

Interaction between individual's psychological mechanisms and time-space constraints to explain individual's day-to-day discretionary activities behaviour: Case study in the Bandung Metropolitan Area, Indonesia

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An individual's time-space prisms (Hägerstrand, 1970) is an important concept to understand the decision making processes that underlie individual's activity-travel patterns. Each individual have different needs and constraints on different day which interaction between them create a unique time-space path between individual on different day. Failing to understand this interaction will underestimate the individual's complex decision making processes in performing an activity or a travel.

Whilst there have been various studies which try to integrate individual's daily constraints in predicting his/her travel patterns, there is a lack of knowledge on how individual's motivation, volition and habit influence his/her participation in particular behaviour to satisfy his/her needs and desires in the given day. Attitude theory provides a mechanism for how the individual's own, as well as other people's subjective characteristics influence the individual's behaviour. However, the theory is often seen to infer individual's behaviour in the same way across different temporal, geographical and social context (Dijst et al, 2008). Therefore, understanding the interaction between psychological mechanism and the individual's time-space constraints will explain the individual's behaviour better and will enhance our understanding of the complexities underlie individual's decision making processes.

Using three weeks of household's time-use and activity diary including individual's relevant cognitive reasons and past behaviours, this paper will simultaneously examine the relationship among subjective characteristics, individual's activity diary, and socio-economic variables to his/her grocery shopping behaviours and out-of-home social-recreational activities. Furthermore, build environment and perceived accessibility variables were also applied in this study to investigate the influence of the objective and subjective of urban surrounding. To explore day-to-day variations in activity time allocation, the model is independently developed for each observation day from Monday to Friday. A separate daily based model is considered to be better suited to exploring the data, rather than a pool-aggregate model (Kang and Scott, 2010). However, this study ignored individual's variation on same day in different week. Same day in different week was treated as pooled-aggregate of each day model.

$$Y_{i,m} = BY_{i,m} + \Gamma X_{i,m} + U_{i,m}$$

Assuming:

$Y_{i,m}$ is $T \times m$ matrix of endogenous variables, $X_{i,m}$ contains $T \times k$ matrix of exogenous variables and $U_{i,m}$ is $T \times m$ matrix of error term and would be independent and identically distributed (iid) for different i of different individual and m for different equation. Then, B is $T \times m$ matrix of direct effect of endogenous variables, Γ is $T \times k$ matrix of direct effect of exogenous variables.

It is assumed in this study that individual' behaviour is a complex mechanism between individual's time-space constraints and his/her subjective characteristics. Excluding one of them tends to underestimate individual's decision making process to participate in certain behaviours.

Individual subjective characteristics do not influence participation the behaviour every weekday. On day-to-day level, individual may have different commitment and intention, and frequency to involve in certain behaviours on particular days. Moreover, individual tends to have day-to-day variability of subjective characteristics shaped by different time-space constraints on different day.

The analysis results show that different type of discretionary activities tends to have different complex mechanism on different day. Grocery shopping is a conscious activity rather than habit conducted when it is needed to fulfil individual's stock. Participating in this activity needs to have strong commitment and intention which must match with individual's time-space constraints on the given days. On the other hand, having longer time-use for other activities and travels shows higher impact to reduce out-of-home social-recreational activities than grocery shopping across days. Out-of-home social-recreational tends to have more temporal flexibility than grocery shopping in developing country context (which is in line with Dharmowijoyo et al, 2015). Therefore, strong conscious commitment and intention, and habit may be needed by individual to participate in out-of-home social-recreational on Tuesday and Thursday, respectively, when time-use for other activities and travels tends to more strongly reduce time allocation to particular behaviour. In grocery shopping model, how dense trade centre, and agriculture/plantation area to be located within individual's resident zone are more likely to affect the behaviour across days, and on Monday, Thursday and Friday, respectively. Therefore, targeting different policies tends to influence different impact on different type of discretionary activities time-use participation.

Furthermore, the estimation results also show that the one who travel with more flexible modes tends to spend more time on out-of-home social-recreational than grocery shopping than the one who travel with more percentage of less flexible modes. In-line with this, the person with higher percentage of multitasking activities within in-home mandatory which may be a non-worker, and a public transport or a non-motorised modes user is more likely to allocate shorter time-use for out-of-home social-recreational, but longer grocery shopping. However, with lower impact than multitasking with in-home mandatory, the one with more time pressures who concurrently undertakes multitasking within in-home discretionary and out-of-home mandatory tends to reduce his/her time-use for grocery shopping and out-of-home social-recreational, respectively. Moreover, the one who performs longer other out-of-home activities tends to reduce time-use for grocery shopping and out-of-home social-recreational across days with stronger magnitude than in-home activities. Probably, individual has his/her out-of-home time-use budget (Marcheti, 2004) which limits his/her time-use for out-of-home activities.

Reference

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