'Margin of Error' in Property Valuations – is There a Need for Safety Margins in Compulsory Acquisitions?

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Key words: margin of error, property valuation, safety margin, compulsory acquisition, compensation

SUMMARY

The ownership of real property is protected by the constitution in most countries. However,in most cases the "public" has reserved a right to limit the constitutional protection of propertywhen it is necessary for the public good. In Finland compulsory acquisitions are allowed for public interest with full compensation. Compensation shall ensure that the affected party's financial position is not weakened in the process of compulsory purchase. In the FIG recommendations market value is stated to be the basis of value for the assessment of compensation.

The applicability of the market value as a basis of value for compensation has been criticized by stating that the use of market value leads systematically to too low values. This seems to justify a use of certain margin of safety which is the question that will be illuminated in this article.The study analyses the variation in property valuations which is estimated by giving the same valuation task to different property valuers. After each valuer has given his/hers opinion about the market value of the property, standard statistical methods are applied to analyze the results.

Standard deviation in the market value estimates provided by experienced valuerswas 32 %.The overall variation was - 68 % and + 113 % from the median estimate. 50 % of the valuations stayed within – 16 % and + 33 % from the median valuation. In this case the valuers were not familiar with the property market that the valuation task concerned. This means that they should have based their valuation judgement more on the input data and less on the "gut feeling". The results however indicate the opposite.

It is undeniable that a compensation based on market value is not a guarantee that it will be possible to purchase an equivalent property as replacement for thecompulsory acquiredone. It is easy to understand why the market value is in many cases too low for a property owner to feel to have been fully compensated.The problem is that we can never know if the marketvalue is correct or not because it cannot be observed. It can be even stated that every market value estimate is correct if it is done according to standardized methods.The cadastral survey model utilized in Finland seems to be quite suitable for compensation assessment because it follows the same valuation routines and does not enable "opinion shopping".

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1. INTRODUCTION

The ownership of real property is protected by the constitution in most countries. However,in most cases the "public" has reserved a right to limit the constitutional protection of propertywhen it is necessary for the public good. For example, if the society needs a land areaof a real property for a street, the owner has to convey land for that purpose, if not voluntarythen by compulsory means. For this interference there are normally strict preconditions. (Viitanen et al. 2010b, p. 5.) This article focuses onthe precondition that is perhaps the most significant one in relation to the protection of property:the requirement of full compensation.

According to Wiiala (1976, p. 134, see also Viitanen et al. 2010a, p. 14) full compensation shall cover market value of the compulsory purchased property, depreciation of value of the retaining property (severance and injuriousaffection), and other damages and costs (disturbance) which will weaken the financialsituation of the conveyor. The question is will the compensation statutes and valuation methods really lead to a full compensation? To solve this question, the term full compensation must be defined.

According to Viitanen et al. (2010b, p. 27) the compensation shall ensure that the affectedparty's financial position isnot weakened in the process of compulsory purchase. In other words, no one should be poorer because of compulsory acquisition but also not richer (see Kalbro& Lind 2007).There doesnot seem to be strict rules that the owner should be able to purchase a similar property for the same price as compensated although the basic idea of compensation indicates that this can be expected (see Viitanen et al. 2010a, p. 14), at least in theory. In practice similar properties donot in most cases exist in the market. This is why the full compensation shall (at least)ensure that thosedisplaced are able to re-establish their lives andlivelihoods in a propermanner (Viitanen et al. 2010a, p. 5).

In the FIG recommendations market value is stated to be the basis of value for the assessmentof compensation (Viitanen et al. 2010b, p. 30). Market value is determined in International Valuation Standards: "*Market value is the estimated amount for which an asset shouldexchange on the valuation date between a willing buyer and a willing seller in an arm'slength transaction, after proper marketing and where the parties had each actedknowledgeably, prudently and without compulsion*." (IVS 2011, p. 20.) According to the definition the market value cannot be estimated in every situation for every property type, not even in the developed countries where the property markets are considered to be transparent. This is why for example Finland has chosen to use fair value as the basis of value when compensations are determined. The definition of fair value is not as strict as the definition of market value. Fair value can be defined even in less active markets based on, for example, to

the utilities the property provides to its owner (service potential). If the market value can be estimated, the two values are equal. In this article the focus shall be on market value which applies in most cases.

By the definition market value can be understood as the most probable price for a certain asset. Market value is not a fact but rather an opinion. The outcome of a valuation is only certain if the valuer can accurately predict the future. Given that is not possible, there will always be an element of risk that the realized price differs from the predicted estimate. (French and Gabrielli 2004.) When the transaction actually realizes the price paid should be in 50 % of the cases lower and in 50 % of the cases higher than the market value (see Figure 1). This means that if the basis of value is market value the compensation received by the conveyors is in 50 % of the cases too low to acquire an equivalent property.

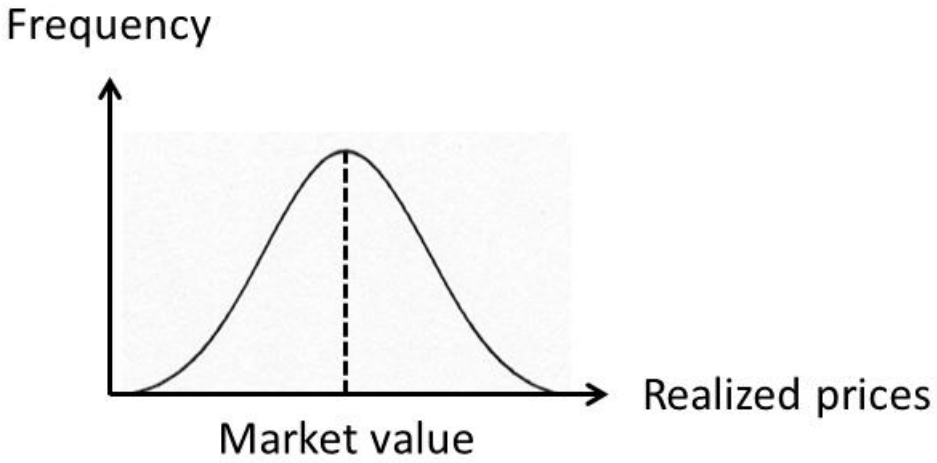

Figure 1:*Market value reflects the most probable price for a certain asset. If market value is estimated correctly realized prices should in 50 % of the cases be lower and in 50 % of the cases be higher than the market value.*

The applicability of the market value as a basis of valuefor compensation has been criticized. For example, Kalbro& Lind (2007)have stated that the use of market value leadssystematically to too low values.This seems to justify use of a certain margin of safety. This is the question that will be discussed in this article.

The purpose of this study is to evaluate the variation in property valuations.By defining the variation, the article considers whether there is a need for safety margins that could be used in compulsory acquisitions in Finland in order to avoid situations where someone's financial situation gets weakened. As a conclusion the article considers whether the Finnish procedure for compulsory acquisitions should be updated.To derive the conclusion for the development needs of Finnish legislation and compulsory purchase process, the article presents the current compulsory purchase system.

2. PREVIOUS STUDIES REGARDING 'MARGIN OF ERROR' IN PROPERTY VALUATIONS

Property valuations contain both random and systematic errors (Levy and Schuck 2005). There is a range of fluctuation both in valuation accuracy compared to sales price, and variation in valuations between different valuers (Boyd and Irons 2002).Valuation is usually understood as the process of estimating price in the market place. This estimation will be affected by uncertainties.French and Gabrielli (2004) stated that the degree of the uncertainties varies according to the level of market activity; the more active a market, the more credence will be given to the input information. And contradictory, if the market is inactive, the judgement of valuer will have more credence.

Factors identified as contributing significantly to inaccuracy in real property valuation include:

- the nature and state of the property market (Millington 1985, Bowles et al. 2001,Dunse et al. 2010),
- quantity and quality of data (Dunse et al. 2010, French and Gabrielli 2004),
- definition of value (Millington 1985, Baum and Crosby 1988, p. 5),
- the integrity of valuer (Levy and Schuck 1999),
- complexity of the property (Bretten and Wyatt 2002),
- valuation methodology (Baum and Crosby 1988, p. 20),
- skill, experience, and judgment of valuer (Gallimore 1998) and
- clients' influence (Levy and Schuck 1999, Amidu and Aluko 2007).

Crosby et al. (1998) questioned whether the 'margin of error' principle of 10-15 percent of range in valuations, which is approved in English courts, is valid according to available evidence collected from previous studies. Their study concluded that the 'margin of error' principle was lacking empirical evidence.According to Blundell and Ward (1997) 20 percent of valuations lie outside of the 20 percent accuracy range of the sales price. Matysiakand Wang (1995) found a 30 percent probability to stay within a 10 percent range in both directions, a 55 percent probability to reach plus minus 15 percent accuracy and a 70 percent probability to stay within a 20 percent variation from the sales price.Hutchinson et al. (1996) found that in comparison to average valuation (mean), 65 percent of valuations stay within 10 percent variance on both sides. In Australian suburbs, Daniels (1984, cited by Rossini 1999) found that in a 'simple' valuation task 50 percent of valuers stayed within a 5 percent variation of the mean, 95 percent within 10 percent, and 100 percent within 15 percent, and in a more complex valuation task, 39 percent of the values differed 5 percent or less, 50 percent 10 percent or less and 95 percent stayed within 15 percent variation.

Variation in valuation outcomes is usually assumed to be more limited than the valuation accuracy because valuerscomply with the same eligibility criteria (Crosbyet al. 1998). Based on the evidence collected from Finnish forest transactions the situation might be in some cases just the opposite. In Finland most of the forest transactions follow the same routine which includes the use of a certain valuation method (summation approach) with established

practices. And because both the buyer and the seller have confident on the property valuation, the valuation itself steers the prices.(Airaksinen 2008, p. 80.) The same phenomenon can be observed in the dwelling markets which in Finland are operated almost totally by real estate agents who value the objects with the same tools.

3. THE SYSTEM OF COMPULSORY PURCHASE IN FINLAND

Expropriation systems describe the process through which land is acquired and compensation is paid (Viitanen and Kakulu 2008, p. 4).The Finnish legal system represents the Romance-Germanic legal family. It is based on statutory law although other sources of law are also recognized. Administrative authorities and the state have the duty to secure justness in the society and quarantee the rights of individuals. All decisisions must be based on statutory law. And as the the law must be ”right and just” in every case, it is written in very general way. This is why it must be examined together with the legal praxis. (Korhonen 1997, p. 5.)

The exact definition of compulsory acquisition (compulsory purchase, expropration, eminent domain) vary from county to country. Generally it is understood as an act of a state or some other authority in enforcing the compulsory surrender of private property for state’s purposes. This is not the case in Finland. In Finland the expropriator can be the state (or its representative), a company mainly owned by state, a company or even a private person. Also the conveyer can a private person, a shareholder of jointly owned areas or the state (or its representative).As in most legal systems, compulsory acquisitions of real properties are allowed only for public interest in Finland. However, the term public interest is not defined in Finnish statutes, because according to legislative materialsit is considered to change in time with the social conditions.This is why the existence of public interest must be defined case by case in accordance with the legal praxis (GB179/1975 II).

Contrary to some foreign systems, Finnish Compulsory Acquisiton Act (Lakikiinteänomaisuudenjaerityistenoikeuksienlunastuksesta, 603/1977, later CA Act) doesnot include an exhaustive list of the appropriate purposes for compulsory acquisitions. Article 4 of the CA Act states that it is possible to compulsory acquire real properties for public purpose if the purpose cannot suitably be achieved in some other way or, if the harm caused to the private interest isnot bigger than the profit to the public need.

Owner of the compulsory acquired property is entitled to a full compensation for the economic losses caused by compulsory acquisition.According to legislative works compensations must be determined on thebasis of the losses of the assignor party, not on the profits of the expropriator. (Constitution of Finland, 15 § and GB 179/1975 II.)

It is a duty of the compulsory acquisition committee to investigate the lossesof the assignor party and to determine compensation in the procedure (CA Act, 41 §).However, there are a few practical exceptions to the *ex-officio*principle.

> *Those whose property is not compulsory acquired but who suffer economic losses due to the project behind the compulsory acquisition proceeding, may be*

entitled to compensation only if they claim it (CA Act, 38 §). If for example a highway is being built, the negative effects donot limit to only those properties which are compulsory acquired. In many cases the owners of neighboring properties suffer economic losses as well due to the neighborhood infringement (noise, dust etc.).

Compensation consists of object, severance (permanent) anddamage (temporary) compensation (CA Act 30, 35, 37 §). Object compensation covers the losses from the compulsory acquired real property and is determined based on the objective value (market value) that the property has. When the object compensation is determined, the subjective value of the property for the assignor party is ignored. The severance compensation maybe determined in cases where the compulsory acquisition concerns only a part of a real property. In these cases the assignor might suffer economic losses that are caused by the permanent depreciation of the remaining property. Damage compensation covers the temporary losses that might occur due to the project behind the compulsory acquisition (moving costs etc.). These compensations are illustrated in Figure 2.

Figure 2:*In figure 2 the owner of real property 13:1 has sold an unseparated parcel 13:X. According to Real Property Formation Act (later RPF Act), article 156, each real property must have an access to the nearest road. Therefore a new road (green line) must be established, in this case through properties 9:2 (forest) and 9:1 (field). If a full compensation would be determined for the owner of the property 9:1, it would consist of the following compensations: object compensation for the lost agricultural land, severance compensation for the depreciation of the remaining property (smaller fields are less valuable than bigger fields) and damage compensation for the lost crop(that the owner could not sell forward).*

All of the compensationsare determined by utilizing Sales Comparison Approach, Income CapitalizationApproach or Cost Approach, which ever suites best for determining the market value of theloss (CA Act, 30 §).

The assessment of object compensation is based on objective value of the property which equals the market value. The market value, however, does not equal the loss that the owner of the object property suffers. The loss equals the subjective value which might be higher or lower than the objective value. Had the owner agreed a voluntary transaction the objective value (agreed price)would have been higher than the subjective value and vice versa because a transaction is not made unless the parties involved gain from it (see Figure 3). Therefore it cannot be assumed that everyone is fully compensated if market values are used for compensation assessment.

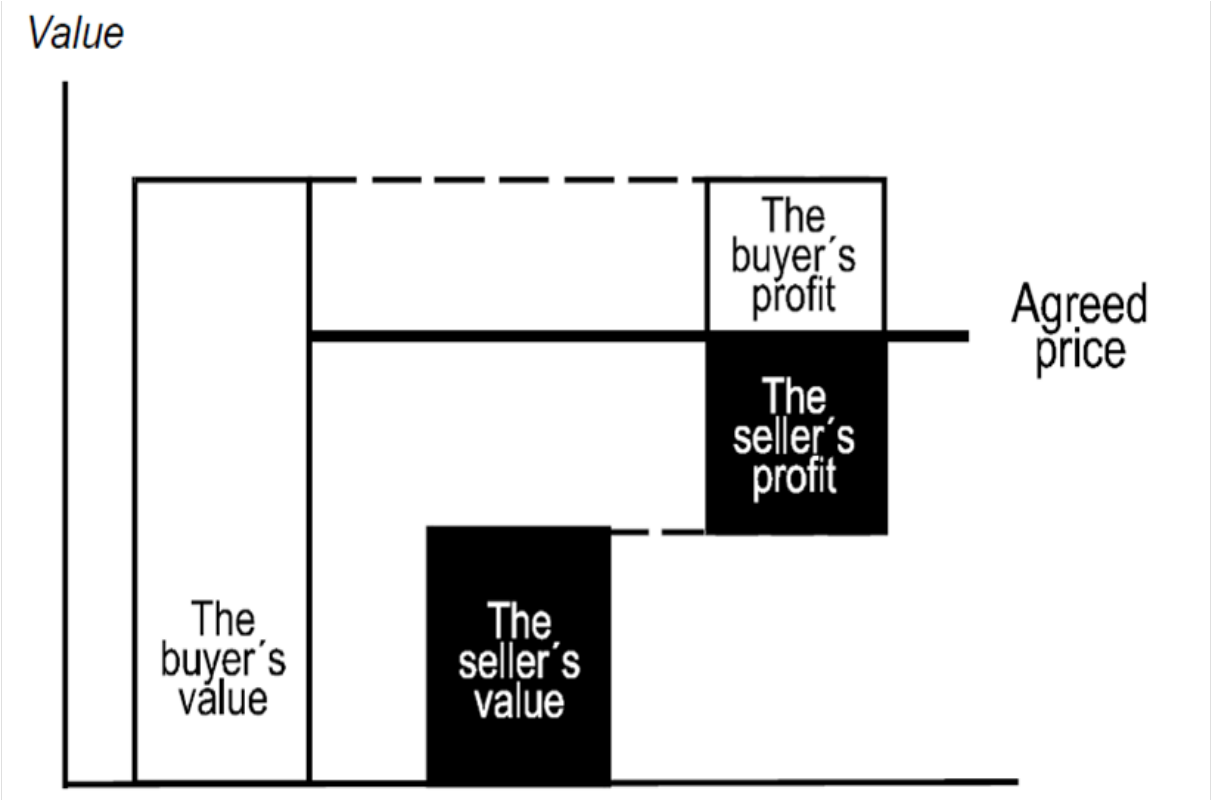

Figure 3: *Transactions are not made unless both parties gain from it. This means that the buyer's subjective value must be higher than the seller's subjective value if a voluntary transaction is made. If the seller's value is higher than the buyer's value a transaction is not realized (between these parties).*

4. MATERIALS AND METHODS

There are two main approaches to evaluate the 'margin of error' which can be defined on the basis of valuation accuracy or on the basis of variations in property valuations. This study analyses the variation in property valuations which is estimated by giving the same valuation task to different property valuers. After each valuer has given his/her opinion about the

market value of the property, standard statistical methods (min, max, average, standard deviation, distribution, percentiles) are applied to analyze the results.

The research is carried out by sending valuation simulation material (property appraisal) to respondents by e-mail. A single respondent is asked to carefully read research material with all its annexes and after that, give his/her opinion about the market value of the valued property on the basis of the given information.

Valuation task concerned a real property in the city of Nokia and its size was 11,8 hectares including 8,6 hectares of forest land, 2,5 hectares of agricultural land and an old farm. In the farm yard there was a single family home, an old barn and an old warehouse for agricultural machinery.

Full information concerning the characteristics of the valuation objects was provided together with the valuation simulation. Also the comparable data including land values (for built and unbuilt land), real property values (for single-family-homes, forests and cultivated land), asking prices (for similar real properties) and timber values was provided.A full description of the collected material and its background information is presented by Ohrankämmen (2013).

The entire group of respondents consists of two different groups, in the other were all Finnish authorized property valuers (220 persons) and in the other randomly, but regionally representatively selected sample of Finnish real estate agents (220 persons). The entire sample was thus 440 persons. After receiving the survey, one of the respondents informed that he had given up the valuation practicing due to the retirement and one stated that he does not actively participate in valuations due to his official position, leaving the effective sample size to 438 persons.

Total number of survey responses returned was 31. The low response rate (7%) can be explained by the fact that the simulation was rather time consuming to complete as it included a variety of other tasks and questions as well.

Respondents were very experienced, 25 of them had been practicing property valuation over fifteen years, four from 11 to 15 years, one from five to ten years and one under five years. Every respondent holds either a certification or an authorization for property valuation.

5. RESULTS

The main objective of this study was to evaluate the variation in property valuations.By defining the variation, the article was set up to provide suggestions for safety margins that could be used in compulsory acquisitions to secure the protection of property.

The variation was calculated by analyzing the variation in different property valuations concerning the same object. Standard statistical methods (min, max, average, standard deviation, distribution, percentiles) were applied to analyze the results.

The average value the valuers gave was 340,167 euros and the median value was 305,000 euros. This indicates that the valuations donot follow the normal distribution. Values estimated for skewness and kurtosis indicate the same thing. It seems that the estimates tend to be more elastic to higher estimates than low ones. Hiironen (2011, p. 16-17) found the same phenomenon also from another sample.Standard deviation was rather big, 108,488 euros. The minimum estimate was 195,000 euros and the maximum estimate was 650,000 euros.One observation was eliminated because it differed significantly (+500 % from the average) from the rest of the answers.

Table 1: *Results of statistical analyses.Standard deviation in valuations was 32 %.*

Number of observations	30
Mean, €	340 167
Median, €	305 000
Std. Deviation, €	108 488
Skewness	1,007
Kurtosis	0,917
Minimun, €	195 000
Maximum, €	650 000

The overall variation was on - 68 % and + 113 % from the median valuation. Standard deviation was 32 %. 90 % of the valuations stayed within – 35 % and + 95 % from the median valuation. 80 % of the valuations stayed within – 28 % and + 60 % from the median valuation. 50 % of the valuations stayed within – 16 % and + 33 % from the median valuation. It looks like there is a large variation in property valuations, considering the fact that in this research each valuer was asked to provide his/her answer based on the information provided.The results are quite similar thanwhat Hiironen (2011, p. 17) presented in his previous study. He discovered that when vacational houses were valued, 50 % of the valuations stayed within -12 % and + 31 % from the median valuation.

It has to be reminded that in this case the valuers were not familiar with the property market that the valuation task concerned. This means that they should have based their valuation judgement more on the input data and less on the “gut feeling” which wells from the market experience of the valuer. The rather large variation in the results,however, indicates the opposite.It may also indicate that they just did not familiarize themselves enough to the property market involved because this was an exercise and not a valuation task from a real client.

If the basis of value in compensations is market value, the object compulsory acquired iscompensated according to its market value. If the market value estimate is too low, so is thecompensation. The problem is that we can never know if the market value is correct or notbecause it cannot be observed (prices can be observed but market values not). It can be even stated that every market value estimate is correct if it is done according to standardized methods because market value is rather an opinion than a fact. But if market value estimates for the same object differ from one another (as they did in our research), our opinion is that it can be assumed that compensation based on market values form a similar curve than market

value estimates. This means that if the estimates form a curve with a normal distribution, half of the property owners, who have been compensated according to market values, cannot re-establish their lives andlivelihoods as they should and therefore have not been fully compensated.

6. DISCUSSION AND CONCLUSIONS

The study showed that there is a large variation in the market value estimates given for the same valuation object by different valuers. The valuation task in this study was, however, a quite complex one which, based on previous studies (Bretten and Wyatt 2002), increases the valuation inaccuracy. The object of valuation in the valuation task simulation used in this study was a quite typical one for a cadastral survey for partitioning but not actually for a cadastral survey for compulsory acquisitions. In Finland in compulsory acquisitions the object of valuation is in most casesunbuiltland, which is being currently used for either forestry or farming.

It seems that the safety margins should be rather big in order to eliminate the possibility of economic losses in compulsory acquisitions in all cases. Utilizing big safety margins would lead in many cases to a rather serious overcompensation which in return wouldnot be fair from the public point of view.

It is undeniable that a compensation based on market value is nota guarantee that it will be possible to purchase an equivalent property as replacement for acompulsory acquired unit. It is easy to understand why the market value is in many cases too low for a property owner to feel to have been fully compensated, and half are by definition entitled to feel so! On the other hand, the level of compensation should result in a fair balance between publicand private interests. The question remains, is the market value a fair balance? At least the Swedes didnot think so. In Sweden the compensation was enhanced by +25% because of valuation uncertainty (SFS 2010:832).

We consider that the benefit to the public equals the sum of benefits of the individuals who are affected by the initiative behind the compulsory acquisition. Therefore a fair balance should mean that if those who are not involved in compulsory proceedings gain something from the initiative, so should the individuals whose possession is compulsory acquired. Because the initiative behind the compulsory proceedings usually affects positively to other properties (e.g. due to better accessibility), market value of the acquired property is not enough to re-establish the former livelihood.Based on the observations made in this research it seems just to employ some sort of safety margin or additional compensation. It cannot be fair that the assignor party who unwillingly participates the project behind the compulsory acquisition bears the risk of uncertainty in valuations. An explicit answer on the scale of the safety margin cannot be given based on the observation made in this study. Previous studies implicate that the safety margin utilized in Sweden would most likely eliminate the risk of weakening someone’s financial situation in compulsory proceedings.

The process in the Finnish cadastral survey model seems to be quite robust for uncertainty in valuations because it doesnot enable “opinion shopping”. In cadastral survey model the valuation is done by a highly educated valuer who represents impartial side and has no personal interest in the valuation outcome. They are also obligated to follow the same valuation routine which is of major importance. As Crosby (2000) has made it known, it is more important that a valuer follows an appropriate methodology rather than that the resulting valuation is “accurate”. Why should valuers alone among other professionals be judged by the result. Doctors do not always cure the patient, lawyers do not always win the case, but still they are judged by the way in which the task was done rather than what was the outcome.

REFERENCES

Airaksinen, M. 2008. Summa-arvomenetelmämetsänmarkkina-arvonmäärittämisessä – in Finnish (The summation approach for determining the market value of forest properties). National Land Survey of Finland. ISBN (pdf): 978-951-22-9267-7. 138 p.

Amidu, A-R., Aluko, B. T. 2007. Client influence in residential property valuatios: an empirical study. Property Management 25:5 (2007). pp. 447-461.

Baum, A., Crosby, N. 1988. Property Investment Appraisal, 2nd edition.Routledge, London.

Blundell, G., Ward, C. 1997. The Accuracy of Valuations – Expectation and Reality. The University of Reading.

Bowles, G., McAllister, P.,Tarbert, H. 2001. An assessment of the impact of valuation error on property investment performance measurement. Journal of Property Investment & Finance19:2 (2001).pp. 139-157.

Boyd, T., Irons, J. 2002. Valuation variance and negligence: the importance of reasonable care. Pacific Rim Property Research Journal, vol. 8 No. 2, 2002, pp. 107-126.

Bretten, J. and Wyatt, P. (2002), Variance in Property Valuations for Commercial Lending, RICS Foundation, London.

CA Act. 603/1977. Laki kiinteän omaisuuden ja erityisten oikeuksien lunastuksesta – in Finnish (Compulsory Acquisition Act).

Constitution of Finland. 731/1999. Perustuslaki – in Finnish (Constitution of Finland).

Crosby, N. 2000. Valuation accuracy, variation and bias in the context of standards and expectations. Journal of Property Investment & Finance. Vol 18. Iss. 2. 2000. Pp. 130-161.

Crosby, N., Lavers, A., Murdoch, J. 1998. Property valuation variation and the ´margin of error´ in the UK, Journal of Property Research15, 1998. pp. 305-330.

Daniels, M. 1984. Test of Variance in Valuation Figures Placed on Individual Properties by Different Valuers. Unpublished Student Project, South Australian Institute of Technology, Department of Property Resource Management, School of Accountancy.

Dunse, N., Jones, C., White, M. 2010. Valuation accuracy and spatial variations in the efficiency of the property market. Journal of European Real Estate Research3:1 (2010). pp. 24-45.

French, N., Gabrielli, L. 2004. The uncertainty of valuation. Journal of Property Investment & Finance 22:6 (2004).pp. 484-500.

Gallimore, P. 1998. The Objective in Valuation: A Study of the Influence of Client Feedback. Department of Surveying, Nottingham University.

GB 179/1975 II. HallituksenesitysEduskunnallelunastuslainsäädännönuudistamisesta – in Finnish (Government Bill on Compulsory Acquisition Act).

Hiironen, J. 2011. Arviointitarkkuuskiinteistöarvioinnissa – in Finnish (Property valuation and valuation accuracy). The Finnish Association for Real Estate Valuation. Kiinteistöarviointi 1/2011. pp. 16-17.

Hutchinson, N., MacGregor, B., Nanthakumaran, N., Adair, A., McGreal, S. 1996. Variations in the Capital Valuations of UK Commercial Property, research report, The Royal Institution of Chartered Surveyors, 1996. 32 p.

IVS 2011. International Valuation Standards, 9th edition.International Valuation Standards Committee. ISBN:978-0-9569313-0-6. 128 p.

Kalbro, T., Lind, H. 2007. Compulsory Purchase: Reasonable and Fair Compensation. Nordic Journal of Surveying and Real Estate Research 4:1 (2007) 7–22.

Korhonen, I. 1997. Expropriation of Real Property - General Laws on Expropriation in Finland, Sweden, Norway and England. Helsinki University of Technology. ISBN 951-22-3846-2. 137 p.

Levy, D., Schuck, E. 2005. The influence of clients on valuations: the clients' perspective.Journal of Property Investment &Finance, Vol. 23 No. 2, 2005,pp. 182-201.

Levy, D., Schuck, E. 1999. The influence of clients on valuations. Journal of Property Investment and Finance 17:4(1999). pp. 380-400.

Matysiak, G., Wang, P. 1995. Commercial property market prices and valuations: analysing the correspondence, Journal of Property Research, 12, 1995. pp. 181-202.

Millington, A.F. 1985. Accuracy and the role of the valuer. Estate Gazette, No. 276, p. 603.

Ohrankämmen, J. 2013. Theeffect of framing in real estate appraisal - a simulation. (yet unpublished MBA-thesis).Nyenrode Business Universiteit.

RPF Act 554/1995. Kiinteistönmuodostamislaki – in Finnish (Real Property Formation Act).

Rossini, P. 1999. Accuracy issues for automated and artificial intelligent residential valuation systems. Paper presented in International Real Estate Society conference, Kuala Lumpur, Malaysia, 26.-30. January, 1999. 11 p.

SFS 2010:832. Lagomändringiexpropriationslagen – in Swedish (Act on changing the Expropriation Act in Sweden).

Viitanen, K., Vo, D.H., Plimmer, F., Wallace, J. 2010a. Enemark, S. (ed.). Hanoi Declaration. Land Acquisition in Emerging Economies. FIG Publication No. 51. International Federation of Surveyors (FIG). ISBN 978-87-90907-82-2.

Viitanen, K., Falkenbach, H., Nuuja, K. 2010b.Compulsory Purchaseand Compensation. Recommendations for Good Practice. FIG Publication No. 54. International Federation of Surveyors (FIG). ISBN 978-87-90907-89-1.

Viitanen, K., Kakulu, I. 2008. Global Concerns in Compulsory Purchase and Compensation Processes. FIG Working Week. Stockholm, Sweden 14-19thJune 2008.

Wiiala, A. 1976. Kiinteistöarvioinninkäsikirja – in Finnish (The handbook of property valuation – in Finnish). VTT Technical Research Centre of Finland.275 p.

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