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Editorial

The Nordic Journal of Surveying and Real Estate Research Issue 16:1 comprises two very interesting papers from the Nordics. The studies come from the fields of Real Estate Economics and Land Management, as is fitting for our journal's tradition.

The first paper by Fredrik Kopsch, Ólafur Sindri Helgason, Alexandra Hansson, and Felicia Johansson examines the impact of list prices on transaction outcomes in the unique Icelandic context. The paper finds that, the choice of list price does affect transaction outcomes. A low list price adversely affects transaction price, but speeds up the transaction process, confirming the suspected trade-off.

The second paper is a Finnish case study on the recent developments in the municipal operating environment, including digitalisation of building permitting. The paper concludes that conclusion, fostering a new way of thinking and redesigning the public sector's operating model are essential in order to enable the adaptation of regulatory renewal, digitalisation and the sustainable use of resources.

This year, we are particularly glad that both papers have a strong link to practice. The findings should be valuable to real estate researchers and practitioners alike.

NJSR wishes to thank all authors and reviewers for their valuable input in 2021!

Riikka Kyrö
Editor-in-Chief

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The Role of List Price in Transaction Outcomes

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Abstract. *The purpose of the study is to analyze the effect of list price strategies on two transaction outcomes, transaction price and time on market. The study quantitatively tests two hypotheses concerning transaction price and time on market. This is performed using both a hedonic modelling framework, as well as duration modelling. The models are applied to a set of property transactions for the capital region in Iceland, a total of 35,000 transactions between 2014 and 2020. This study concludes that the choice of list price does affect transaction outcomes. In particular, a low list price in relation to market value adversely affects transaction price, and speeds up the transaction process. Thus, the findings confirm an existing trade-off between achieving a higher price, or selling a property quicker. The findings of this study may come to practical use in the sales process of real estate, as it may inform real estate agents as to the expected outcomes of different list price strategies. The results of this study are in line with previous findings under different sales processes, thus suggesting that list price strategies work similarly independent of sales processes. As such, this study increases understanding of the role of list prices.*

JEL-classifications*: D12, D82, R31*

Keywords*: anchoring effect, duration model, hedonic pricing model, list price, pricing strategies, real estate agents, sales price, trade-off*

1 Introduction

The purpose of this study is to investigate the impact of list prices on transaction outcomes of real estate. More specifically, we hypothesize that low list price strategy, in relation to a property's market value, speeds up the transaction process at the cost of achieving a lower transaction price, and vice versa. We test our hypotheses on a set of property transactions in Iceland, spanning the period from January 2014 through August 2020. Using these transactions calculate a measure of the degree of overpricing for a property, the percentage deviation between list price and estimated market value. We then test our hypotheses using this measure.

The methodology largely follows that of similar research carried out on different housing markets (e.g. Hungri-Gunnelin et al., 2020 for Sweden). The

sales process of residential property in Iceland stands in contrast to that of other Nordic countries, whose sales format is predominantly based on a procedure with public bids, e.g., Sweden (Hungria-Gunnelin et al., 2020) and Norway (Olaussen et. al., 2018; Khazal et al., 2020; Sønstebø et al., 2021) where bids are open. In Iceland, buyers are placing their bids without observing other bids or the number of bidders involved. Hence, the procedure of selling and purchasing real estate in Iceland can be categorized as a standard sealed-bid auction, in which bids remain secret and unobservable to participating bidders throughout the auction process. It can be argued that low list price spurs a bidding war and thus results in higher prices. The empirical results do not support this however (see e.g. Björklund et al., 2006; Bucchianeri and Minson, 2013; Hungria-Gunnelin et al., 2020). In any case, the auction process could be expected to have some impact. Thus, studying the Icelandic housing market provides additional information on the subject of list prices and their effect on the transaction outcome.

In a sealed-bid auction, the announced *list price* becomes a particularly important piece of information. According to findings in previous empirical research, list prices are argued to positively impact the number of bidders (Hungria-Gunnelin, 2013; Han and Strange, 2014; Han and Strange, 2016), negatively impact transaction price (Björklund et al., 2006; Bucchianeri and Minson, 2013; Hungria-Gunnelin et al., 2020), alter buyers perception of quality (Taylor, 1999) and adversely impact duration on market (Genovese and Mayer, 2001; Stevenson and Young, 2015; Hungria-Gunnelin et al., 2020). Since real estate agents usually facilitate property sales, list prices can be argued to be one of the major tools in affecting transaction outcomes. For instance, real estate agents might desire to attract a broad field of buyers, increase the potential for a higher return and close deals quickly. List prices have received attention as an area of research in regard to these desired outcomes.

Against this background, this study will address the impact of list prices on transaction outcomes in the context of a sealed-bid system with unlimited bids per bidder, with the Icelandic residential housing market serving as example. We will test two hypotheses. The first hypothesis concerns the impact of list price on the sales price, where we hypothesize that a lower list price in relation to market value will result in a lower transaction price. Our second hypothesis concerns the impact of list price on time-on-market, where we hypothesize that a lower list price in relation to market value will result in a quicker sale.

This study addresses, similar to several other studies, the impact of list price in regard to sales price and time-on-market. Furthermore, the existing research examines list prices with auction formats different to the one practiced in Iceland, that are characterized by sealed bids. To our knowledge, this is the first study examining list prices in the Icelandic housing market.

The remainder of this study is organized as follows. Section 2 provides a description of the sales process on the Icelandic housing market. Section 3 provides a description of the previous research literature underlying our two hypotheses. Section 4 provides a detailed overview of the data used for analysis. Section

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5 provides a description of the methodological approach. Section 6 provides a presentation of data and results. Section 7 concludes.

2 Institutional background

Sales of residential properties in Iceland are commonly intermediated by real estate brokers that work on behalf of both sides of a transaction. According to law, Icelandic brokers must act in the best interests of both parties. The process of broker-assisted property sales in Iceland follows the standard procedure of listing, marketing, viewing, negotiation, contract signing, etc. The initial process includes counseling the seller in determining an appropriate asking price for their client's property before putting it on the market for sale. Real estate agencies usually have their own websites where the property is advertised for sale but the main sales channel is via two popular websites.[1] A standard advertisement includes pictures, a basic description of the property and associated costs of buying the property. An open house viewing is typically arranged a few days after listing when the interest among buyers usually is at its highest (normally the initial three to five days after listing).

Eventually, when the seller is matched with a buyer and both parties have agreed, a contract is signed and thereby, the contract becomes binding. Some agreements are also conditional on certain prerequisites, e.g., a loan must be granted, or buyers have to sell their current house, which has to be fulfilled before the purchase can go through. Usually, it takes around 4–8 weeks from when a bid initially is placed until a contract is signed, then additionally 1–2 months until the actual hand over of the housing unit. 30–60 days after this, title deeds and the final payment will be made.

There are several costs associated with a property transaction. The seller's costs for a brokers' service includes a commission fee, that commonly is based on a percentage rate of the transaction price between 1.5 and 3%. Also, a cost of capital gains tax at 22% if they have owned the property less than 2 years (otherwise tax free) and normally a contract fee. In addition to the transaction price, the buyer bears the cost of the authorization of the documents and the stamp duty at 0.8% of the total estimated value of the property (0.4% for first time buyers and 1.6% for legal entities), and a fixed fee in brokerage service.

The standard procedure of buying a property in Iceland is that prospective buyers place sealed bids, i.e. bids are unrevealed to other bidders involved. Brokers do not directly reveal the bids that have been placed. Instead, buyers involved in a bidding process will usually receive some information about whether their bid is considered reasonable and worth a try or that somebody else involved in the bidding process has already matched the listed price. If demand is high, buyers will be asked by the real estate broker if they have placed their final and best bid. The bid must be in written form and signed in order to become legally binding. The buyer is then not able to withdraw their bid. The seller also cannot back out of the transaction once they have accepted a bid. Usually, a bid is made to be valid

[1] www.mbl.is/fasteignir and www.fasteignir.is.

for a day and the seller must decide within that time frame whether they want to accept the bid or not. It is common that a seller makes a counterbid if the bid is close to their reserve price.

3 Previous research and hypotheses

A few different strands of research literature and theoretical considerations are relevant to the current study. First, the literature on anchoring effects (see Jacowitz and Kahneman 1995, and Staff 2019) has a bearing on list prices. List price may work as an anchor when it comes to the bidding process (Staff, 2021). Potential buyers use the list price as a bearer of information when formulating an idea regarding their own willingness to pay for the property. This bargaining strategy is applicable to residential real estate transactions where list prices work as anchors (Sergio, 2019). Kahneman (2011) claim that people are influenced by the property's list price when considering their reservation price. He argues that the value of the same property will appear higher if the list price is high compared to if it is low (Kahneman, 2011). The assertion of a positive relationship between list prices and sale prices is supported by several studies including a paper written by Bucchianeri and Minson (2013). By investigating a large and diverse data set of residential market transactions, they found that higher list prices are correlated with higher selling prices. Their result showed that a higher list price leads to an increase in sales price. Hence, the theory implies that list prices serve as a point that buyers refer to when estimating a house' worth. Thus, anchors are linked to price expectations since high anchors (list prices) generate higher estimates (bids).

Björklund et. al (2006) found a similar relationship based on data in the county of Stockholm. Enegren (2017) and Hungria-Gunnelin et al. (2020) analysed whether a low list price would lead to a higher sales price, based on the assumption that low list prices would attract more potential buyers. They both found the opposite relationship between list price and sales price, i.e., a low list price generated a low transaction price. This result also holds for Norwegian data (Anundsen et al., 2020).

Other studies address the issues of agents' informational advantages and its effects on prices and the transaction process. A low list price has been argued to reflect a brokers' incentive to earn a commission quickly. Real estate agents will sometimes counsel sellers to set a low price in the hope of attracting multiple bidders (Han & Strange 2014; Hungria-Gunnelin, 2013), as it increases the willingness among buyers to incur the costs of visiting a particular house (Chen and Rosenthal, 1996). In auctions, low list prices tend to lead to "bidding wars" due to its potential of engaging more bidders, especially during housing booms (Han & Strange, 2014). Also, the chance of receiving bids of a superior amount increase (Pryce, 2010).

A major concern from the seller's point of view in establishing a list price is its impact on time on market (TOM) and sales price. Selling at the highest possible price and as quickly as possible are considered as two incompatible "attributes" and thus, the seller faces a trade-off, which is suggested in Miller (1978), Trippi (1977) and Björklund et. al (2006). A high list price compared to the property's

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market value may lead to an extended TOM, due to difficulties in finding buyers that are willing to pay the higher price (Genesove & Mayer, 2001; Stevenson & Young, 2015). The chances of maintaining a flow of buyers will decrease as the price is set at a higher level (Haurin et al., 2013; Haurin et al., 2010). Conversely, low list prices might shorten the length the property is out for sale at the expense of lower sales price, due to the "shortened" market exposure (Anglin et al. 2003).

Miller (1978) found a positive relationship between sales price and TOM. He argues that a seller is more likely to capture a relatively superior selling price, the longer a property stays on the market. Trippi (1977) and Jud et al. (1996) found a similar correlation. In contrast, Cubbins (1978) found an inverse relationship (higher sales price – shorter TOM and vice versa). Another inverse relationship between TOM and list price was found in a study by Tucker et. al (2013). They compared the difference in sales price before and after the introduction of a policy that prohibited sellers to relist their houses and hence manipulate the total length of TOM. The results showed that when exposing the total TOM of a relisted property, the sales price significantly decreased (USD$16000).

Taylor (1999) bids a possible explanation for an inverse relationship between TOM and sale price or list price. He argues that a reason for buyers being cautious to elongated listings of properties is that they may signal poor quality due to flaws detected by earlier prospective buyers. Hence, stigmatization is built up among speculators when a property has been listed for too long (Taylor, 1999). Haurin et. al (2010) conclude that a longer TOM might be advantageous for atypical properties in order to find a match between buyer and seller. Furthermore, several papers have studied the effects between list price and TOM by considering the number of bidders which in turn, affects the length of TOM. The chances of maintaining a flow of buyers will decrease as the price is set at a higher level is found in Haurin et al. (2013) and Haurin et al. (2010). Thus, lower list prices will improve agents' chances of a quicker transaction relative to a comparable property priced above market value (Zahirovic-Herbert et al. 2019). According to Genesove and Mayer (2001) and, Stevenson and Young (2015), a high list price compared to the property's market value leads to an extended TOM due to difficulties in finding buyers that are willing to pay the higher price.

The degree of overpricing has also emerged in the literature to study the impact different degrees of deviation from the market price (positive and negative) has on the property's sales duration. Hungria-Gunnelin et al. (2019) studied this relationship, expressed as DOP, on the number of days an apartment stays on the market. They found a positive correlation, indicating that the lower DOP, the lower TOM. Thus, a high list price in relation to a property's market value reduces the arrival rate of bids and in turn, lengthens TOM. The lower the DOP, the quicker sale is also confirmed in Anglin et al. (2003), who also applied the DOP parameter.

Knight (2002) studied the causes and effects of changes in list prices. The result indicates that mispricing is costly both in money and in time. Houses with large list price changes have both a longer TOM and sell at lower prices. Setting the correct list price is argued to be of crucial importance as a revision of it has been shown to negatively affect the final sales price of the property (Knight, 2002).

Asabere and Huffman (1993) show how a list price (both low and high relative to the property's market value) lead to deviations from optimal TOM and mispricing. Xiaolong and Arno (2019) found that a revise in homeowners' list price is more likely to occur when they expect to make a loss when selling their home. They will change the list price downward and in a more aggressively manner than other home sellers.

Hoeberichts et al. (2013) address list price dynamics in boom-and-bust markets. They analyse the interaction between initial price setting by the seller, list price reductions and the probability of sale in the Dutch housing market. They found that the impact of overpricing differs over the housing cycle. In boom periods, overpricing tends to extend the sales period and increase the probability of a list price reduction, suggesting a "start high-reduce quickly" pricing strategy. In contrast, the opposite effect is true during busts, where overpriced homes are least likely to result in list price adjustments downwards (Hoeberichts et al., 2013).

In summary, there are a handful empirical studies related to list prices in different manners and with somewhat varying findings. Nonetheless, several of the studies show a positive correlation between list prices and sales price as well as between list prices and TOM. Drawing from this previous literature we will test the following two hypotheses:

H1: *A list price below a property's market value leads to lower sale prices*
H2: *A list price below a property's market value leads to shorter time-on-market*

4 Data

The data used in this study has been provided by the Housing and Construction Authority in Iceland and is sourced from National Registers Iceland and the Association of Real Estate Agents. The data contains transactions of residential houses (apartments, detached and semi-detached houses) in the Capital Region during the period January 2014 through August 2020. The total set of data contain 36,314 observed transactions with information on size in meters squared, number of rooms, location, dates of listing and contract as well as listing price and transaction price.

Table 1 provides an overview of the variables included on both models. In the hedonic model, the dependent variable is the natural logarithm of sales price, *lnPT*, and *TOM* is the dependent variable of interest for the duration analysis. The variables *DOP*, *nr of rooms*, *sq meters*, *apartment, loc* and *time* will be used in both models as independent variables.

Three of the variables, controlling for location (assessment area), size and number of rooms were included since they are considered as fundamental price determinants. Degree of overpricing (*DOP*) describes the percentage difference between list price and estimated market value. *DOP* is a key variable of interest, and its creation is described in detail in the methodological section.

The variable of size indicates a house's number of square meters which is one of the most prominent characteristics of a property. A large sized house increases the ability of changing floor plan. Also, a larger house has a greater potential to fit the activities a household usually approaches such as kitchen, hobby room and

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Table 1. *Variables included in the regression models.*

Variable	Description
ln(PT) (%)*	Sales price of the home, dependent variable of the hedonic model
TOM (in days)*	Time on the market (date of contract – date of listing), dependent variable of the duration model
DOP (%)*	Degree of overpricing [$(P_L–P_E)/P_E$)], percentage ratio (%)
nr of rooms	Number of rooms
sq meters	Size of the property in square meters
Apartment	(0,1) Dummy variable for housing type, apartment or single family
loc (dummy)*	(0,1) Dummy variable for location
time (dummy)*	(0,1) Dummy variable used for estimation of P_E

Note: * Variables that have been modified or generated.

storage. Hence, we expect this variable to have a positive relationship between price and size. Comparably to the principle of large sized homes, a house or apartment with several rooms has a great potential of fitting different activities and attributes into the home. Thus, the variable of number of rooms is also expected to be positive.

The transaction data included three different variables controlling for geographical location: postal code, street and assessment area. Assessment area refers to different geographical areas in the Capital Region defined for real estate valuation purposes where properties are considered comparable. These areas are divided into smaller areas and are greater in number than postal code areas and therefore describes variations in price to a larger extent. A dummy variable for each of the assessment areas was created, resulting in a total of 80 location dummies (*loc*). Furthermore, a total of 80 time dummies (*time*) were created describing the year and month the transaction took place.

Table 2 shows descriptive statistics of variables included in the regression models with mean, standard deviation and the maximum and minimum values.

The average property in our data sample has a living area of 112 m^2 divided on 3 rooms and takes roughly 72 days from initial listing until the contract is signed. The transaction price and list price are close in value, yet the listing price exceeds

Table 2. *Descriptive statistics of variables.*

Variable	Mean	St. deviation	Min	Max	No. obs
P_T *(ISK)*	44,400,000	18,100,000	4,700,000	192,000,000	36,314
P_L *(ISK)*	45,500,000	18,800,000	5,500,000	218,000,000	36,314
P_E *(ISK)*	37,400,000	14,300,000	13,000,000	62,100,000	31,671*
DOP (%)	0.035	0.1918	–0.8842	11.545	31,671*
TOM (days)	71.979	60.233	0	365	36,314
nr of rooms	3.734	1.513	1	25	36,314
sq meters	111.517	47.803	16.4	350	36,314
Apartment	0.7448	0.4359	0	1	36,314

Note: * The number of observations for P_E and *DOP* differ from the full sample of 36,314, as the transactions in 2014 was excluded in the estimations of P_E, see section 5.

the sales price. The estimated market price falls below both the transaction price and the list price. The mean value of *DOP* is 0.0353 with a standard deviation of 0.1918 which indicates that the property, on average, is over-priced in relation to the estimated market value. However, the degree of overpricing is relatively small.

Table 3 displays different *list price-sales price* relations based on our transactions over the studied time period. In addition, differences in *TOM* are displayed.

Table 3. *Different sales price-list price relations.*

Relation	$P_L < P_T$	$P_L = P_T$	$P_L > P_T$	**Full sample**
Frequency (%)	11.4	16.1	72.5	100.0
List price (m.ISK)	43.9	46.1	45.7	45.5
Sales price (m.ISK)	45.1	46.1	43.9	44.4
TOM (days)	50.8	78.6	74.0	73.0

As shown in Table 3, 11.4% of the properties were sold at a price exceeding the list price, on average 1.2 million ISK higher than list price. These properties had a shorter sales duration (around 50 days) than properties sold at a price equal to or above the listed price. Nearly 16% of the transactions were sold at list price, with an average sales process of 79 days. The majority of transacted properties, 73%, were sold at price below the list price, corresponding to an average price difference at 1.8 million ISK. Thus, there is evidence of a predominantly share of properties being listed at a price above the actual transaction price in Iceland.

5 Methodological considerations

Since the two hypotheses of the paper concern two different outcomes, one regarding transaction price and the other regarding time on market (*TOM*), two different methodological approaches are warranted. Hypothesis 1 will be tested using a hedonic modelling framework and Hypothesis 2 using a duration model framework. Thus, we are following the methodological approach of Hungria-Gunnelin et al. (2020). In the following, we will describe the research design for each hypothesis.

Hedonic price model and Hypothesis 1

The hedonic pricing model, first suggested by Rosen (1974), provides an approach with wide applications in studies of real estate prices and values. The hedonic model allows for estimation of implicit prices of attributes related to real property, for instance the initial pricing strategy. The hedonic model to be estimated to test Hypothesis 1 can be stated as (1):

$$\ln\left(P_T\right) = \beta_0 + \beta_1 DOP + \beta_2 DOP^2 + \sum_{j=3}^{n} \beta j Xj + \varepsilon \qquad (1)$$

There the transaction price in log ($\ln(P_T)$) is regressed on a measure of the degree of overpricing (*DOP*) as well as matrix (*X*) of relevant property characteristics. Variables included in *X* can be divided into different categories. Some variable describe the listed property itself. In our models we use, as

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previously described, size measured in both square meters and number of rooms. We also have information regarding housing type, apartment or single family home. In addition, it is typical to include locational variables. Distance to city center or other amenities falls under this category. We do however not have access to georeferenced data, and as such we cannot calculate any distances. It is also common, and often of great importance, to control for time. This can either be done by deflating the observed prices, or by including time dummies. We opt for the latter.

The variable *DOP* has been applied in studies by Asabere and Huffman (1993), Björklund et. al. (2006) and Hungria-Gunnelin et. al. (2020). These studies do however differ in how they generate the variable. Asabere and Huffman (1993) calculated *DOP* as the percentage deviation between initial list price (P_L) and the transaction price (P_T). Such an approach does however imply a problem of endogeneity as sales price appear on both sides of the equation. In order to solve the endogeneity problem, Björklund et al. (2006) developed Asabere's and Huffman's (1993) measure of *DOP*, by replacing sales price with an estimate of the market value (P_E). In this study we adopt the approach of Björklund et al. (2006) with *DOP* being defined as (2):

$$DOP = \frac{P_L - P_E}{P_E} \tag{2}$$

Using an estimate of the market value rather than the actual transaction price does however necessitate a discussion of how the market value is to be estimated. Björklund et al. (2006) used a mass-appraisal model as a first step to provide an out of sample estimate of market values. Their approach implied using 95% of available observations to provide the out of sample estimate for the remaining 5% of observations, thus left for the analysis to follow. Hungria-Gunnelin et al. (2020) improves on this methodology with the aim of keeping a greater part of the original observations, and at the same time providing a more reality based approach to appraisals.

Rather than using one mass-appraisal model with a large part of available and random sampled observations, the approach suggested by Hungria-Gunnelin et al. (2020) uses only observations from the past twelve months. For example, when providing an estimate of the market value of property sold in January 2015, we use observations for all of 2014. This approach not only limits the information discarded to the first year of observations (compared to 95% of the sample in Björklund et al. (2006)) but also better resembles how real estate agents, sellers and buyers likely form their expectations of value. The mass appraisal model can be expressed as (3):

$$\ln\left(P_T\right) = \sum_{j=1}^{n} \gamma jXj + \mu \tag{3}$$

Where transaction price in log ($\ln(P_T)$) is regressed on a matrix of property characteristics the same as for (1). In total we estimate 68 mass appraisal models. The first estimation will be the market price for January 2015, where we use

all previous transactions made between January 2014 and December 2014. The estimated market value for February 2015, is in turn based on transactions from February 2014 through January 2015, and so on, until the last month of observations in August 2020.

The second step to provide the variable *DOP* is to use the regression results from the 68 mass appraisal models to estimate market value P_E, this is obtained as follows (4):

$$\ln\left(P_E\right) = \ln\left(\widehat{P_T}\right) = \sum_{k=1}^{n} \widehat{\gamma_k} X_k \tag{4}$$

where $\widehat{\gamma j}$ are the estimated coefficients from (3). With (4) we have the necessary information to calculate the *DOP* using (2).

When estimating (1), the sign and magnitude of the *DOP* coefficient, β_1, is of primary interest. β_1 will indicate the percentage change in sales price (due to the log-transformation) by a one-unit (1%) change in *DOP*. Our first hypothesis, that a lower list price relative to market value results in a lower sales price, will receive support if the sign of β_1 is positive.

Duration models and Hypothesis 2

Duration models, also known as *survival models* or *hazard models*, are commonly used to model the length of time spent in a given state or the time elapsed until a particular event of interest occurs. For instance, duration models have been employed for modeling durability of unemployment, machine functioning, etc. (Arkes, 2019) and also duration of rental vacancies (see Sternberg (1994) and Gabriel and Nothaft (2000)] and houses' duration on market (see Zuehlke (1987), Yang & Yavas (1995), Donald et al. (1996) and Hungria-Gunnelin et al. (2020)).

A duration model is built on a survival function, S(t), used to model the probability of a duration, T, *past* some given period in time *t* or, alternatively, the probability of an event of interest *not yet occurred* by duration *t* (Arkes, 2019).

The *hazard rate* is part of the hazard function and is defined as the risk of occurrence of a certain event per time unit (t). A hazard ratio > 1 means that the probability of exit a state increases over time. Conversely, a hazard ratio < 1 means that the probability of exit decreases over time. A hazard ratio of 1 means no association between time and the probability of an exit.

The distribution of survival times can be approximated by different functions. A widely used distribution for modeling survival statistics of various types of engineering applications, e.g., failure rates of mechanical components, is the *Weibull distribution* (Lai, 2006). The Weibull distribution is a generalized form of the exponential distribution; it reduces to an exponential distribution if $\alpha = 1$. This indicates no time dependence, or, a hazard rate that remains constant over time (Lai, 2006), represented by a straight line in the hazard function. However, this assumption might be inappropriate in cases when the impact on the hazard rate changes over time. The Weibull distribution has the advantage that it allows for such changes as time progresses (Arkes, 2019). For instance, the chances of a house sale might increase from time zero and up to some point, followed by a

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decline in probability the longer the property stays on the market (see Björklund et al., 2006).

In order to investigate our second hypothesis, we estimate the TOM model by specifying the hazard function based on the Weibull distribution, which has been done in previous studies (see Jud. et al. (1996), Hungria-Gunnelin et al. (2020), Yang and Yavaş (1995). As mentioned, the Weibull specification allows for varying probability in sale or "exit of the market", and hence, it provides a more accurate parameter estimates and a better fit to our data set than an exponential distribution would do.

Our duration random variable of interest for this hypothesis, T, is the *TOM* variable. The survival function, *S(t),* will in this context be defined as the probability of *TOM* exceeding some time *t* (Jud et al., 1996; Hungria-Gunnelin et al., 2020). Thus, our model can be specified as (5):

$$S(t) = \Pr(TOM \geq t) \tag{5}$$

The hazard rate will be the conditional probability of a unit being sold on a particular day, given that it "survived" on the market until then. For instance, it is more likely that a property is sold the longer it stays on the market, due to exposure to a larger number of potential buyers.

To model the relationship between duration time and our set of explanatory variables, we express the hazard function as conditional on these variables as (6):

$$h(t \mid X, DOP) = \lambda(t) * \exp(\beta X + \delta DOP) \tag{6}$$

The explanatory variables are the same covariates used in Hypothesis 1. β is the vector of regression coefficients representing the effects of the units' characteristics on *TOM* at time *t*. Parameter δ represents the effect of *DOP* and is of main interest for investigating Hypothesis 2. It will describe how list price (measured in *DOP*), affects the probability of sale, and in turn, the sales duration (*TOM*). A hazard ratio ($\delta < 1$) will support our second hypothesis. This will indicate that the higher *DOP*, the less likely it is for the property to exit the market and, in turn, increase *TOM*. That is, if list price is set lower than market value, a decrease in *DOP*, will lead to a decrease in expected *TOM* (a smaller number of days on the market).

6 Estimation results and analysis

The following section will provide the results from estimated models, as well as an analysis of what qualitative conclusions can be drawn.

Testing our first hypothesis

Table 4 depicts the results from the analysis based on the hedonic price model, as expressed by (1). The hedonic model is estimated on a sample of 31,671 sales transactions, excluding all of 2014 as these observations were used to create the *DOP* variable. Table 4 also includes a baseline model. The baseline model is used to derive the key variable of interest, *DOP*, although not using the full set of data as previously described.

Table 4. *Results of the hedonic model.*

	Baseline model			***Hypothesis 1***		
Explanatory variable	**Coeff.**	**P-value**	**St.err.**	**Coeff.**	**P-value**	**St.err.**
DOP	–			0.9047*	0.000	0.00249
DOP2	–			–0.0827*	0.000	0.00062
Sq meters	0.0052*	0.000	0.00003	0.0049*	0.000	0.00001
Nr of rooms	0.0164*	0.000	0.00110	0.0199*	0.000	0.00050
Apartment	–0.0452*	0.000	0.00282	–0.0359*	0.000	0.00130
Constant	16.64*	0.000	0.01488	16.69*	0.000	0.00644
Location dummies	Yes				Yes	
Time dummies	Yes				Yes	
No. of obs.	36,310				31,671	
R-squared	0.8001				0.9600	
Adj. R-squared	0.7992				0.9598	

Note: * denotes a significance level at 1%.

The explanatory power of the baseline model is relatively high, at 0.8001. This indicated that our model can explain 80% of the variation in price. Locational dummies and time control are included in the estimation but excluded from presentation. All coefficients are significant and carry the expected sign. Larger homes, both measured with number of rooms and square meters, fetch higher sales prices. Apartments, as compared to single family homes, fetch lower prices on average. Including two measures of size, number of rooms and square meters, may potentially create a problem of multicolliearity. The correlation between the two variables is high (0.8194), but post-estimated variance inflation factors (VIF) do not suggest multicollinearity to be a severe problem (VIF of 3.92 and 3.40 for square meters and number of rooms respectively).

The explanatory power of the model testing our first hypothesis is high, at 0.9706, indicating that 97% of the variation in the logarithm of sales price is explained by the independent variables included in our model. The higher R^2 is to be expected when including *DOP*, as it does contain information about estimated prices. No other coefficients are affected in a significant fashion from this inclusion.

As depicted in Table 4, the coefficient of *DOP* is 0.9047 indicating that for each percent increase in *DOP,* the sales price increases by 0.9047%. Conversely, for each percent of under-pricing (negative *DOP*), the sales price decreases by –0.9047%. For instance, a property under-priced with 10% will result in a sales price reduction of 9.047%. Hence, we have received support for our hypothesis (i.e., larger "under-pricing" in relation to the market value leads to a lower sales price). The negative value of *DOP2* at –0.0827, however, indicates a non-linear relationship between *DOP* and sales price. This can be interpreted as the effect of *DOP* will be positive up to a certain point, then reach an "optimum" and the price then starts to decline, which similarly is found in Björklund et. al. (2006). An explanation is the lack of

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interest among buyers as the price increases as well as the constraint in buyers' willingness to pay a price that largely exceeds the market value.

The finding of a positive relationship between *DOP* and sales price are similarly found in recent empirical research examining the Stockholm and Gothenburg housing market (see Björklund et. al., (2006) and Hungria-Gunnelin et al., (2020)) and the U.S housing market (Bucchianeri & Minson (2013)). A possible explanation of this relationship could be the state of market, that has been rising during the observed time period and hence, it has been more of a "seller's market". A high demand and low interest rates are suggesting an increased willingness-to-pay among households. Thus, properties are likely to sell even though the *DOP* would be substantially high, and the properties then would be "overpriced".

Our findings are strongly related to the theory of anchoring. The anchoring effect can be considered as particularly applicable to the Icelandic housing market. Due to the sealed bids system, buyers are inhibited from price information revealed through other bidders' behavior which prevents the individual buyer from getting an idea of the market value of the unit. Hence, the list price is the only accessible piece of price information and the anchoring theory implies that bids likely will be placed close to the list price. Consequently, if the list price is set high relative to the market price, bidders' bid will also tend to be high. However, too high list prices might scare off buyers.

It should be taken into account that the results may be affected by different sources of error. A potential issue with the model concerns the estimation of expected market value through the mass appraisal models for obtaining *DOP*. Systemic errors in data arise from lack of value-bearing factors. This might lead to either overestimations or underestimations of the properties' market value and in turn, affect the *DOP* and the estimation of the model. Another possible error is lack of independent variables controlling for quality. Quality has a major effect on house prices as it, for instance, reflects the construction of a house which includes architecture, materials, standard and condition.

Testing our second hypothesis

Table 5 depicts the results from the duration model assuming a Weibull distribution. The hazard ratio of *DOP* is of main interest for Hypothesis 2.

The results of the duration analysis are presented as hazard ratios. A hazard ratio greater than 1 implies an increased probability ("risk") of sale and conversely, less than 1 suggests a decrease in probability. A ratio exactly equal to 1 indicates that there is a lack of impact of independent variable in question on the sales speed.

The variables *Sq meters* and *Nr of rooms* are both relatively close to 1. They are however statistically different from 1. That is, the impact of the size and number of rooms have a negligible effect on the probability of sale per time unit and in turn, the sales speed. Since both variables are in some way a measure of size, and correlate to each other positively, the effects will counter each other.

Apartments stay longer on the market than single family homes do. Going back to the descriptive statistics, we may find an explanation in the relative

Table 5. *Results of the duration model.*

	Hazard ratio	z-value	p-value
DOP	0.6918*	–11.76	0.000
Sq meters	0.9934*	–27.51	0.000
Nr of rooms	1.060*	9.64	0.000
Apartment	0.9168*	–5.03	0.000
Location dummies	Yes		
Time dummies	Yes		
No. observations	31,663		
α	1.437		
Log-likelihood	–36,381.988		

Note: * denotes a significance level at 1%. Standard errors within parentheses.

amounts of the two types sold. Roughly 75% of listings are apartments, which likely means there are more viable substitutes to apartments than single family homes. A greater competition may lead to longer sales periods.

The hazard ratio of *DOP* at an estimated value of 0.6918 leans support to our second hypothesis, stating that *a list price below market value leads to a shorter time-on-market*. The ratio implies a decreasing probability of sale (and thus, the duration on the market will be shortened), the higher *DOP* is. In other words, the more a property is overpriced in relation to its market value, the less likely it is for the property to be sold. Put differently, for a given amount of time a unit increase in *DOP* results in only 7 sales compared to 10 sales for similar objects. However, one must also keep in mind that the probability of sale changes with time itself, denoted by α being larger than unity.

A possible explanation of the result is an increased interest among buyers of properties listed at lower price levels. A lower list price, considering buyers will differ in their reservation prices, will attract a larger crowd. The number of potential buyers will rise because the interval of matching reservation prices of buyers increases. Also, buyers might see a chance of making a bargain, which further adds to the crowd of speculators. A large number of bidders will raise the competition, which in turn may trigger the sales speed. Matching becomes smoother. A reason for higher list prices leading to an extended TOM could be the increased difficulties of finding a buyer who is willing to pay a higher price which, in turn, leads to a longer time on the market. In general, more expensive properties takes longer time to sell. A longer duration means a higher risk of a stigma effect building up among potential buyers, as properties that have been marketed for too long may signal "poor" quality.

7 Conclusions

In this study, we have examined the impact list prices have on the final sales price as well as the length of sale in Icelandic housing transactions. We have posed two hypotheses based on previous findings: (1) A list price below a property's market

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value leads to lower sale prices, (2) A list price below a property's market value leads to shorter time-on-market. We find support for both hypotheses.

By using a comprehensive set of residential transaction data sold in the Capital region of Iceland during January 2014 to August 2020, we have estimated both a hedonic model and a duration model to test our proposed hypotheses. Our evidence suggest that a *low list price decreases the sales price*, which gives support to our first hypothesis (1). Our second hypothesis (2) also received support, stating that *low list prices leads to shorter time on market*. Thus, according to our findings, a list price below market value is linked to a lower sales price and shorter time on the market, respectively.

The empirical findings from the regression models confirm that a *trade-off* between the sales price and TOM exists; low list prices shorten the TOM but at the expense of the sales price, which becomes lower. Contrariwise, higher list prices are related to an extended duration on the market, but the extended exposure enables sellers to capture more superior selling prices (Anglin et al., 2003). These findings are similar to other studies including Miller (1978), Trippi (1977), Björklund et. al (2006), Enegren (2017) and Hungria-Gunnelin et al. (2020).

The trade-off implies that both the broker and seller are facing a dilemma of either increasing the chance of selling within a shorter time or at a higher price. The brokers' choice of pricing strategy might be strongly dependent on the type of brokerage fee they charge. By fixed fees, there are larger incentives of selling at a higher speed (rather than maximize the sales price) as they will only charge a set amount per sold unit. Brokers will be aware of the final payoff in advance and will not benefit from putting more effort into increasing the potential of higher sales prices and hence, their incentives are lowered.

Our findings show clear evidence of *price anchoring*, a theory proposing that low values (list prices), gives rise to low estimates, i.e., buyer' bids. We believe the anchoring theory to be particularly applicable in the context of list prices in a sealed-bid system as in Iceland. This is due to individual buyers' inability to receive any signals about the true value of a property through estimates of their bidding opponents. Instead, their judgment will only be dependent of their own valuation (private value) of the property in question. Hence, the list price serving as the major reference of buyers' bids. In contrast, in the case of public bids, one can get an idea of the "common value" both by observing the list price and, maybe most important, the bids of their competitors.

As the results of Hypothesis 2 show, a low-pricing strategy reduces the duration of sale. A possible explanation for this result is quicker buyer response and a more vigorous bidding activity as it evokes a greater interest among people. This stimulates the competition which in turn, speeds up a sale. Furthermore, the property will receive less market exposure. In general, more expensive houses take a longer time to sell. The positive correlation between low list prices and low sale prices (Hypothesis 1) might be explained by low-listed properties are signalling "low quality".

Another explanation of a positive correlation (high list prices-high sale prices) is the rising state of the Icelandic housing market, which means a larger

likelihood of selling even though list prices are set at a high level in comparison with the market demand. The lowering of interest rates, causing drops in the mortgage lending rates, means that more people can finance their housing investments and buy properties even at higher price levels. The positive price trends for both apartments and single-family houses that have been on a stable rise the last decade also tend to higher the expectations of prospective buyers, who will expect the prices continue to increase and might tend to buy even overpriced properties. Noteworthy is that our findings are applicable to a rising market but would perhaps have been different if observing a falling state of the market.

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Improving Efficiency in Finnish Public Land Use Processes – Regulatory Change and Digitalisation in Focus

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Abstract: *The efficiency of the public sector is a major discussion topic internationally. The discussion often refers to a need to review, renew or reform public regulation in an attempt to balance the public economy, citizens' needs, digitalisation, and the sustainable use of resources. For example, Finland aims to reform-built environment regulation and promote digitalisation both on local and national levels, while balancing efficiency needs. This paper explores the potential to improve public land use processes by enhancing efficiency in the building permit process. The paper studies possible solutions based on the case development processes of two Finnish cities, and reflects on them in a nationwide context by interviewing key persons in municipal land use management. Based on the findings, the challenges in achieving efficiency lie in the complexity of processes, public sector management, organisational culture, and the needs of co-operation on multiple levels. Particularly problematic is the unpredictability of the process, possibly outweighing the tangible benefits of the development. Digitalisation, including the use of data models and 3D BIM in automation, interaction and knowledge management, is expected to aid the efficiency of the land use and building permit processes in the long run. Findings suggests that emphasising development in land use and building permit processes, fostering a new way of thinking and redesigning the public sector's operating model are essential. The redesign should focus on more strategic management and on a new mindset for designing and conducting public processes. A successful new operating model and a renewed mindset would enable the adaptation of regulatory renewal, digitalisation and the sustainable use of resources.*

Keywords*: building permit, efficiency, digitalisation, operating model, public sector*

1 Introduction

The efficiency of public administration is important to public land use processes (see e.g. Lehtovuori et al., 2017; Ahonen, 2017). A recognised challenge in many European countries is to offer public services in line with the needs of the citizens using fewer resources, for instance due to reduced tax revenues and manpower (e.g. Andreassen 1994; Ludwiczak 2014). Increasing economic pressure requires the public sector to focus more on citizens' interests than does the private sector (Muggenhuber 2006). Moreover, there is an established link to sustainability with the public sector's principles where, for instance, resource efficiency and citizen satisfaction are key components of both sustainability and public administration (Leuenberger 2006).

The demands for resource efficiency and sustainability are present in many urban areas where countries regulate planning and development. The public sector aims to balance public and private needs and listen to its citizens in development projects. Fewer regulatory resources and more supervisory responsibilities are included, for instance, in the job descriptions of building permit authorities across Europe, despite the increase in construction activities (Meijer and Visscher 2006; Jääskeläinen and Virkamäki 2013).

Efficiency in building permit processes in Europe is being sought through legislation, technology (information modelling) and outsourcing. However, construction supervision and, in particular, the commissioning of buildings still require formal approval (Silius-Miettinen 2018). In the end, the overall efficiency of a construction project depends heavily on the actions and decisions of the authority (Teräväinen 2021).

The possibilities of efficiency gains in the built environment and land use processes are significant. In Finland, the average annual value of construction output alone is more than €30 billion. Almost two-thirds of Finland's national assets worth €1 trillion (real reserves) is in the value of buildings and structures (Rakennusteollisuus RT ry, 2018; Ahonen et al. 2020). While the efficiency improvements in public services are extensively discussed, most studies view the improvement of service quality and the performance of public processes, for example in health care, education and social welfare (Chen et al. 2005; Ludwiczak 2014; Ahonen et al., 2020). Moreover, studies on process-dependent development focus on, for example, improvements in efficiency through digitalisation (see Silius-Miettinen 2018), developments in local detailed planning duration (see e.g., Rinkinen 2007) or building control and organisational change in the UK (see Hawkesworth & Imrie 2009).

Efficiency aims in the development of public services are connected to promoting a suitable organisational culture in organisations. Several studies have promoted this issue in Finnish systems, such as Teräväinen (2021) who examined the effects of the organisational culture on efficiency in construction, and Jurmu (2021) who studied municipal reform for the purpose of increasing knowledge and expertise and of focusing on reforming the operating culture of organisations. This study fills a research gap related to the public sector's regulatory redesign, and the challenge of providing efficient service in public land use processes.

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'Land use process' in this study means a set of public sector-led processes, from the designing of a new residential, commercial or industrial area, up to controlling and granting building permits.

The research aims to establish how to enhance the efficiency of land use processes by improving the building permit process. The problem can be divided into three questions:

Q1. What kind of challenges and development needs exist in current public land use regulation and processes?

This question explores factors affecting public sector land use regulation and processes to achieve efficient service. The study considers the effects on the entire land use process from local detailed planning to the building permit phase.

Q2. How could the building permit process be improved to meet the challenges of land use processes?

Potential improvements to the building permit process are studied as a way to improve the efficiency of land use processes in general. Suggestions for improving both the building permit and land use processes are formed based on the findings. The findings are derived from examining case cities.

Q3. How could improvements in the building permit process be adopted more widely?

This question studies possibilities of adopting the identified improvements of the building permit process by utilising the theoretical framework of institutional pillars.

The article is structured as follows. Section 2 presents a review of built environment regulation and digitalisation. Section 3 focuses on the theoretical framework of institutional pillars. Methods are introduced in Section 4. Section 5 describes the land use processes in Finland, and Section 6 presents the case studies. Findings are presented in Section 7, and further discussed in Section 8. Finally, Section 9 concludes the article.

2 Review of built environment regulation and digitalisation

The building authorities across Europe are seeking efficiency gains in building permit processes through legislation, 3D building information models (BIM), and outsourcing (Silius-Miettinen 2018). The focus is on advances in digitalisation, as well as processes and regulation.

2.1 Developments in building regulation internationally

The real estate and construction sector attempts to respond to needs that have arisen from an increasingly complex and constantly changing economic environment (Ahonen 2017). The desire in many countries is to streamline the local detailed planning systems, or even withdraw the current systems of public processes and regulation, in order to support competitiveness and vitality. The Finnish debate echoes the European discourse. The change in England, Denmark, France, Germany the Netherlands, Norway, Scotland and Sweden is characterised by an emphasis on strategy, and flexibility as described in Lehtovuori et al (2019). The systems, including the cadastre and its maintenance, typically have at least a

century-old tradition, and improvements may cause the process to become heavy. This heaviness has often not kept up with service needs (Van der Molen, 2002 and 2003). Among the digitalisation processes, the building permit process is seen as one of the priorities of public sector development (Noardo et al. 2020).

Building regulations set minimum requirements for safe, healthy, energy-efficient and accessible buildings, and function in a similar process basis across Europe (Pedro et al. 2011). There is a broad consensus within the regulatory sciences about the trend towards deregulation and privatisation (Mothusi, et al. 2014; Meijer and Visscher 2006: Andreassen 1994). This ideal is also guiding regulatory and other policy decisions. Reorganising regulation, as seen in the European Union and its activity towards better regulation by, for instance, simplifying the regulation and improving the transparency of decision-making (Radaelli and Meuwese 2009), has become a typical target. Likewise, the adoption of the sustainable development goals in built environment control has been a common European development target (directives 2010/31/EU; 2012/27/EU; Renda 2017). Building permit systems have been converging, especially in terms of the technical requirements and standards within the European Union, to contribute to the establishment and functioning of a single market for services (Meijer and Visscher 2006; Pedro et al. 2011). Reorganisation of the regulation is accompanied with the implementation of organisational changes to the revision of the operating culture of organisations, or the application of regulations in public institutions (Jurmu 2021; Teräväinen: 2021; Chen et al. 2004). Examples are the Australian regulatory reform (Liddy and Turner 2018) and organisational culture considerations in United Kingdom (Hawkesworth and Imrie 2009).

2.2 Utilisation of digital environment and 3D city and building models

Digitalisation is a major goal in many public processes. The aim of digitalisation is to better satisfy current construction demands by providing more efficient and transparent processes, for example in the building permit process (Guler and Yomralioglu 2021). Data modelling technologically enables tools for quality assurance and increasing cost awareness, but organisational changes are required to increase efficiency in processes (Silius-Miettinen 2018).

The popularity of utilising BIM in public processes has increased significantly in recent years. For instance, the majority of the Consortium of European Building control association's (CEBC) member country organisations favoured utilising digitalisation in the building permit process. As the process becomes digitised, the possibilities of data management, use and storage are increased by using BIM in the process (CEBC 2018). BIM technology in the building permit process allows possibilities for digital submission, and automated compliance checks based on the model. While the technological and data basis for 3D BIM-based building permits is generally ready to use, its large-scale generalisability would require augmentations of systems, data harmonisation and the development of standards as experienced, for example, in South Korea (Kim et al. 2020), the Netherlands (Van Berlo et al. 2013) Finland, Estonia, the United Kingdom (CEBC 2018) and Turkey (Guler and Yomralioglu 2021).

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The advantages of information technology and 3D BIM lie within data exchange and information sharing. The availability of more reliable information in decision-making allows more fact-based reasoning. This could happen through, for instance, the reduction of transaction costs due to better coordination and management of construction projects, dispute-solving (see e.g., Bean, et al. 2019 Bakhareva, et al. 2020), or in general by integrating BIM and GIS data to support decision-making in land use and construction (see e.g., D'Amico, et al. 2020).

3 Reviewing phenomena through institutional pillars

The renewal, revision or reform of regulation, its applications and changes in organisational culture can be studied trough the institutional framework, its elements and how they perceive changes (e.g., Ranta 2021; Peltonen 2020). Institutional theory helps to develop causal understanding of institutional and policy change in public management changes (Barzelay and Gallego 2006). Institutional theory is utilised to allow better understanding of this phenomenon, to categorise change and to provide suggestions on how to adopt change.

Institutional theory examines organisations as places of broader social structures and meanings (Powell and DiMaggio 2012). Institutional theory considers the process of how structures, including schemas, rules, norms and routines become established as authoritative guidelines for social behaviour. The components explain how these elements are generated, diffused, adopted and adapted over space and time, and how they fall into decline and disuse (Scott 2004). To some degree, institutions resist change and innovation, for example through isomorphic mechanisms (DiMaggio and Powell 1983), pressure from other organisations, and cultural surroundings. Scott (2008) further differentiates three types of elements that underlie institutional order: regulative, normative, and cultural-cognitive. The three separate elements as pillars of institutions reveal through their indicators the rules, norms and beliefs that impact the social behaviour in organisations, affecting its activities, relations and use of resources. The pillars are presented in Table 1.

Regulative elements consider setting rules, monitoring and sanctioning (Scott 2008). Regulation and its employment are an essential aspect of the public sector's ability to establish control, for example in the built environment. Coercive rules, monitoring and sanctioning in land use processes are all conducted by public organisations, and are based on a written juridical framework presented in Section 5.

Normative elements impose constraints on social behaviour (Scott 2008). The normative system includes both values and norms. Values represent conceptions of preferred or desirable standards against which existing structures or behaviours can be compared and assessed. The norms specify how things should be performed (Scott 2013). In its actions, the public sector utilises a set of values such as fairness, justice, transparency and equality (see e.g., Fountain 2001; Leuenberger 2006) in how it perceives its regulative tasks. This set of values can determine, for instance, how officials should position themselves in public procedures.

Cultural-cognitive elements emphasise shared understanding that constitutes the nature of social reality, and the frames through which meaning is made (Scott

2008). In organisational perspectives, there are organisation-specific cultural and shared understandings of how, for instance, public processes are conducted. In relation to change management, institutional isomorphs may describe effects on organisational changes and how innovations break through (DiMaggio and Powell 1983). They further describe isomorphism in organisations with coercive, normative and mimetic mechanisms. For instance, the coercive mechanism means formal and informal pressures exerted by other organisations upon which they are dependent and by the cultural expectations of society. The pressure may distort the innovations, since the same institutions may act as significant impediments, despite their innovative models (Alasoini 2016).

Table 1. *Three pillars of institutions (Scott 2008).*

	Regulative	**Normative**	**Cultural-Cognitive**
Basis of compliance	Expedience	Social obligation	Taken for granted/ Shared understanding
Basis of order	Regulative rules	Binding expectations	Constructive schema
Mechanisms	Coercive	Normative	Mimetic
Logic	Instrumentality	Appropriateness	Orthodoxy
Indicators	Rules, Laws, Sanctions	Certification, Accreditation	Common beliefs, Shared logics of action, Isomorphism
Basis of legitimacy	Legally sanctioned	Morally governed	Comprehensive, Recognisable, Culturally supported

4 Research design

The research design consists of an academic literature review and qualitative case study approach. The study is divided into several phases. The first phase of the research concentrates on answering the first research question by explaining trends affecting public sector development in terms of the construction industry, defining concepts of land use processes and its characteristics. The aforementioned phase is based on the analysis of literary sources. The second phase of the research answers the second research question. The answers to the second questions were provided by describing practical achievements and techniques used in the experimental building permit processes from the case cities of Järvenpää and Hyvinkää. The aforementioned phase is based on a document review, and the authors' observations of the case. The third phase of the research answers the final research question. Data was collected through themed interviews with specialists in the land use and planning fields. A total of 10 interviews were conducted, and 11 participants were interviewed between March and September 2021. One interview included two participants from the same authority based on the interviewees' own requests to provide the necessary answers. The authors were responsible for conducting all the interviews and all interviews were recorded at the interviewees' consent.

The interviews were constructed in a themed semi-structured manner with pre-defined themes providing systematic comparison of the topics (see themes in

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appendix 1). The open conversation allowed an efficient way to gather information and discover additional information or connections to the topic, utilising the practical experiences of the interviewees (see e.g., Kvale and Brinkmann 2009).

The interviews were meant to gather information from specialists with a comprehensive understanding of the industry or direct experiences of managing and conducting building permit processes in Finland. As most building activity is concentrated on the largest cities (Helsinki, Espoo, Vantaa, Tampere and Oulu), the focus was on reaching the authorities responsible for the building permit process from these areas of Finland. Further viewpoints were gathered from specialist state organisations from the Ministry of Environment and the heads of associations representing different parties in the industry. The Association of Finnish Local and Regional Authorities, the Association of Finish Building Inspectors and the Association of Property Owners and Construction Clients (Rakli) were interviewed.

The majority of respondents had both public- and private-sector experience from multiple organisations after which they had ended up in their current positions. Experience also ranged from national development to international co-operation. The interviewees had experience of representing the general perspective of the juridical context, and municipal authority and building permit processes in general were acquired. The request for the interview was addressed to 11 participants as seen on Table 2.

Table 2. *Interviewees.*

Interviewee	**Role**	**Sector**
N1	Municipal building official	Public
N2	Ministry of the Environment	Public
N3	Ministry of the Environment	Public
N4	Municipal building official	Public
N5	Municipal building official	Public
N6	Municipal building official	Public
N7	Ministry of the Environment	Public
N8	Municipal building official	Public
N9	Finnish association in building industry	3rd sector
N9	Municipal building official	Public
N10	Finnish association in building industry	3rd sector
N11	Finnish association in building industry	3rd sector

The research utilises thematic analysis as a means of interpreting the empirical data. Content analysis interprets meaning from the content of text-based data and is customarily employed to describe a phenomenon when existing theory thereon is limited (Hsieh and Shannon 2005). The key difference in thematic analysis is the possibility of the quantification of data, for instance theme-based data on the frequency of its occurrence in content analysis or by non-linear analysis in theming. Vaismoradi et al. (2013). On this occasion, non-linear analysis of the empirical material was favoured. The aims were to reflect on tested techniques in case-examples, their generalisability and to find out possible new development foci.

5 Built environment regulation and regulatory reform in Finland

Land use optimisation is often sought in land ownership, with land being wanted for the most productive use. Improving land use is often the starting point for initiating its planning process. The Finnish Ministry of the Environment plans to reform build environment legislation (e.g., LUBA 132/1999) by simplifying and clarifying the regulation as well as including regulatory means, for instance to achieve sustainable construction (YM014:00/2018). This legislative reform has been under way since 2018 and is expected to impact the regulation of the built environment systems described in this paper.

The public land use process, defined in the study, is based on current national legislation (e.g., LUBA 132/1999) and its applications as well as other legislation (e.g., the Real Estate Formation Act REFA 554/1995 and the Code of Land Laws (540/1995). The juridical context is administrated by the municipalities of Finland to various extents. The extent determines which processes the municipality maintains. The division depends on the needs of the municipality such as size or historical preferences. The juridical framework defines a set of procedures for local detailed planning and development. The processes allow public organisations to exert control on how the built environment is developed, especially in urban areas (see e.g. Rajaniemi 2006 on local detailed planning). In this context, local detailed planning, plot division, subdivision and building permit are described as part of public land use processes in chronological relation to each other (see Figure 1).

5.1 Local planning processes

Municipalities are responsible for local master plans and local detailed plans that are part of Land Use Planning System in Finland. The process and its phases are regulated in Finnish land use and building legislation (e.g., LUBA 132/1999;

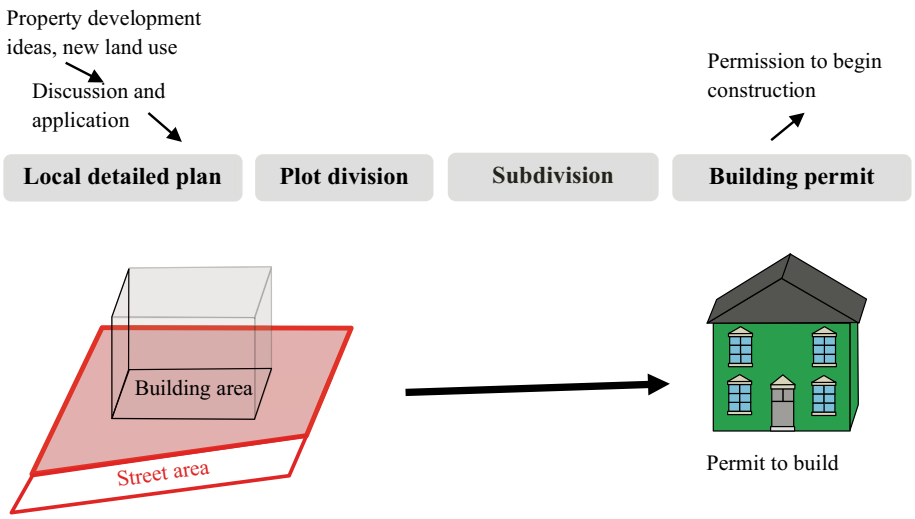

Figure 1. *The general phases and interfaces of the overall land use process in this context.*

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Häliseva-Soila 2017). Local detailed planning is a multi-phase process from the initiative to the adoption of a plan. The major phases of the local detailed plan in Finland are the participation plan, draft of the plan, the proposal of the plan, and processes of approval (LUBA 132/1999). The initiation usually begins when there is a need to develop the land use in a specific area. The need may derive from the municipal organisation itself or, for example, from a landowner or party interested in the land. Partnership- or project-based local detailed planning has become significantly more popular in the past decade (Ekroos et al. 2018). If the local planning authorities agree on development possibilities, the process may commence officially. The second major phase represents the participation and assessment scheme where the planning process is described to the participants. The following phase, the preparation, may include devising and presenting one or multiple drafts of the plan as well as hearings of various participants and authorities. After the preparation is completed, a proposal for the local detailed plan is produced and put on public display. After the display period, the plan may be accepted and adopted if there are no objections. Otherwise, the plan is revised if needed (LUBA 132/1999; Häliseva-Soila 2017; Valtonen et al. 2017). The plan may be accepted in the municipal (local) committees or other administrative organs after which it is approved. The method varies between municipalities depending on how they have organised the approval proceedings. After the proceedings, the plan is adopted (LUBA 132/1999; Häliseva-Soila 2017).

5.2 Plot division and subdivision

Plot division is based on land use and building legislation and local detailed planning and building permit processes. The purpose of the plot division is to determine the extent and possible division of building volume for each designed building area (plot). The plot division is made binding when the primary location of the city area, the building density of the block or the explicitness of the land administration system so require (LUBA 132/1999). The plot division phases include initiation, proposal of the plan and, if possible, adoption of the plan, thus following similar steps to the local detailed planning process. Altogether, plot division and the local detailed plan can be conducted and adopted simultaneously. The purpose of subdivision as a public cadastral procedure in areas of binding plot division is to establish new properties, rights of properties or to modify present ones based on the Real Estate Formation Act (REFA 544/1995). In such areas public authorities, primarily municipalities conduct the procedures (REFA 544/1995 section 3). The procedure includes initiation, planning, implementation and conclusion. The process differs in local detailed planning and plot division insofar as it is based on different legislation and includes direct regulatory discretion of cadastral authorities (see e.g., REFA 544/1995; Mattsson 2011; Sulonen 2020 and HE 26/2021).

5.3 Building permit

A building permit in Finland is required for most types of projects, when constructing a new building, significantly renovating or otherwise significantly

altering an existing building. The process is based on the Land Use and Building Act (LUBA 132/1999), as local detailed planning and plot division and is employed by municipalities. To some extent, the municipalities themselves define what type of construction project should be included in building permit processes (LUBA 132/1999 Chapter 18) and what local specifications are needed (LUBA 132/1999, Section 14). In comparison to many European systems, the Finnish planning and building system appears to be multi-level. For instance, there is no separate level of local detailed plan in France and a building permit is granted directly on the basis of the local master plan (Lehtovuori et al. 2019).

The role of the building permit in Finland is to impose restrictions derived from regulation as a local detailed plan or juridical framework at building level. These restrictions are based, for instance, on the security of the building and the hearing of possible parties involved. In this context, the applicant's needs are used as an example. The authorities responsible for building permits interpret and match the applicants' needs with the building restrictions defined, for example in the local detailed plan. The building permit additionally includes a structural inspection of the buildings and other control of the legality criteria (LUBA 132/1999). The permit process is initiated if the requirements stated in the legislation and, for instance, municipal guidelines are met. The required criteria are investigated by the authorities responsible for the building permit process and, if met, permission to build is granted. The municipal decision-making body is a responsible authority in building permit processes (LUBA section 21), but in practice it delegates its decision-making power to the officials (building inspector). The delegation of the power of decision depends on the municipal administration processes. For example, building permits for large-scale projects are sometimes granted by municipal decision-making bodies rather than officials. After the permission, meetings and check-ups are held, ending in final inspection, where the project is accepted as ready. The check-ups are to check phase-by-phase how well the construction process is advancing. The phases are described in Table 3.

Table 3. *The different phases of the building permit process.*

Initiation	**Preparation**	**Decision**	**Control**	**Approval**
The procedure commences	First meeting Authorities investigate format criteria	Grants permit to build if possible Local building control authority, e.g., a committee or some other multimember body, excluding the municipal board, appointed by the local authority Depending of the municipal administration processes, municipal decision-making body is involved.	Check-ups of e.g. the base of the building, chimney, pluming, ventilation check-ups	Appeal period 30 days

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A deviation can be issued if the local detailed plan or regulatory requirements are not in a line with the applicant's practical needs, for example if there is a minor deviation of the local detailed plan in the building permit (LUBA132/1999 Section 171 and 175).

5.4 The complexity of land use processes

Comprehending the overall public land use processes is inconvenient, since transactions for land development and building typically involve a number of separate authorities within municipal organisation. The reason for this, is that competence requirements for the public authorities and officials are defined in Finnish legislation[1]. Despite same juridical context, significant differences in interpretations and practices between municipalities or individuals are present in public organisations (Luoma 2020). The complexity is propagated, since the operating practices of authorities within and between organisations vary. The established complexity exists partly because long-established practices in the processes are being unrenewed (Ahonen 2017). Luoma (2020) states that the level of complexity relates to the size of the organisation, increased in larger organisations. For instance, the details implemented in the juridical local detailed plan may become an unreasonable burden as formalities prevent the project from proceeding (Luoma 2020).

A traditional concern in public land use planning processes is that less regulative or private land development can lead to non-desirable construction (Ahonen 2017). Ahonen (2017) further states that examples from the Anglo-Saxon countries have demonstrated possibilities of the system whereby, for instance, the private project developers may decide for themselves how the specific buildings are designed and especially implemented. Teräväinen (2021) suggests that the development of an organisational culture in the building industry requires concurrent actions by public authorities, private companies and in education. According to Teräväinen, such actions increase the transparency of information, factual knowledge-based management and deeper and more genuine co-operation among the various parties of a construction project. Co-operation and trust play an active role in development. The public sector requires changes in organisational culture emphasising values such as openness, trust, collaboration, inter-institutional co-operation and knowledge exchange across organisations to achieve best practice exchanges together (Muggenhuber, 2006; Markkula 2006; Toivonen 2020). Such actions would benefit co-creation and co-operation (see e.g., Brandsen, et al. 2018). For instance, co-operation has positive effects on the efficiency of the process in local detailed planning (Toivonen 2020).

5.5 Land use process development in Finland

Local detailed plans have become increasingly comprehensive or focused on already built areas, which has affected the duration of the process (Rinkkinen 2007; Rinkinen and Kinnunen 2017). For instance, there is ongoing debate in

[1] e.g., REFA Chapter 2 section 5; LUBA sections 10, 79, CLUB sections 3,4, 37.4.

Finland on the private local detailed planning initiative, the expanding importance of project-based local detailed planning, and the goal of deregulation (Lehtovuori et al. 2019). To modernise legislation, the Finnish Ministries of the Environment and Agriculture and Forestry aim to simplify and generalise the processes in land use, building and real estate legislation in the coming years. There is also an aim to improve sustainability in construction (e.g., LUBA132/1999 and REFA 544/1995). The changes in legislation should further promote digital communication and automated processing of generic decision-making and implementation by exploiting digital tools and databases.

6 Case descriptions

Finnish municipalities have carried out development projects to improve efficiency in land use processes. The cities of Järvenpää, Hyvinkää and Vantaa are nationally representative cases, especially considering digitalisation and 3D BIM usage in the building permit process (Virkamäki and Vastamäki 2019; CEBC 2018). This study

Table 4. *The description of cases.*

	Case Järvenpää	**Case Hyvinkää**
Number of inhabitants	44,000	47,000
Area	39.9 km^2	336.8 km^2
Founded	1951	1917
Location	Southern Finland	Southern Finland
Total volume of building areas permitted	971,000 m^2 (2021) 630,000 m^2 (2011)	504,000 m^2 (2021) 713,000 m^2 (2011)
Number of building permits (2021)	316 (2021) 475 (2011)	348 (2021) 712 (2011)
Permit duration (days)	36 (2021) 54 (2018)	20 (2021) 45 (2018)
Development projects		
Electronic building permit and archiving	2013 electronic building permit process 2016 electronic archiving.	2015 electronic building permit process 2016 electronic archiving.
Change in operating model	2013 re-designing decision-making processes, 2019 building code	2017, re-designing decision-making processes and building code
Development project participants	building permit department, land use planning, etc.	building permit department, land use planning, etc.
	Preparation of BIM usage 2017–2019, in co-operation of Vantaa	2019–2021 digitalisation following Järvenpää
First building permit using 3D BIM	May 2021	September 2021
Cross-municipal building permits, officials are allowed to operate in both municipalities	Since 2015 (partial, e-g. head of unit) 2021 (all)	Since 2015 (partial, e-g. head of unit) 2021 (all)

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explores the development projects of two separate municipal organisations, the cities of Järvenpää and Hyvinkää during 2017–2021. The experiments were partially conducted in co-operation with the City of Vantaa (Virkamäki and Vastamäki 2019). The case cities are medium-sized in the Finnish context (45,000–50,000 inhabitants), but in close proximity to the Metropolitan Region of Helsinki. Due to its location, the city of Järvenpää in particular has been one of the fastest growing cities in the country, with high activity in various land development and building projects (see e.g. Lehtonen, 2020). The aim of the case development projects was to significantly improve performance, for example by reducing operating costs drastically or supporting convenient transactions with the participants. The experimental methods include two essential elements: 1) digitalisation, and; 2) changes in the operating model. The cases can be compared in Table 4.

6.1 Digitalisation

One key digitalisation feature in land use processes is utilising data models including 3D BIM in the building permit process. This change was prepared in the Ministry of the Environment's reform of built environment legislation (see YM014:00/2018). The reform relies on the digitalisation of the built environment and land use processes in general, such as the systemisation and data management of local detailed plans. The proposed regulations on digital data management in building permits are based on the good practices of the case cities, for example. Case Järvenpää was the first to implement digital services in building permit processes in 2013, which nowadays is in place in most Finnish municipalities. The digital development in the case cities consists of electronic application, preparation, implementation and decision-making in the building permit process. The interactions and discussions with the authorities are implemented digitally. The documents necessary for building permit decisions are digitally archived (Virkamäki and Vastamäki 2019).

The digitalisation of processes allows the use of building data models in the building permit process. The data models are 3D city models that are useful at numerous stages of building permit processing. The method is to insert the applicant's plan for future building into the city's information model, enabling immediate comparison and inspection of multiple building permit requirements. This action automates generic inspection. The use of the data model delivers efficiency in the process, which will completely eliminate construction inspection as a separate process in the future (Virkamäki and Vastamäki 2019). The first building permit submitted with the 3D model (BIM) was approved by the City of Järvenpää in May 2021 (Järvenpää, 2021). The following implementation was approved by the City of Hyvinkää in September 2021. Various additional implementations are planned in the coming months, with varying building permit requirements such as for more complex apartment buildings. In these implementations, a well-executed BIM produced the building permit decision in one day, instead of a week, or even a month. Successful implementation in case cities promotes the creation of a more standardised model for utilising BIM in the building permit process.

Moreover, digitalisation enables co-operation with other municipal organisations, allowing the use of municipally specific material irrespective of location (Virkamäki and Vastamäki 2019). Established practices and co-operation in decision-making between the organisations were promoted to allow a similar and fluent operational environment for various builders. From the perspective of resource-efficiency, the established practices allowed more flexible exchanges in resources between the organisations whenever needed.

On a national level, such extensive co-operation between independent municipalities is rare in Finland. For instance, practices vary, willingness to co-operate is needed throughout the organisations, and software incompatibility causes challenges. The case example encourages adopting cross-municipal co-operation and implementation in national legislation. Municipal co-operation and possibilities of resource exchange have been adopted in the reform of the Land Use and Building Act (see YM014:00/2018).

6.2 Changes in the operating model

Essential development elements in operating models are, for instance, re-designing decision-making processes, promoting interaction with participants, implementing cross-organisational building permit processes, and exempting small-scale projects from authorisation. These changes are related to service design and re-modelling the role of authorities. In development projects, repetitive training of authorities, data managers and other personnel as well as iterative process developments were conducted to finally obtain the results and commitment of the involved parties and organisations. The changes focus on the institutional pillars of normative and cultural-cognitive elements, on re-evaluation values and expectations, and on reforming shared understanding of service design principles. In practice, defining and explaining the basis of current working methods, shared understanding and common logic behind varying building permit decisions allowed experiments on how to redesign them.

Several pieces of legislation were enacted to streamline the efficiency of the building permit process. Authorities ensured their availability to participants and proactivity in fulfilment of the tasks. As an example, the authorities automatically offered services that the participants generally have to request later in any case. This, for instance, was based on the need to decrease the need for re-familiarisation with the case, and unnecessary interaction during the project.

In an attempt to achieve efficient service, reorganisation of the permit decisions was implemented in Case Järvenpää. Firstly, a change was made by delegating building permit decisions to authority officials from municipal decision-making bodies, allowing the latter to focus on broader decisions. The purpose of this reorganisation was to avoid delays and minimise workload caused by preparation and inducting additional parties into the process.

A broader utilisation of the relative extent principle in supervision (LUBA section 124) is one way to achieve flexibility. The extent and type of supervision is scaled on the basis of the difficulty of each building project, or the general need for guidance. However, there are variations in how extensively the method

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is employed in different municipalities requiring it (Korpivaara and Syrjälä 2015). In the case cities, small-scale projects were exempted from the building permit process. After the change shown in Table 4, in Case Järvenpää the number of permits decreased significantly between the 2010s and 2020s, and the total volume of permitted building area almost doubled. This change captures a shift in resources to more efficient use. The efficient use of resources in this case improved the quality of service by allowing authorities to decrease the duration of building permits and to offer guidance.

7 Results

This section presents the results of the interviews under the topics of changes in regulation, operating model and digitalisation. The final sub-section categorises the results.

7.1 Changes in regulation

Based on the interviews, the general consensus on construction supervision was experienced to have been under significant change. The operating models have been shifting towards the promotion of flexibility, efficiency, availability and interaction with citizens, and their needs within the process. Significant regulative changes are being prepared nationally for the entire land use processes, for example in legislation and the formation of national databanks. The building permit process specifically is subject to global sustainable development trends such as energy efficiency requirements and overall sustainability. The respondents were positive about past development, partly because they had obtained more opportunities to influence the process. In contrast, the juridical development of overall land use processes was met with expectations and concerns. Additional re-regulative needs in land use processes to promote sustainable building were considered necessary, but raised concern about the possibilities of emerging issues in practical processes from municipal building permit officials, state representatives and third-party representatives. The municipal building permit officials had especially experienced changes affecting their current workload, and there was an evident desire for electronic services:

> "In the past, the norm was born in such a way that good construction practice was confirmed into building regulation … Now, they are preparing binding legislation from scratch, which is extremely complex and very difficult for the authority to review." (N7)

Interviews with building permit officials and third-party representative revealed detailed regulation- and control-related difficulties in issuing building permits or at least hindering the benefits of construction projects. Again, relinquishing parts of control would allow flexibility. Building permit officials highlighted examples of possible resolutions: exempting a portion of small-scale building projects from regulative control, implementing less complex practices in overall land use processes (juridically), focusing on mass-based regulation and allowing project implementers more freedom to design within the designed 3D framework.

> "It's pretty general perception that local detailed plans are too detailed. I would see the question of whether the idea of what the plan seeks is achieved and then leave the designer free to implement and monitor." (N4)

7.2 Changes in operating model

The building permit officials generally perceived strict and detailed public control to be based on the assumption that lesser control would lead to non-desirable construction, both in planning and building control. The level of control was discussed, but no specific findings emerged from the answers. The answers were mostly case-dependent, even among building permit officials. The answers varied from tentative statements to claims that deregulation and decontrol would not lead to non-desirable construction, based on their experiences of successful pilot projects in municipalities. Several building permit officials based their perception on a lack of trust between the authorities and the applicant of the process. Moreover, the control and interpretation of regulation were partially perceived to overlap in land use processes, such as local detailed planning and building permit, especially in the third parties' experiences.

> "There are things in the building permit phase that need to be checked and taken care of and we are guided at that point by certain things, so these should not be guided elsewhere now (e.g., in city planning)." (N11)

Most building permit officials and state officials considered the deviation method from LUBA as an effective tool to grant flexibility in many areas, especially if done in co-operation with local detailed planning authorities. The need for deviation emerged when, for instance, local detailed planning restrictions partly differed from the practical needs. Some respondents pointed out that the use of deviation was relatively common, even in newly planned areas.

> "Planning accuracy has increased over the years. In other words, very detailed city plans are made. ... in (X city) there had been more or less deviations in every case from the local detailed plans and even so that the plan could be a year or two old." (N3)

The interview participants suggested that the operating model for the building permit process had undergone a change in recent decades towards interaction with citizens and fulfilling their various needs. Modern building permit authorities were more available to parties to the process at the beginning of the process. A change is also associated with a change in the values, where the authorities together with participants try to find the best possible outcome and to promote openness and interaction within the processes. Moreover, future changes in public organisational management and culture were expressed by some interviewees. An aspect proposed by one building permit official was to consider the building permit process as a service adapting to the applicant's own processes, preventing their need to separately produce materials and timetables for another process.

> "Building control is a service task … not so much that the permitting process prevents things from being done, but the kind of solution-oriented building

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> control… so that certain social goals are realised and at the same time we are helping, serving customers." (N10)

Building permit officials highlighted the co-operation and trust within the organisation as essential factors for streamlining the process. Co-operation between the building permit and local detailed planning processes was considered particularly useful on a case-by-case basis, or when agreeing on responsibilities. Representatives of the state and associations highlighted co-operation between municipalities and the state organisation. Third-party representatives saw co-operation as necessary for all aforementioned parties along with the applicants, to avoid complexity or contradictory statements. In order to reduce contradictory requirements or those that became gradually stricter within municipal organisations, co-operation was seen as essential.

To summarise, the levels of co-operation consist of both internal and external co-operation within municipal organisations and with other parties and participants or other stakeholders. Differences in organisational culture, practices or interpretations were perceived as problematic, possibly hindering willingness for co-operation.

> "The management culture has changed and cooperation on the national level has clearly changed. There is more doing things together and that is a good thing. And we should get out of [thinking] about 'Us' 'You' and 'Them', and see ourselves as all being in it together, doing the same thing." (N8)

Co-operation would benefit from the establishment or continuation of national best practises, as most of the interviewed municipal building permit organisations have already created processes to some extent. Further, a state representative suggested standardisation of, for instance, a pre-approval process for complete house packages, rather than re-establishing them case-by-case in every building permit process.

In terms of resource management, all respondents agreed there are deficiencies in resourcing municipal building permit processes, especially from a national perspective. Based on experiences, the challenges were caused by significant labour turnover, or a direct need for additional labour. The severity of the challenge was considered to vary between building permit organisations. Some building officials and the municipal association representative experienced that the challenge most extreme in smaller organisations. The significance of the employer image and the knowledge-based management of municipal organisations was highlighted by one of the building permit officials as affecting labour retention and availability.

> "Increasing the workload beyond tolerance is an issue" (N1)

Based on the responses in general, municipal co-operation or mutual exchange of resources was perceived as one of the potential solutions to overcoming challenges in resource management. In practice, either direct working hours or knowledge could be exchanged. Alternatively, a building permit official talked about regional building control to better ensure uniform operation. There were reservations

about practicality among municipal permit officials, since municipal organisations cannot embrace practices for co-operation where technical incompatibility or political obstacles may occur.

> "Job rotation both within and between organisations, absolutely essential. So that gives a feel to the reality of construction" (N7)

The development of the operating model was seen as necessary by the interviewees. However, building permit officials and third-party representatives acknowledged that the indicators measuring the development of building permits should be renewed. For instance, based on the aforementioned suggestions, measuring improvements in process duration is crucial but could not depict development alone. The reduction of the duration from months to weeks is significant, although decreasing the duration even further may lead to over-optimisation. The participants from the represented categories emphasised the reliability of the process as an important measurement, for example, providing a service promise as the maximum possible duration of the procedure. Moreover, as a permit official suggested, the creation of added value for citizens is essential.

The interview outcome suggests that re-evaluating the indicators of development would increase knowledge management and concentration on the reliability of the process. However, promoting necessary changes to achieve efficiency, such as increasing reliability and flexibility and decreasing complexity and arbitrary decisions, was deemed as a management challenge in public organisations by several non-public and public representatives.

> "Meeting the development aims (efficiency and citizens' needs) is a particular management challenge" (N11)

7.3 Changes in digitalisation

As mentioned, the promotion of digitalisation and electronic development was perceived favourably by interviewees. Expectations focused on digitalisation contributing to resource efficiency and allowing authorities to focus on better service delivery. Despite the process having already been digitalised during the previous decade, some building permit officials experienced that the transformation had not been significant enough. In practice, this relates, for instance, to persisting with paper-based practices in the process, especially from a data transfer and data mobility perspective.

> "I miss processes being truly digital. Currently they are paper processes transformed into digital form. There's a lot that you have to fill out on PDF forms etc. It's not genuinely digital" (N9)

The national goal is to make the data repository related to construction comprehensive, and to enable automation. Automation was expected to cover parts of the process or most of the process, depending on the respondent. In particular, the proliferation of information models and the focus of related legislative changes enabling digital transformation (see YM014:00/2018) were perceived as

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a key development perspective for process development by most building permit officials. Some building permit officials and state representatives considered the development as beneficial for other tasks or processes such as decision-making and interaction with citizens, based on better information management. For instance, one building permit official emphasised that the information model would indeed allow more efficient real estate development and property life cycle management.

> "Building life cycle management ... start thinking about the repairs and alterations needed since construction products or construction methods have some kind of estimated lifespan. Goals are set from the early stages of construction ... and then there is no need to start a long-term repair programme from scratch since it is already known [in data model] when you have to think about what structure" (N5)

7.4 Analysis and categorisation of results

The general acceptance of the changes affecting the building permit process was positive. Similarly, throughout the municipal building permit processes, there were experiences of resource deficiencies by municipal and non-municipal parties. The reservation in most cases stems from concerns about resource management, and possibly increasing workloads. The main findings are summarised in Table 5.

Inspecting the phenomena through Scott's (2008) institutional pillars of Regulative, Normative, Cultural-cognitive differentiation (see Section 3), changes in every aspect of institutions are present. The link present in the normative and cultural-cognitive pillars relates to changes of established practices and how they are understood within organisations. The national reform of legislation raised expectations and concerns depending on the topic of the planned changes. A method of forcing through new regulation without best practises was the target of some reservation, colliding with regulative and normative means. Decreasing control and regulation, such as establishing less detailed restrictions, was experienced to decrease complexity and increase efficiency. Detailed normative and regulatory control are experienced either with reservation or the necessary bureaucratic means of exercising control.

The cultural-cognitive institutional changes relate to the adaptation of different roles of authorities, such as promoting cross-organisational co-operation and proactive service as well as boosting or hindering changes. The change involves reviewing established values on how the public sector carries its processes from a normative perspective, whereas the cultural-cognitive perspective defines how the values are reviewed. Possible regulation of the mutual exchange of resources and advancements in digitalisation and automation are based on good practices from the case studies. The practices are also based on the creation of systems and guides to establish cross-municipal processes.

Table 5. *Summary of findings from the data.*

Institutional pillar	Benefits and adaptations	Challenges and reservations
Regulative, Normative	Juridical reconstruction, operating model, digital development. Changes in building control. Unifying the land use processes on a national level through digitalisation.	Juridical development of the planning system, untested regulation and its effects on workload. Resource management challenges and redefinition of indicators to meet the needs.
Regulative, Normative, Cultural-cognitive	De-control and deregulation may grant flexibility and efficiency in local detailed planning and the building permit process.	May lead to uncontrolled construction activities. Needs are case dependent and require strong co-operation within municipal organisation.
Normative, Cultural-cognitive	The change towards responding to citizen's needs promotes general desire to solve challenges together to gain mutual efficiency	The definition of a customer, especially in cases with conflicts of interests.
Normative, Cultural-cognitive	Open co-operation, co-creation, share of resources and knowledge.	Willingness, lack of trust and different practices of organisations or sub-organisations may hinder co-operation. Promotion of co-operation was deemed as a management challenge in public organisations.
Regulative, Normative, Cultural-cognitive	Mutual exchange of resources to aid deficiency e.g., in human and knowledge resources	Political willingness, technical incompatibility
Regulative, Normative, Cultural-cognitive	Digitalisation of the building permit process was anticipated to aid resource deficiency, knowledge sharing and smoothness of processes.	Variation in the expectation of the possible benefits and level of automatisation Lack of holistic view, e.g., paper-based process simply transformed into digital form.

8 Discussion

8.1 Summary of Findings

The aim of the research was to increase understanding existing challenges in land use processes, more specifically how to respond to those through developing the building permit process. In this section, the research questions are separately discussed providing answers to them.

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Q1. What kind of challenges and development needs exist in current public land use regulation and processes?

Balancing needs. The general aim of the public regulatory reform is to uphold public principles while maintaining efficient operation. Considering land use and construction, the discussions on the national level is about either increasing or decreasing regulation. Increased regulatory needs focus on, for example, sustainable building, whereas simplifying regulation would allow for increased flexibility in a changing world. Examples of similar development trends are recognised in the international context, especially in Europe and the European Union. Despite many attempts, the ongoing challenge is still to achieve balance in public control and operating organisations in order to highlight the aforementioned needs, responding to the changing needs of the future.

Complexity. Land use processes from local detailed planning to building permit processes are multi-staged and involve an extensive range of units and authorities in municipalities. The multitude of parties and variation of practices cause complexity. This complexity is a result of non-systemised practices and contradictory statements between public organisations. The complexity is especially enhanced in large public organisations due to information loss or differing internal perspectives of the case. Moreover, practices and interpretations vary between municipal organisations. The multi-staged nature of an organisation or process is present in the building permit process, since applicants may have participated in previous parts of the land use process with several separate authorities, such as local detailed planning or cadastral procedures. The final adjustment of the outcome of the overall process to the applicant's needs is included in the building permit process. The complex system is especially a challenge from an applicant's perspective, if one is unfamiliar with the particular operating model and practices of the specific public organisation. To enhance the efficiency of the land use processes in general, and the building permit processes in particular, the complexity of the process should be strongly addressed and reduced. Based on the results, the ongoing attempts to reduce the complexity are not sufficient to meet the challenge. The results highlight throughout the need to redesign the land use process or at least to consider the overall land use process rather than local detailed plans and/or building permit redesign alone. Reducing complexity is in line with the regulative reforms in an international context, especially in Europe. The institutional changes would require regulative and normative elements, such as a systematic process on a national level and decreasing diversion in practices. Changes in regulative and normative pillars could mean reviewing legislation, norms and organisational structure to streamline the overall process (Scott 2008; Ranta 2021).

Digitalisation. Moreover, the use of digitalisation entails significant possibilities related to information management and automation. Automation and IM allow the efficient use of resources, and enable better interaction with the parties involved in the process. Better information exchange and handling decreases the possibilities of misunderstanding, and allows establishing systemised ways of handling the information within organisations. As an example, the use of BIM

offers opportunities for automated verifications in building permit processes, as well as more up-to-date and comprehensive information on regulative decisions. Technological development is on the verge of allowing the use of BIM in various parts of land use, and even building permit processes. However, wider adoption would require changes in operating models and a harmonisation of practices.

Q2. How could the building permit process be improved to meet the challenges of land use processes?-

Optimising the overall land use processes should be considered, as there the different processes such as local detailed planning and building permits are closely connected. In contrast, sub-optimisation of processes can drive the development in a disharmonious direction. In a national context, the actions and developments of the building permit process require co-operation within the field of operations, for example, between public organisations, municipal ones and the state. Regulative changes can be described through regulative and normative institutional pillars, as stated in previous answers concerning, for instance, the reordering of the municipal decision-making system and exemption of small-scale building projects from the building permit process, or even in digitalisation. However, implementation of the changes is supported by cultural-cognitive elements, since the operating model consists of granted and shared behavioural patterns as organisational culture.

Operating model. Cases Järvenpää and Hyvinkää employ management redesign, co-operation and systemised production within two separate municipal organisations. Development work is being conducted in broad co-operation with several other municipal organisations such as the City of Vantaa. Systemising and merging processes is special and a significant step towards a reduction of organisational diversity and thus complexity on a national level. The work is part of changes in the operating model for the public building control organisation, and gives positive examples of national aims. The remodelling of the decision-making system, for example focusing strategic and practical decisions on the appropriate levels of organisations, as well as exempting small-scale projects from the building permit process, are part of coping with diminished resources, and regulatory reform. The reconstruction and implementation of the changes practically involved remodelling the organisational culture and shared understanding, for instance of how the public sector should focus on consistent service and processes rather than only municipal variation as a base. This change would encourage building permit officials to provide swifter processes and to respond to emerging needs. From the service design perspective, co-operative actions such as the authorities being proactive towards participants in the building permit process could be employed. As a practical gain, this decreases the need for repeated re-familiarisation with the process, since parts of the permit processes are more often conducted simultaneously.

Digitalisation. Both Case Järvenpää and Case Hyvinkää exhibit efforts to overcome problems by responding to stakeholder needs through digital development, increased municipal cooperation, and process remodelling. Digital development concentrated on the creation of data models for buildings, a 3D city

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model and electronic transactions. As an example, the applicant's needs in the building permit process are directly conveyed to the data model. Using the model, the applicant can validate their plans digitally before receiving the actual permit. The method drastically redraws the building permit process from paper-based processing to direct electronic validation, freeing up needed public resources for better quality service such as guidance. The digitalisation and development of the operating model contribute to the established goal of improving interaction between participants and reducing the complexity perceived by citizens. The first building permits accepted with the use of 3D (BIM) in the cases of Järvenpää and Hyvinkää represent an interesting sample, paving the way for an automated building permit process nationally and internationally.

Q3. How could improvements in the building permit process be adopted more widely?

The interview findings suggest that the national reform of the Land Use and Building Act and the national digitalisation projects are perceived in multiple ways. The use of data models, automation and digitalisation in general were perceived to increase information exchange, and to unravel issues related to operating resources. The regulatory changes in detailed planning legislation and sustainable building were considered more challenging, because the interviewees saw the upcoming regulatory changes as being based on coercion rather than tested best practices. Based on the findings, the regulatory change seen as coercion would increase complexity, rather than minimise it. In general, the complexity of land use processes was recognised as a challenge to be resolved. This complexity was said to be influenced by the long duration and excessive details of land use processes, such as local detailed planning or building permit processes. The differences between municipalities, municipal organisations and even official practices were perceived as further promoting the complexity. The level of complexity is affected by the trust between the public authority and the applicant of the process, or other participants.

A general solution aimed at decreasing complexity and enabling flexibility in local detailed planning is to allow deviation. However, an additional procedure would not increase efficiency in the public system. Based on the interview findings, preparing deviations collaboratively within municipal suborganisations reduces the need for deviation altogether, by establishing mutual trust and co-operation within the organisation. Deviation is seen as a suitable tool to use, with common ground rules and co-operation. The challenge is that deviations are quite common in some geographical locations. Either reducing the need to deviate, or establishing additional possibilities to deviate within existing land use processes, would be beneficial. However, such changes would involve modifications to the Land Use and Building Act. Co-operation between municipal organisations increases possibilities to even out resource deficiencies, and standardise practices in public processes to decrease complexity. The co-operation and compatibility of gross-organisational systems would allow for systematisation of services, and

the sharing of best practices. Furthermore, establishing a joint operating model and management principles would decrease variation and complexity between organisations. Compatibility needs are related to the aforementioned operating practices, judicial interpretations, technical capabilities, administrative capacity and political willingness.

In terms of internal processes, remodelling the decision-making system effects efficiency considerably as seen in Case Järvenpää. The decision-making is streamlined by 1) preventing detailed decisions from encumbering the superior municipal decision-making bodies, and 2) exempting small-scale building projects from building permits altogether. The desire for digital development such as data model design and process automation emerged strongly from both the experimental processes and the interviews. Digital development was especially expected to address the resource deficiency in many municipal organisations, as well as to improve data management and interaction between participants.

The national development of data models and increased use of 3D BIM in land use processes are bases for this digital development. The use of both systematised data models and 3D BIM increase the possibilities of process automation, making up for human resource deficiencies once technical difficulties have been overcome. The results suggest that the elements of regulative or normative institutional pillars would require changes in the cultural-cognitive pillar to achieve efficiency. This applies, for example, to the establishment of shared desire for change and co-operation. In particular, barriers to changes should be removed. Understanding and adopting digitalisation require different ways to utilise available data and tools, and this is an element of the cultural-cognitive pillar of an institution. For instance, data management should not be conveyed as it was in paper-based processes. Adoption of such ways will also aid adoption with the national development of digitalisation.

8.2 Theoretical contribution

This study contributes to the body of knowledge on public sector administration efforts to improve their processes. The efficiency of regulated public processes warrants both an assessment of the juridical framework, and empirical observations and qualitative case studies provide insight into the issue. The juridical framework consists of a set of laws and regulations such as the national Land Use and Building Act, the land administration that defines public land use processes, and the implementation of both. As the construction industry and land use processes are both subject to changes due to national legislative reform, regulative and normative pillars are used as a theoretical framework (Scott 2008).

The framework is studied through institutional pillars describing the deliverance of regulation, a specific purpose of land use and building permit processes. In this context, managing changes in institutions is visible, and required in connection with the different pillars of institutions. For instance, the study suggests that re-evaluation of the interpretation of the norms and regulation based on modern needs, allow efficiency gains. Refitting the regulative needs with building permit resources requires adaptation of new cultural-cognitive

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means. In this context, the regulatory, normative and cultural-cognitive pillars are interdependent, even though in some contexts they are described as opposites (Scott 2008).

A similar phenomenon was presented by Ranta (2021), where normative and cultural-cognitive pillars of institutions were identified as affecting circular economy implementation, even with general regulative institutional support. The institutions resist change and innovation, to some degree, for example, through isomorphic mechanisms with pressure from other organisations, and cultural surroundings (e.g. DiMaggio and Powell 1983). Similarly, the study findings suggest that there are cultural-cognitive elements in public institutions that act as barriers or drivers for change. To overcome the barriers preventing or challenging modification of regulative and normative elements, for example reform of national legislation and land use and building system, the basis of cultural-cognitive elements in public institutions needs to be considered, such as how public sector values in this industry are understood. The reforms in regulation and norms are conducted by forming a basis in cultural-cognitive understanding. On the other hand, best practices may be conveyed into regulation, if necessary.

The cultural cognitive pillars characterise the change in implementation, operational sense. Fostering an efficient culture, a new shared understanding of, for example, new or existing values forms a basis to support the reform of regulation and technology adaptation, to fully implement changes. In this case the cultural-cognitive pillar describes how well the design and implementation of regulative and normative changes were made. The cultural-cognitive elements of shared understanding of values and cultural perceptions affect on how the public processes are conducted and remodelled. Redefining processes, for instance, the extend of building control, it is critical to understand all reasons why maintained level is formed and uphold. In described cases, the remodelling of the process relates on regulative and normative elements, but the design and implementation of the changes required understanding of cultural-cognitive elements and means to alter them. The phenomenon was also present in the adaptation of digital means, such as the digital tools understood to aid or hinder the overall service aim.

The public sector's aim of fairness, justice, transparency and equality ultimately defines modern interpretations of regulation or process design. This aim also affects how public officials should position themselves; how, for instance, the values are understood, and how modern needs are included in the understanding. The indicators of different pillars are presented in Table 6.

The findings are in line with previous studies on efficiency through changes in organisational culture and operating models of public and private processes (Teräväinen, 2021; Jurmu, 2021). This study also supports the findings of previous studies on building permit processes or reforms in Australia and the United Kingdom (Hawkesworth and Imrie 2009; Liddy and Turner 2018). The institutional characteristics and connections indicate that successful overall change in public processes simultaneously involves the reform of regulation, organisational culture and management, as well as technology advances, where the cultural-cognitive element forms a foundation for a new way of thinking and

Table 6. *Indicators of public land use processes on Scott (2008) pillars of institutions.*

	Regulative	**Normative**	**Cultural-Cognitive**
Indicators in public land use processes	Laws and regulations, e.g. city building order and exemption of it.	Certified patterns: Public sector values and defined patterns, e.g. on how public officials interact and is managed.	Common beliefs on how the public sector works and should work: shared logic behind interpretation and applying values. How management structure is understood. Isomorphic mechanisms for change, basis or hindrance of change.

thus provides the means to design new public land use and building processes and to implement them.

Moreover, findings from the interviews suggest that there is variation in how cultural-cognitive elements are perceived within organisations. In practice, this means understanding the shared logic behind system design, for example, what is and what is not included in the building permit or city planning processes, as comprehensive and voluntary services. The findings suggest fostering a new mindset, a way of thinking, while renewing land use and building processes and regulation (regulative and normative elements). Patterns taken for granted or shared understanding (cultural-cognitive elements) of public sector's values and culture may act as barriers, hindering the reform of the land use and building system.

8.3 Evaluation and limitations

Research may be evaluated from several perspectives including credibility, transferability, dependability and confirmability (Lincoln and Guba 1985 pp. 218–219; Eskola and Suoranta 1998 pp. 208–212). To secure credibility, i.e. that the research findings represent the truth in interviews, the following methods were applied. The research structure is documented and presented and the research data from themed interviews were recorded, transcribed into written form and stored carefully. Further, the interpretation of data was done by two researchers. The thorough documentation, such as the recording and storing of interview data makes the material verifiable, contributes to confirmability. A consistent chain of evidence was established by systematic data acquisition and analysis from where the research conclusions were drawn.

For transferability, the interviewees were selected nationwide. However, the selection of interviewees in Finland represents a clear limitation. The country is divided in 300 municipalities, each with independent city planning. In practice, the majority of construction activity is concentrated in largest urban areas, well represented in the study, however it should be noted that, this study does not fully cover challenges in small municipalities. Moreover, the uncertainty of the

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oncoming reform of land use and building legislation affects the results, and depending on the final outcome of the reform, may render some parts of the results obsolete in future.

8.5 Conclusions and further research

The identified changes in the operating model reflect the remodelling of the organisational management and the current juridical and regulatory framework. Understanding institutional divisions and how they embrace or resist change allows for the formation of design needs. For instance, the basis for the design principles lies in digital means and knowledge management, both digitally and in organisational management and co-operation. The findings suggest that there is a strong need to reduce complexity and detailed restrictions to allow for efficiency in land use processes. The efficiency may include better resource management, reliability and use of planning time. In order to avoid complexity, it would be important to enhance the role of strategic decision-making, and enable knowledge building in the planning processes, rather than concentrating on cumbersome details. Strategic management might aid efficiency and co-operation throughout the overall land use processes, rather than partial optimisation or the micromanagement of processes. Achieving efficient and resilient land use and building administration would have a positive effect on utilising valuable resources for both economic and environmental matters.

As for future research, investigating change management and institutional drivers from private and public perspectives would give more insight into the emerging trust issues between parties, and how it is reflected in the behaviour of the different parties in practice. Additionally, the municipal organisations are keen on strengthening their own public image, their attractiveness as employers and as providers of high-quality public services. It would be relevant to study whether this could be accomplished in the coming years and, if so, how.

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Appendix 1 – Themes of the questionnaire

The interview themes are translated from Finnish.

Themes of the questionnaire that led the discussion
The interviewer explains shortly the aim of the research and interview

- **Details of the respondent & short history of experience on appropriate field**
- **Status and change**
  - What is the purpose and status of building permit process at the moment?
  - How activities have changed recently?
  - What kind of changes are coming and what changes do you see necessary?
  - Is there a shortage of resources or expertise between municipalities?
  - Do you see benefits from the exchange of resources between municipalities?
- **Applicant's needs (customer)**
  - How applicant's needs are reflected in current work?
  - How may the needs be better taken into account in building permit processes?
- **General questions**
  - What kind of possible flexibility in building permit process can be implemented in relation to the local detailed plan? Especially considering the applicant's needs.
  - How does the local detailed planning regulations serve applicant's needs?
  - Possibly ideas for legislative amendment.
- **Development processers**
  - What kind of development targets have you had or will have for building permit process?
- **Digitalisation**
  - How has the digital development affected to building permit processes?
    - Are there technical opportunities/challenges for development?
    - How can modern technology and artificial intelligence better serve customer-orientation?
  - What role do data models play in building permit process?
    - How this affects automation?
- **Change in operating models**
  - How the operating culture has changed (considering building permit)?
  - How the customer's needs can be taken more into account today?
- **Cooperation**
  - What opportunities do you see for municipal co-operation in building permit or other processes?
  - What opportunities do you see for cooperation within the organisation in land use processes?

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