CAUSES ANALYSIS OF UNSOLD NEW HOUSING STOCK BY CAUSAL LOOP DIAGRAM

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ABSTRACT: The unsold new housing stock is an important phenomenon that affects the financial status of construction companies in the housing market. It gets impacts from various variables constituting the housing market. This study identified the causes of 'unsold new housing stock' by analyzing the correlation between unsold new housing stock and the supply/demand in housing market. The study used system dynamics for the analysis.

Keywords: *Unsold New Housing Stock, Housing Market, System Dynamics, Causal Loop Diagram (CLD)*

1. INTRODUCTION

According to the Ministry of Construction and Transportation, there were 'unsold new housing stocks' more than 100,000 units in the years of 1995, 1996 and 1998. The insolvency ratios of construction companies for 1995, 1996, and 1998 were 3.16%, 4.04%, 7.01% respectively, which were quite higher than other years. The increase in unsold new housing stock is an important phenomenon that affects the profitability and financial situation of construction companies; however, it had been only used as an index when predicting the housing economy. There are not enough in-depth researches on unsold new housing stock.[1] This study will analyze the dynamics between various variables of housing market through system dynamics and identify the causes of unsold new housing stock.

2. SYSTEM DYNAMICS

System dynamics is a modeling method that is widely used in analyzing systems of industry, economy, society and environment.[2] The Causal Loop Diagram (CLD) is the core of system dynamics modeling, identifying the structure of feedback using arrows in indicating the causal relationship between variables. In the construction industry, system dynamics are used in the construction policy analysis, construction duration delay and contract ordering methodology; however, there is no study on unsold new housing stock using system dynamics. Therefore, the CLD suggested in this study would be able to contribute in the planning of future policies and projects on housing especially, the on unsold new housing stock issue.

3. System dynamics for unsold new housing stock

(1) The impact-variables of unsold new housing stock

Identification of variables is an important process when choosing the major variables that give impacts on current issue. The variables related to unsold new housing stock have been classified into three variable categories of: housing supply, housing demand and economic elements. Detail variables for each variable category were chosen by existing literature and statistical data.

(2) CLD of housing supply

Correlation in housing supply was inferred by having investment as a major impact-variable. As seen in ㄱ, the CLD of each variable is defined as the change in supply-demand difference caused by ROI, housing price rise and Supply of new houses. When the housing supply quantity is on optimum level, the housing market is on balance;

however, if the supply exceeds demand too much, it affects the new house demand and the unsold new housing stock increases.

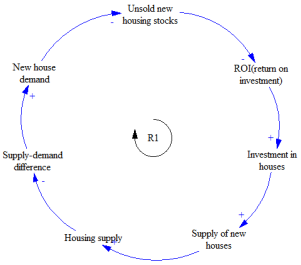

Fig. 1 Causal Loop Diagram of housing supply

(3) CLD of housing demand

Fig. 2 is the negative feedback structure of impact-variables in housing demand. The supply-demand difference will decrease by the excessive supply of housings; which can impact on fall of housing price. The fall of housing price will decrease expected transaction profit, discourage Motivation for asset investment, decrease housing demand and consequently increase unsold new housing stock.

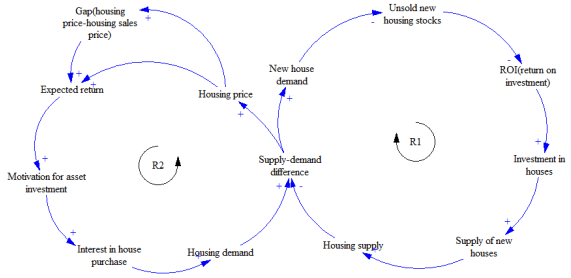

Fig. 2 Causal Loop Diagram of housing demand

(4) CLD by macro-economy

Fig. 3 is CLD by macro-economy that has more elements than others. Like in R3-1, R3-2, variables related to household income such as Mortgage and Mortgage repayment capability give direct impact on the increase and decrease of housing demand.

Like in R4-1, R4-2, the rises in Mortgage interest rate and Production factor cost caused by decline in macro-economy increases housing selling price and results in the decrease of housing demand. The feedback loop of macro-economy variables has been found as positive feedback structure increasing the unsold new housing stock as in R3-1, R3-2, R4-1 and R4-2.

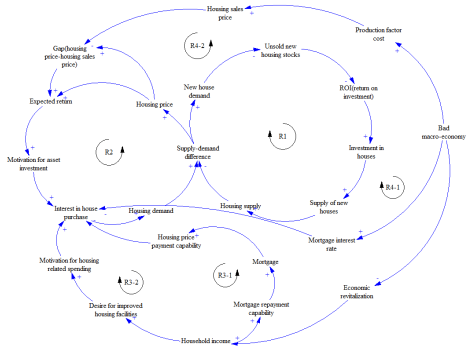

Fig. 3 Causal Loop Diagram by macro-economy

4. Conclusion

In this study, the variables were drawn through the review of existing research literature. The CLD in system dynamics used in the analysis of correlation between variables. Different from the previous single-direction impact-elements analysis, it was possible to draw 22 causes of unsold new housing stock by way of correlation impact analysis using CLD. If a simulation would be done utilizing the CLD suggested by this study in the future and more objectivity would be secured, it is believed that more effective solution could be suggested when policies to decrease the unsold new housing stock would be established.

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REFERENCES

[1] Jung, C.M., Kim, J.S., "The Role of Unsold new Housing Stocks in the Housing Market", Journal of Korea Planning Association, Vol.40, pp. 81-91, 2005.

[2] Sterman, J., "Business Dynamics : System thinking and modeling for a complex world", McGraw-Hill, New Yock, pp. 191-232, 2000.