correlation matrix for the factor analysis showed that the data set is factorable, with a value of 0.85, which is greater than the minimum level of 0.60 (Worthington & Whittaker, 2006). The internal-consistency reliability of the sub-scales from the current sample was investigated by using Cronbach's alpha which varies between 0.73 and 0.90. The cumulative variation of the locational dimensions (maximum likelihood, varimax rotation) by five sub-factors was 55.3 percent. The cumulative variation of the physical feature dimension by two sub-factors is 56.9 percent. Seven factors were derived from the exploratory factor analysis, in which five factors are related to locational attributes and two factors are related to physical attributes, see Appendix, Table A1.

In order to identify the items among the set of seven factors that maximize the nomological value of the conceptual SEM-model, each item was subsequently entered into the SEM model. If it failed to increase the nomological value of the model, the item was discharged and replaced with another item until the nomological value reached a maximum, see Appendix, Table A2. Seven items were finally selected and entered into an additional explorative factor analysis

(maximum likelihood, varimax rotation) to confirm that the items only load on the constructs of locational and physical attributes. The explorative factor analysis confirmed that this was the case. This result was also confirmed by an analysis of discriminant validity which was performed by using LISREL. The correlation matrix for independent variables is presented in the Appendix, see Table A3.

The locational construct consists of four items and the physical feature construct of the three items derived from the exploratory factor analysis. The constructs of overall value and perceived value are items that are specially designed for this study alone and consist of three items that measure the overall attitude towards the neighborhood: the first item captures the overall impression of the neighborhood, the second captures information from word-of-mouth – whether the respondent would recommend Hornsberg Strand to their friends – and the third on whether the respondent believes that s/he will thrive in Hornsberg Strand. The first item in the perceived value construct captures the VFM statement by asking whether the respondent believes that the location provides VFM, the second item captures whether the respondent believes that the apartment provides VFM and the third item captures the overall standpoint: whether the home provides good VFM. All items are measured on a seven-point Likert scale (1 = absolutely disagree to 7 = absolutely agree).

*Convergent Validity*

Assessment of the homogeneity of the indicators and their constructs is made to validate whether the constructs only relate to the chosen indicators. Convergent validity is assessed by investigating coefficients which measure the strengths of the relationship between two variables: t-values which measure statistical significance and R2 values that estimate the linearity strength of a relationship (Jöreskog and Sörbom, 1993).

*Discriminant Validity*

Assessment of the separateness of constructs is made to determine discriminant validity between constructs. Discriminant validity is assessed by measuring the correlation between two constructs by using a confidence interval and the standard error of the constructs, and should have a value below 1.0 (Jöreskog & Sörbom, 1993). An alternative control can be made by using the modification index which suggests changes to the model in LISREL.

*Nomological Validity*

Nomological validity is an assessment which is made to ensure that the model as a whole is a valid measure. The validity of an SEM is determined by measuring the nomological validity (Bollen, 1989; Jöreskog and Sörbom,

1993). Nomological validity is assessed by measuring the distance between the model and the data that represent constructs by using chi-square, degrees of freedom ($\chi 2$,, df) and a probability estimate (p value). A valid measure of nomological validity for a structural model is when the relation between ($\chi 2$,, df) is close to one and the p value is higher than 0.05. Analysis of the structural equations by using LISREL was made by first determining the convergent validity of the indicators and then the discriminant validity of the constructs. In the second step, causal relationships between the constructs were analyzed to determine nomological validity.

## 5. Results

Dependent constructs

*Customer-perceived value*
These indicators are valid representations of the customer-perceived value: t-values are above 7.98, factor loadings are above 0.84 and R2 is above 0.68.

*Overall value*
These indicators are valid representations of the overall value: t-values are above 8.45, factor loadings are above 0.83 and R2 is above 0.68.

Independent constructs

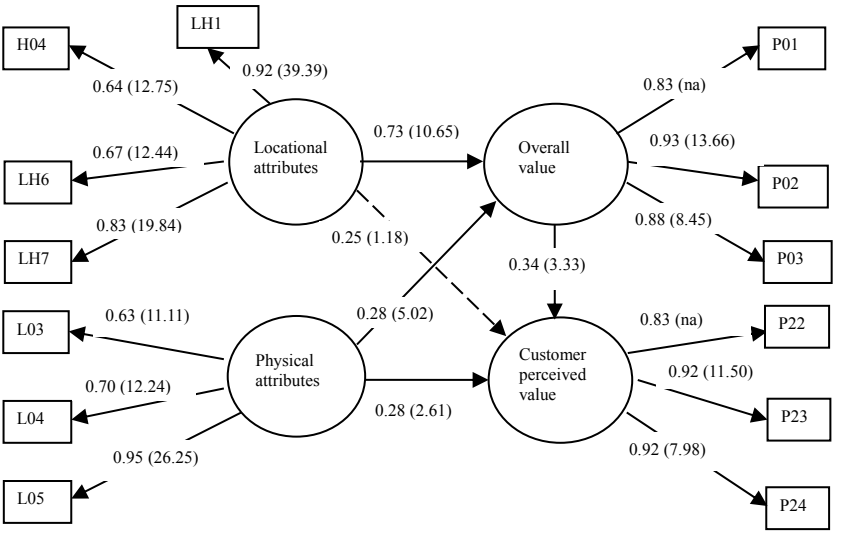
*Location*
The indicators are valid representations of perceived performance: t-values are above 12.44, factor loadings are above 0.64 and R2 is above 0.41.

*Physical attributes*
The indicators are valid representations of perceived performance: t-values are above 11.11, factor loadings are above 0.63 and R2 is above 0.40.

Nomological validity

The SEM model shows a good fit to the data: GFI= 0.92, P-value= 0.28, RMSEA= 0.022, CFI=1.0, SRMR=0.05. Since the model fits the data, the direct and indirect causal assumptions hold between the model and the empirical data.

**Figure 6 The Effects of the Constructs of Locational- and Physical Attributes on Customer-perceived Value.[1]**




Evaluation of hypotheses

The results that show the effects of locational and physical attributes on customer-perceived value are displayed in Figure 6 as well as in the Appendix, Table A2. The SEM provides good statistical estimates so it is meaningful to analyze the relationships in the model.

H1: The greater that residential customers value the location of a property, the greater the overall value. This hypothesis is confirmed by the empirical data (coefficient=0.73 t-value=10.65).

H2: The greater that residential customers value the location of a property, the greater the customer-perceived value. This hypothesis cannot be confirmed by the empirical data (coefficient=0.25, t-value=1.18).

H3: The greater that residential customers value the physical features of a property, the greater the overall value. This hypothesis is confirmed by the empirical data (coefficient=0.28, t-value=5.02).

[1] Note: Figures are coefficients, with t-values in brackets. Dotted lines represent insignificant relationships. Complete questions for each indicator are presented in the Appendix, Table A1.

H4: The greater that residential customers value the physical features of a property, the greater the customer-perceived value. This hypothesis is confirmed by the empirical data (coefficient=0.28, t-value=2.61).

H5: The greater the overall value, the greater the customer-perceived value. This hypothesis is confirmed by the empirical data (coefficient=0.34, t-value=3.33).

H6: Locational features have a positive indirect effect on perceived value through the overall value. This hypothesis is confirmed (see Table 1).

H7: Physical features of an apartment have a positive indirect effect on perceived value through the overall value. This hypothesis is confirmed (see Table 1).

**Table 1 Direct, Indirect and Total Effects of Locational and Physical Attributes on Perceived Value.**

| Independent constructs | Dependent constructs | Direct effect | Indirect effect | Total effect |
|---|---|---|---|---|
| Locational attributes | Perceived value | N/A | 0.25 (2.29) | 0.25 (2.29) |
| Physical attributes | Perceived value | 0.28 (2.61) | 0.09 (2.04) | 0.37 (4.47) |

***Note:*** Figures are coefficients, with t-values in brackets.

## 6. Discussion

Since my data fits the theoretical model, I have not rejected the proposed model as a viable representation of the true relationships that underlie my data. The RCPV- model reveals both indirect and direct relationships between the constructs of physical attributes and overall value on the perceived value. It would not have been possible to determine this effect by using, for example, a hedonic regression framework, due to the character of the items used in this study which mostly reflect cognitive and affective factors. In evaluating the hypothesis, the direct causal relationship between the locational construct and VFM does not hold, thus providing support for the theoretical assumption that an overall judgment is made to decide whether a specific location is suitable or not, and then, as a result, the decision process continues, and conclusions on perceived value and VFM are reached, given the attributes and amenities of the property. In Table 1, the total effect on the perceived value of the apartment is considerably higher than the total effect from the locational construct.

The result shows that when respondents choose location, the factor that matters is the apartment when assessing VFM. Does this mean that the proposed model has the potential to improve the way that productivity and customer value in real estate have been previously identified? Yes, I believe that is the case, since from the standpoint of structural equation modeling by using a theoretical model, I have achieved reliable statistical estimates on customer-perceived value. But what are we measuring? This question might seem superfluous, but the project that I used in this study was under construction, which means that neither the landscaping nor all of the buildings were in place. The respondents visited a construction site with a show apartment in place. Despite this, the items that validate the SEM include comments such as "the nature around Hornsberg Strand makes me feel relaxed" or "this is a safe town environment" and "Hornsberg Strand has a soothing environment"! These are indeed brave beliefs. So, what are we measuring, if not their expectations of having nature around them, opportunities to relax and living in a soothing residential environment? The respondents looked beyond the construction site and were able to infer a positive image of the complete development in their minds.

How do these findings relate to those made by Bookout (1994) and Psilander (2004)? My findings indicate that by using the laddering technique, key features in a residential development that consumers highly value can be identified, and furthermore, by using an SEM, their existence can be statistically validated. Therefore, by using the SEM, the first two questions posed by Woodruff on how to improve our understanding on ways to deliver customer value to potential residents can be answered.

However, developers in general strive to identify attributes at the lowest level in the customer value hierarchy model because it is actionable and rational from a short-term perspective, but what happens in the long run when consumer preferences change? Do old truths stay the same or change? According to Woodruff (1997), consequences in use situations are far more important to consumers than product attributes. If the items that have been found are studied, it is discovered that they are all at the consequence level: psychological and functional consequences according to the MEC theory; consequences that are probably easy to connect to values and goals held by the respondents. Consequences in a use situation seem to matter to potential tenants which are in accordance with the findings of Woodruff (1997).

Does this question matter to commercial residential developers? No, not really. Most construction companies ask for checklists of customer-perceived values close to the attribute level, which could easily be applied and adapted to a specific project. Short-sighted maybe, but understandable if senior management is focusing on the bottom line figures: Did it sell? How much profit did we make considering the costs? From society's point of view, consumers will suffer a welfare loss if developers do not try their best to maximize consumer value. This technique does look promising as a means of

taking our current knowledge a step further, as well as providing a competitive edge for developers who are interested in advancing their understanding of customer value. Developments that are attractive to consumers can be more profitable, given that consumers are prepared to pay a premium for the fulfillment of customer-perceived values and given that marginal costs for doing so equal marginal revenue.

The questionnaire consisted of 31 plausible items used to test the model and 6 items were found to explain the theoretical model. The remaining 25 items did not contribute towards a valid model with respect to nomological, convergent and discriminant validities. All of the items were the result of laddering interviews and thus found to be important to the respondents, so why did not more items validate the RCPV-model? The reason is found in the SEM technique, since LISREL measures correlation and error covariance structures simultaneously between all constructs in the model. If more items are entered into the equations, increasing error covariance patterns between these items will reduce the validity of the model. Since the proposed model is theoretically sound, items that verify the model should therefore represent customer-perceived value with respect to the respondent's beliefs. If no items were found that validated the theoretical model, the whole model will of course have failed.

The high numbers of females (91%) who answered the questionnaire came as a surprise. The reason that so many females decided to answer the survey on behalf of their spouse might be that the female is the decision maker, who is taking the final decision to accept or reject the choice of a new apartment.

## 7. Future Research

The customer value hierarchy model demonstrated by Woodruff and the productivity analysis provide the basis for the theoretical model developed in this paper and the SEM has been validated by empirical data. However, more research is needed to advance our understanding of customer values in residential development or other categories of real estate, such as office and retail facilities, to increase our understanding of the features the create customer perceived value. A collaborative project is planned to study how developers and architects can use the laddering technique and the RCPV-model in the early conceptual design of a planned residential construction project. The purpose of the project is to validate the technique, and more specifically, study how factor loadings vary on constructs of location and physical attributes, depending on the different design solutions in similar locations in a reference project.

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# Appendix

**Table A1 Explorative Factor Analysis**

| | Multivariate analysis: factor loadings (maximum likelihood rotation) internal consistency and total variance explained. | Factor loading<br>Locational attributes | Cronbach's alpha<br>Locational attributes | Variance explained %<br>Locational attributes |
|---|---|---|---|---|
| | **1. Communication** | | | |
| | H1. It is obvious how easy it is to get from Hornsbergs Strand to the inner city | 0.76 | 0.83 | 14.7 |
| (R) | H5. The lack of possible public transport to Hornsberg Strand is worrisome | 0.75 | | |
| (R) | H7. My friends will find it difficult to get to Hornsbergs Strand | 0.72 | | |
| | H8. There is better quality of life to be able to bike from Hornsbergs Strand to the city | 0.4 | | |
| (R) | H9. In Hornsbergs Strand, there are no activities that interest me | 0.36 | | |
| (R) | H10. The distance to the subway is too far, so I will not save time | 0.77 | | |
| | **2. Noise** | | 0.9 | 12.4 |
| (R) | H3. The noise in the area worries me | 0.88 | | |
| (R) | H6. In Hornsbergs Strand, I am disturbed by the traffic | 0.79 | | |
| (R) | LH9. The noise in Hornsbergs Strand is really annoying | 0.84 | | |

***(Continued…)***

***(Table A1 continued)***

| | | Factor loading Locational attributes | Cronbach's alpha Locational attributes | Variance explained % Locational attributes |
|---|---|---|---|---|
| | **3. Urban environment** | | 0.81 | 10.5 |
| | LH1. In this home environment, I can relax | 0.64 | | |
| | LH2. The architecture of Hornsbergs Strand is representative of a modern town | 0.44 | | |
| | LH6. This is a safe urban environment | 0.66 | | |
| | LH7. The residential environment in Hornsbergs Strand is soothing | 0.69 | | |
| | **4. Relaxation** | | 0.74 | 10.3 |
| | H2. The proximity to Ulvsundasjön makes it easy to access nature | 0.69 | | |
| | H4. The nature around Hornsbergs Strand makes me feel relaxed | 0.68 | | |
| | LH4. The feeling of being close to nature is evident in Hornsbergs Strand | 0.74 | | |
| | LH8. The proximity to Ulvsundasjön is Hornsbergs Strand's biggest asset | 0.33 | | |
| | **5. Architecture** | | 0.73 | 7.4 |
| (R) | LH3. This neighborhood seems bland | 0.67 | | |
| | LH5. House architecture is boring | 0.54 | | |
| (R) | LH10. Hornsbergs Strand is really dead | 0.49 | | |

***(Continued…)***

***(Table A1 continued)***

| | | Factor loading Physical attributes | Cronbach's Alpha Physical attributes | Variance explained % Physical attributes |
|---|---|---|---|---|
| | **6. Standard of the apartment** | | 0.85 | 29.1 |
| | L2. The choice of materials in the apartment is appealing | 0.68 | | |
| | L6. This kitchen is of a high standard | 0.82 | | |
| | L8. This apartment feels luxurious | 0.67 | | |
| | L9. This kitchen is functional in all respects | 0.58 | | |
| | L10. This bathroom is really well equipped | 0.62 | | |
| | **7. Social relations** | | 0.83 | 27.8 |
| | L1. The way that this apartment is designed means that I can easily socialize with my friends | 0.74 | | |
| | L3. The level of natural daylight in this apartment creates a feeling of well-being | 0.46 | | |
| | L4. All the space in this apartment is well-proportioned | 0.81 | | |
| | L5. In this apartment, I can relax | 0.64 | | |
| (R) | L7. This apartment is difficult to furnish | 0.65 | | |
| (R) | L10. There is insufficient storage facilities in this apartment | 0.49 | | |

***Note:*** R= negative statements, H1-H10, LH1-LH10, L1-Ll0 is the actual numbering of items in the survey

**Table A2 Construct Analysis Structural Equations**

| | Abbreviation | Factor loading | t-value | $R^2$ value |
|---|---|---|---|---|
| **Locational attributes** | | | | |
| In this home environment, I can relax | LH1 | 0.92 | 39.39 | 0.84 |
| The nature around Hornsbergs Strand makes me feel relaxed | H04 | 0.64 | 12.75 | 0.43 |
| This is a safe city environment | LH6 | 0.67 | 12.44 | 0.48 |
| The residential environment in Hornsberg Strand is soothing | LH7 | 0.83 | 19.84 | 0.72 |
| **Physical attributes** | | | | |
| Daylight in this apartment creates real satisfaction | L03 | 0.63 | 11.11 | 0.40 |
| All of the space in this apartment is well-proportioned | L04 | 0.70 | 12.24 | 0.49 |
| In this apartment, I can relax | L05 | 0.95 | 26.25 | 0.91 |
| **Overall value** | | | | |
| Hornberg Strand gives a very good overall impression | P01 | 0.83 | na | 0.69 |
| I can recommend Hornberg Strand to my friends | P02 | 0.93 | 13.66 | 0.87 |
| I will enjoy Hornberg Strand | P03 | 0.88 | 8.45 | 0.77 |
| **Perceived customer value** | | | | |
| Given Hornberg Strand's location, this location provides value for money | P22 | 0.83 | na | 0.68 |
| Given the apartment's standards, this apartment provides value for money | P23 | 0.92 | 11.50 | 0.85 |
| This home provides good value for money | P24 | 0.92 | 7.98 | 0.84 |

***Note:*** The wording of indicators is the same as in the questionnaire.

**Table A3 Construct Validity**

Correlation matrix of independent variables

| | Location | Physical attributes | Overall value | Perceived |
|---|---|---|---|---|
| | --- | --- | --- | --- |
| Location | 1.00 | | | |
| Physical attributes | 0.52<br>(0.09)<br>5.63 | 1.00 | | |
| Overall value | 0.88<br>(0.03)<br>26.34 | 0.66<br>(0.06)<br>10.74 | 1.0 | |
| Perceived value | 0.45<br>(0.08)<br>5.88 | 0.51<br>(0.07)<br>7.62 | 0.52<br>(0.06)<br>8.68 | 1.0 |

Covariance Matrix of Latent Variables

| | Overall value<br>Perceived value | | Location | Physical attribute |
|---|---|---|---|---|
| | --- | | --- | |
| Overall value | 1.00 | | | |
| Perceived value | 0.53 | 1.00 | | |
| Location | 0.88 | 0.45 | 1.00 | |
| Physical attributes | 0.66 | 0.51 | 0.52 | 1.00 |