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Stakeholder views about Land Use and Transport Integration in a rapidly-growing megacity: Social outcomes and integrated planning issues in Seoul

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ABSTRACT

Land use and transport integration (LUTI) has been promoted around the world as essential for sustainable urbanization. Using Seoul as a case study, this paper critically examines if and how LUTI policy can bring positive social outcomes, including accessibility and quality of life, in rapidly-growing megacities. We explored stakeholder views about the experience of these outcomes in different localities, and about critical elements and processes needed to enhance social outcomes. Our research identified that facilitating compact urban form around transport nodes does not guarantee increased accessibility or livelihood opportunities. The outcomes are closely related to the quality of development around nodes, accessibility to public facilities, local mobility, and functionality of pedestrian paths. Ensuring sustainability of social outcomes from LUTI approach requires: balancing restrictions and incentives to control quality of development around nodes; creating cost-effective strategies to maintain local environmental quality; applying flexible rules to address varying priorities and opportunities in different localities; and multi-level planning that balances the responsibilities of metropolitan and local stakeholders to facilitate desired outcomes. We conclude that, in rapidly-growing cities, a flexible and holistic approach to integration should be applied to reflect diverse needs and local circumstances and to ensure fair benefits across the city.

1. Introduction

Megacities across the world invest in mega infrastructure projects to promote economic growth, improve accessibility, address environmental issues, and enhance quality of life (Chapin, 2012; UN-Habitat, 2017). How to facilitate sustainable development through urban infrastructure has been discussed by many authors (e.g. ADB, 2006; Banister, 2008; Givoni, Macmillen, Banister, & Feitelson, 2013). Emphasis has been placed on the importance of having an integrated approach to mega urban transport projects (MUTPs), specifically land use and transport integration (LUTI), to be a catalyst for the sustainable growth of megacities and the regeneration of neighbourhoods, especially in European and North American contexts (Bertolini, 2012; Cervero, 2001; Hall, 2008) and increasingly in Asia (ADBI, 2019). Such an approach is considered key to achieving sustainable urban forms, especially in cities experiencing rapid development (Sung & Oh, 2011). Various cities have implemented LUTI-oriented policies, particularly in the form of Transit-Oriented Development and Compact City (Bertolini, Curtis, &

Renne, 2012; Jenks, 2019; OECD, 2012). An integrated approach has been promoted on the assumption that it would enhance the achievement of the objectives of infrastructure development, specifically to increase accessibility to opportunities and enhance the wellbeing of the whole of society (Bertolini, 2017).

Theoretical discussion and policy debates about LUTI policy have primarily addressed the economic effects of the spatial changes triggered by an integrated approach to MUTPs (Kim, Gu, & Park, 2008; Mathur, 2019; World Bank, 2017). Rather than reflecting on a holistic perspective of outcomes, what tends to be measured is the increase in land prices and employment density (see Jin & Jin, 2015; Randolph, 2006). Some scholars (Lee, 2018; Stanley, 2014) have argued that, in order to go beyond the current focus only on the development effect at the nodes irrespective of the socio-economic context, more attention must be given to the long-term consequences of current planning practices on local situations. There needs to be an assessment of the sustainability of social outcomes (e.g. the distribution of quality of life across local communities) that result from the implementation of MUTPs

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and from the subsequent spatial transformations they create (Jones & Lucas, 2012; Lee, 2018; Vanclay, 2017).

The need for a holistic approach to spatial and transport development integration has been addressed by several authors (Curtis, 2012; Givoni et al., 2013; Stanley, 2014). Jenks (2019) and Neuman (2005) argued for greater examination of the problems either created or ignored by top-down planning policies that only focus on high-density, compact development. If, and how, such planning policies create broader social outcomes is being questioned (Bramley & Power, 2009; Prince's Foundation, 2014). Various authors (Scherrer, 2019; Stanley, Stanley, & Hansen, 2017) have stressed the need to explore the way LUTI-oriented policies and processes could address positive societal outcomes, especially in fast-growing cities that attempt to achieve sustainable urban form through transport development and land use transport integration (UN-Habitat, 2016).

We address the gaps in the theoretical and empirical examination of the social outcomes that arise from the implementation of LUTI policies, especially in rapidly-developing megacities. Our paper examines stakeholder perspectives about the social consequences induced by MUTPs and LUTI policies that focus on high-density development around transport nodes. The consequences we examined included: increased accessibility to opportunities; improved quality of daily life; and the extent to which benefits are fairly distributed across local areas. These outcomes tend to comprise the original rationale for MUTPs and LUTI. Furthermore, we identify the key barriers to, and opportunities for, creating positive societal outcomes in spatial planning policies and processes. The research used the case of Seoul, which can be considered as an exemplar of megacities that have experienced rapid urban development and that have applied LUTI policy. Looking at Seoul is useful to enhance understanding of Asian planning practice and to contribute to the literature on the applicability of a LUTI approach (Sung & Choi, 2017).

2. An integrated approach to Mega Urban Transport Projects for sustainable urbanization

Most megacities – i.e. cities or conurbations of around 10 million and more – have had growing pains, including social and environmental impacts arising from the rate and quality of their development (Cervero, 2001; UN-Habitat, 2016). Many cities, e.g. Bangkok, London, Mexico City, New York, Sao Paulo, and Seoul, have faced severe problems, including traffic congestion, environmental degradation, and unbalanced spatial development (Stanley, 2014; Sung & Choi, 2017). To cope with such problems, an integrated approach to mega-urban transport development has been advocated (Cervero & Murakami, 2009; Heeres, Tillema, & Arts, 2016; Legacy, Curtis, & Sturup, 2012). Under the name of Transit-Oriented Development (TOD) or Compact City, the urban planning policies of such cities aim to achieve the integration of land use and transport by facilitating development of a compact urban form and a pedestrian-friendly environment around transport nodes (Hall, 2008; Sung & Oh, 2011). LUTI policies focus on increasing density through high-rise development in central areas, where accessibility levels are usually high (Stanley, 2014).

A few scholars (e.g. Neuman, 2005; Stanley et al., 2017) have argued for a holistic approach to LUTI to bring about long-term sustainable outcomes that reflect societal needs and local circumstances. The social consequences arising from an integrated approach – e.g. accessibility to life-enhancing opportunities, quality of life of local communities, and distributional effects – are being questioned (Bramley & Power, 2009; Burton, 2000; Martens, 2012). Urban planning policies in many megacities have primarily focussed on facilitating high-density development at transport nodes through a top-down planning approach, regardless of the needs, priorities, and interests of local neighbourhoods (Scherrer, 2019; Wang & Shaw, 2018). Such policies have mainly aimed to maximize development effects through densification, rather than to operationalise the fundamental purpose of integrated planning – i.e. to

provide a range of activities for local people and to enhance livelihood opportunities (Litman, 2019; Martens, 2012; Stanley, 2014). There is lack of consideration of the effects of LUTI-oriented policies on different localities that can vary widely in terms of size, function, socio-economic context, and level of centrality (Lee, Yi, & Hong, 2013). A top-down planning approach is likely to create limited positive impacts by failing to address the varied socio-economic needs of different localities (Neuman, 2005; Scherrer, 2019; Searle, Darchen, & Huston, 2014). Furthermore, the applicability of an integrated planning approach in rapidly-growing cities has been questioned because densification policies may lead to deterioration of social and environmental conditions (Jenks, 2019).

The actual social outcomes from the implementation of MUTPs and LUTI-oriented policies must be critically evaluated in a way that considers the interests and needs of local neighbourhoods and how they were affected (Lee, 2020). Such an evaluation would seek to understand the outcomes from the perspective of local stakeholders, especially the extent to which their various livelihood opportunities had changed (Wang & Shaw, 2018). The overarching questions to be considered in this paper are: to what extent and how do spatial changes induced by MUTPs and LUTI planning policies create positive benefits for local neighbourhoods and facilitate a fair distribution of benefits across the city over time? We explore this question by undertaking a case study of Seoul, a megacity that has rapidly developed, has implemented many MUTPs, and has explicitly applied LUTI policies to pursue sustainable growth and environmentally-sustainable development (Sung & Oh, 2011).

3. Seoul's approach to integrating land use and transport for sustainable urban development

Seoul is a megacity that has experienced socio-economic disadvantage and environmental pressure from its rapidly-growing population and economic growth since the 1950s (Cho, 2005) While the population went from 1 million to over 10 million, the metropolis has continually extended its transit system (having 9 subway lines of approx. 350 km as at 2020) to reduce traffic congestion, support employment growth concentrated in the centre and sub-centres, and to increase access to the centres from a wider area (SMG, 2003). The LUTI concept has influenced transport and spatial planning policies, especially from when the subway network was extensively expanded in the late 1990s and 2000s (Sung & Choi, 2017; Sung & Oh, 2011). High-density transit-oriented urban development (e.g. subway station area development) was promoted by the Seoul Metropolitan Government (SMG) as being key to achieving compact, effective and environmentally-friendly urban development (SMG, 1997, 2006) (see Table 1). The official comprehensive urban plans (2011 and 2020) established 'increasing the distribution of quality of life' and 'accessibility to jobs and services across the city' as key priorities, and considered that these would be achieved by facilitating the development of socio-economic hubs around the transport nodes. Subsequently, local plans (i.e. Jigudanwi Gyeheck in Korean) were established by SMG and local authorities to facilitate high-density commercial and mixed development around nodes, and to trigger socio-economic development.

To operationalise LUTI policy, various instructions have been embedded in the planning policies (MOLIT, 2003, 2018; SMG, 2014) to control land use around the nodes, and along and near the main pedestrian roads and laneways near the main roads (Sung & Oh, 2011). Local plans identified various prohibited and suggested types of land use activity, and the minimum and maximum levels of allowed density and heights of buildings that developers had to consider in order to obtain development permits. If developers followed the suggested instructions, various development incentives – e.g. rights to build higher and denser development – were generally provided. These instructions included developing land use activities that were likely to: increase centrality at the nodes (e.g. high-rise office buildings, convention centres, cultural

Table 1
Direction for spatial development at transport nodes in Seoul.

	Seoul Plan 2020
Overarching objective for LUTI	To strengthen the centrality of transport nodes in the sub-centres and key local centres in order to improve the public transport system and increase accessibility to jobs for everyone in Seoul.
Specific instructions for LUTI-oriented development	- Avoid a linear pattern of commercial development - Priority to be given to high-density, high-rise, mixed development - Integrate stations with adjacent buildings and land uses - Develop transport transfer facilities and public spaces at major nodes - Regeneration of housing near nodes - - Develop new spatial developments and transport developments together
Instructions for districts	Enhance the centrality at nodes, improve condition of housing and public facilities, and have a context-specific approach to local development

Source: SMG (2006).

complexes); integrate public open space and pedestrian paths in private land; contribute to widening pedestrian paths; and constructing and donating public facilities to the SMG (MOLIT, 2003; SMG, 2014). When development proposals are finalised by developers and are consistent with the local plan of the respective neighbourhood, they are then reviewed by local authorities (i.e. district governments). The final decision is made by the metropolitan government, SMG.

The rules for land development at the local level varied in accordance with the level in the urban hierarchy (Batty, 2006). Like many other megacities (notably London), in the SMG's planning policy (SMG, 2006), the localities in Seoul (or at least the centres of the localities) are classified according to their role, function, and level of centrality. They are categorised into three groups: Centres and Sub-centres (e.g. CBD and other key business districts); Quarter centres; and District centres (MOLIT, 2003). In Seoul, there is considerable diversity between localities at the different levels of the urban hierarchy, but relatively limited diversity within the levels (Kim et al., 2009) (see Table 2). As the metropolitan-level socio-economic hub, the centres in the Central Business District (CBD) have the highest level of substantial retail and office facilities, while the district centres have a higher proportion of local shops (Kim, Lee, & Kim, 2012).

The implementation of LUTI policies and the metro lines have triggered spatial transformation through changes to the spatial structure of Seoul and to the land use patterns around nodes (Jin & Jin 2015; Jun,

Table 2
Varying characteristics of localities at different urban hierarchy levels in Seoul (SMG, 2006).

Centres classified according to the urban hierarchy	Relative amount of foot traffic	Relative amount of commercial land use	Primary strategy of local spatial planning policies(SMG, 1997, 2006)
Centre and sub-centre (CBD + 5 sub-centres)	High	High	Strengthening global and metropolitan level centrality as CBD
Quarter centre (11 centres)	Middle	Middle	Strengthening centrality by balancing residential and commercial function, providing public facilities, creating landmark buildings
District centre (53 centres)	Low	Low	Strengthen centrality by increasing commercial land use and enhancing access to public facilities

2020). A major change was that high-density, mixed land use development tended to occur around the nodes in the CBD (Sung & Choi, 2017). There was an increase in accessibility to opportunities in the CBD due to the continual concentration of jobs and services, as well as the enhancement of the transport network (Choi, Gu, Lee, Kim, & Seung, 2012). However, as in other megacities (Curtis, 2012; Scherrer, 2019), some authors (Hwang & Cho, 2008; Kim & Lim, 2011) have questioned the long-term social outcomes from the LUTI-oriented policies of Seoul, especially the extent of contribution to enhancing life opportunities and to the equal distribution of accessibility and wellbeing across the city. In many quarter and district centres, the level of spatial development around nodes appeared to be limited over time, contributing little to the development of the local socio-economic hubs or to enhancing accessibility to a range of activities (Lee, Arts, & Vanclay, 2020). Moreover, the effectiveness of the planning approach for MUTPs has also been questioned (Lee, Lee, & Chung, 2015). Overall, it is not clear whether LUTI policies have actually facilitated an integrated planning approach that has brought about social outcomes that have met the varied interests and needs of local people living across Seoul (Choi et al., 2012).

4. Methodology

This paper examines the social outcomes arising from LUTI-oriented development that are experienced by local residents and other stakeholders. It also considers the critical elements of planning policies and practices that are needed to enhance the social outcomes from the spatial transformations that are induced by MUTP and LUTI policies. To investigate the social outcomes, the extent to which spatial changes contribute to providing access to a range of activities for local people and to improving quality of life, and the extent to which benefits are distributed across local areas, needs to be considered (Litman, 2019, 2020; Yildiz, Kivrak, Gultekin, & Arslan, 2020). Therefore, we examined how local stakeholders experienced the changes in land use patterns, layout of roads and pedestrian paths, and to their local environment. The quality of life of local communities refers to accessibility to jobs and services, local mobility, and key factors affecting daily life, such as community cohesion, socio-economic vibrancy, and sense of place (Bramley & Power, 2009; Lee, 2018; Martens, 2017; Rydin, 2010). In addition to examining social outcomes, key barriers and opportunities in spatial planning policies and practices were identified, and the implications for MUTP practice and planning were examined.

We used a multi-methods approach to examine stakeholder perspectives about the social consequences of LUTI policy and MUTPs. We conducted site visits, focus groups with local residents, group discussions with planners, and spatial analysis. To obtain the specific locations for the research, one node was randomly selected from each of the three urban hierarchy levels – i.e. a node in the CBD, a Quarter centre, and a District centre (Table 2). This urban hierarchy was used because it reflects the different contexts of localities across Seoul, such as size, function, and centrality (Lee et al., 2013; SMG, 1997, 2006). To maintain anonymity, we named the selected nodes: A, B and C.

For each node, site observation was undertaken during working hours on a typical working day. It involved walking around in the vicinity of the selected nodes to observe the surrounding environment and quality of pedestrian paths. The lead author walked on most streets and laneways within a circumference of approximately 15 min' walk from each node. Photos were taken, and notes were made in a research diary.

Focus groups and group discussions are the key methods used for this research. These methods were chosen to gain a deep and nuanced understanding of the social outcomes experienced by stakeholders (Hennink, Hutter, & Bailey, 2011). Such discussions enabled the participants to provide a broad range of views about the long-term social consequences of LUTI policies and MUTPs, and barriers and opportunities to enhancing the social outcomes from the perspective of stakeholders: local residents; local authorities; and the metropolitan government (see Table 3). In conducting the focus groups and group discussions, the

Table 3
General outline of the issues discussed in focus groups and interviews.

	Questions for local residents	Questions for local planners	Questions for metropolitan planners
What	What are local people's experiences of the consequences of LUTI and MUTPs on their daily life?	Validating focus group results; societal consequences of spatial transformation at neighbourhood (what happened, what aims were met?).	Validating focus group results; societal consequences of spatial transformation at macro and neighbourhood scale?
	Why some interests were achieved and others not?	Reasons behind that some interests were achieved and others not?	Reasons behind that some interests were achieved and others not?
How	How to enhance social outcomes through local spatial planning policy & processes?	How to enhance social outcomes through: (i) local spatial planning policy & process; and (ii) multi-level planning process & MUTP planning in general?	How to enhance social outcomes through: (i) spatial planning policy and process; and (ii) multi-level planning process & MUTP planning in general?

principles of ethical social research (Vanclay, Baines, & Taylor, 2013) were observed.

Eight focus groups were conducted with the elected representatives of the local neighbourhoods, together with other people these representatives nominated. The representatives played key roles in local spatial planning – e.g. facilitating discussion among local groups and communicating with local authorities. We asked that the participants be people who had been resident in the area for more than 15 years and who lived within walking distance of the node (stratified according to within 500 m, and 500 to around 1000 m). The participants lived in residential blocks, which were normally separate to the commercial buildings on the main road. Two or three focus groups were conducted in each location (3 in location A, 2 in B, and 3 in C). Each focus group had 5 or 6 people, being mixed in terms of gender, age, and background. Discussion focused on the participants' experiences and their perceptions of the spatial changes around their node, along the main roads and laneways, and the consequences of these changes on the quality of their daily life and the distribution of benefits. Barriers and opportunities for improving the situation were also discussed. Collection of data ceased when additional focus groups led to recurring viewpoints and thus saturation was achieved.

After the focus groups with residents, three group discussions were undertaken with local planners: one group discussion for each local authority. Because of the limited number of planners within these authorities, these groups each had about 3 participants. The planning officers validated the findings from the focus groups with local residents, and they also discussed barriers and opportunities to enhancing social outcomes in spatial planning policies and practices.

A further group discussion was held with five planning officers working for the metropolitan government. They reflected on the findings from the earlier discussions and identified barriers and opportunities in current spatial planning policies and practices. Key issues related to LUTI planning at metropolitan and local level and in multi-level planning were discussed, and lessons to enhance the social outcomes of future MUTPs and subsequent spatial development were identified.

All focus groups and group discussions were done in the Korean language. Ranging in length from 60−90 min, they were recorded, transcribed, and qualitatively analysed using a mixture of theoretical and inductive coding in Atlas.ti 8.0. Codes were assigned to interview quotes based on their latent content to capture the underlying meanings. All analysis was done in Korean, with a few extracts being selected and translated into English by the lead author. It should be noted that the lead author is Korean.

Spatial analysis was also conducted to supplement the focus group results, especially with regard to accessibility to opportunities. Accessibility was identified based on the results of the discussions. To understand macro-scale accessibility (of the metropolitan area), the number of nodes people can reach by the metro lines within a given time period (30−45 min and 45–60 min) was measured (Palmateer, Owen, & Levinson, 2016). To understand micro-scale accessibility (of the specific locations), we identified the number of public facilities and shops located within 5 min and 10 min walking distance from the nodes.

5. Local stakeholder perceptions on the social consequences of spatial transformation

5.1. Accessibility and quality of daily life

The focus groups showed that the spatial transformations triggered by LUTI-oriented policies and urban subway development did not always bring positive impacts in terms of increased accessibility or quality of daily life for local stakeholders. However, we identified that local stakeholders did perceive benefits from enhanced macro-scale accessibility that resulted from the subway network expansion, although their experience of local-scale accessibility was not always positive. In all focus groups, participants expressed high levels of concern about increasingly-limited access to public facilities, especially basic social and cultural services such as the administrative offices and libraries. This negative experience was described by a local resident: "It seems that these basic services have disappeared over the past decade while the main road has been transformed. We never had a chance of having good social, cultural, educational activities … what do we continuously pay taxes for?" Many local people indicated that they now actually had to travel longer to access such services. Our spatial analysis (see Fig. 1) of local-scale accessibility validated this experience: at all locations, most public facilities were located at the edge and out of walking distance from the node (i.e. more than 10 min walking distance).

All local stakeholders noted that the high-density retail and office development on the main roads near the nodes created high levels of pedestrian and vehicle traffic and other negative impacts that reduced local mobility and limited accessibility in the neighbourhoods. One participant emphasised that he often made a detour as the area has become too congested and dirty. The negative experience was also related to increasing high-density residential development along the back streets in the vicinity of nodes: "There are too many cars, people, and buildings to pass. I felt suffocated walking through such surroundings." Local stakeholders indicated that such negative impacts of densification gradually affected the socio-economic vibrancy and their sense of place in the residential areas. Several participants mentioned that they now spend much less time on the street because there was no space to talk and mingle. Furthermore, participants mentioned that their negative experiences had been amplified by the persistently-poor street layout. They emphasised that narrow streets, inefficient street connections, and cars invading pedestrian paths greatly restricted accessibility, mobility, and the overall quality of daily life.

The focus group results identified that the social outcomes varied according to the urban hierarchy (see Table 4). Participants living in the CBD experienced a wide range of negative consequences on their accessibility to local amenities, which resulted from rapidly-expanding, large-scale, high-density retail and office development. All CBD participants noted that continuously-increasing levels of commercialization on the main road contributed to a limited quality of commercial services at affordable prices, eventually creating limited choice for local residents in the CBD. A participant emphasised that "The situation on the main road got worse and worse. There was nothing to buy or to enjoy … so we rarely go there." The CBD participants also indicated that they experienced reduced accessibility due to the residential area being increasingly segregated by continuously-expanding commercial development and other undesirable impacts, such as traffic and pedestrian
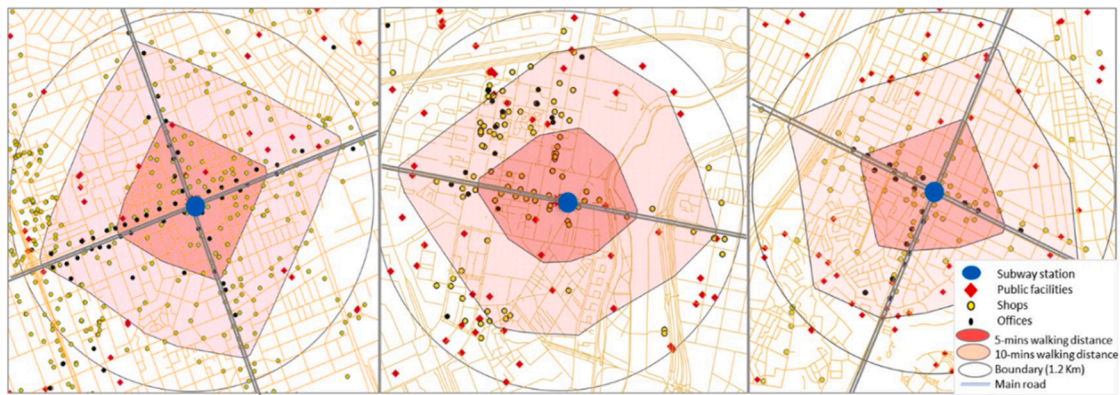
Fig. 1. **Public facilities and shops within 5 and** 10 min **walking distance from nodes (2019 data)** [CBD (left); Quarter centre (middle); District centre (right)].

Table 4
Extent of selected benefits arising from mega urban transport projects.

	Access to jobs	Access to local amenities	Quality of daily life	Distributional effects	Overall satisfaction
CBD (A)	High	Low	Low	Low	Moderate
Quarter centre (B)	High (except for deprived areas)	High (except for deprived areas)	Moderate	High	High
District centre (C)	High	Moderate	High	Low	High

congestion. As a participant stated, "We tend to stay within the boundary of the residential area most of the time, avoiding congestion and noise. When we need to buy groceries, we travel to neighbourhood districts". The local residents indicated that such negative experiences were amplified by the poor quality of the living environment and the limited public facilities in residential areas. This was attributed to spatial planning policies that only allowed limited redevelopment of the residential area, as well as to the high price of land in the CBD. Overall, CBD residents experienced minimal benefits from accessibility gain and a high level of negative social impacts, despite the considerable spatial development and the best transport networks.

In the quarter centre, the focus groups suggested that local stakeholders perceived a high level of accessibility gain, which resulted from the new socio-economic hub at the node comprising high-density commercial and mixed land use. The participants emphasised that the need to travel to the CBD had dramatically decreased since the commercial and cultural facilities at their hub provided a wide range of high-quality services: "We used to travel all the way to the CBD ... Now we can do everything right here. It is part of our routine that we hang out here after work and much of the weekend". Several participants identified that the concentrated development at the socio-economic hubs led to a loss of functionality and ambience elsewhere (i.e. slumisation), and to disparity within the quarter. Increasing spatial and social disparity between the around the hub and elsewhere was perceived as a negative social impact by all participants. The limited accessibility to the transport network and low level of development were associated with the low quality of life and high levels of crime in the area, especially in the more deprived parts.

In the district centre focus groups, participants considered the moderate level of commercial development as a catalyst for increasing accessibility to a range of local amenities. Such positive perception was noted in the discussion: "The local area around the node has been revitalized since the subway network was enhanced. We can ask people to come to our neighbourhood and spend time with us." However, participants indicated that the overall accessibility gain was limited, because of their continuing need to travel to many services in the CBD and their quarter centre. Furthermore, participants perceived a high level of positive changes to their quality of life due to the enhanced quality and functionality of the main pedestrian paths. They suggested that the key benefits to local people from local development were increasing opportunities for social activities in an open space, and enhanced sense of place, which resulted from renovation of the main pedestrian road in the vicinity of the node. Overall, local people in the district centre perceived a fair distribution of benefits from spatial development and transport networks. However, the old main road had lost functionality and socio-economic vibrancy following the development of the subway network.

5.2. Analysis of key issues related to social outcomes

By analysing the focus group results, several key issues related to the social outcomes from long-term spatial transformation and urban subway development in Seoul were identified. The increase in high-density commercial land use around transport nodes did not necessarily create greater access to opportunities for local people. In the CBD, despite continuously-increasing commercial development, compared to other localities, local people had negative experiences in terms of reduced accessibility to local amenities, because of the many negative impacts that were created, especially congestion and a feeling of the enclosure (or being surrounded or trapped) of their residential area within in the CBD. The higher value of land in the CBD also contributed to limited opportunities for social activities. In contrast, at the quarter and district centres, positive experiences stemmed from the relatively-moderate level of spatial transformation that brought affordable choices and limited negative consequences.

Moreover, the results indicated that the level of accessibility gain was mostly determined by the different quality and range of land uses facilitated at the different urban hierarchy levels. In the CBD, the limited quality and affordability of commercial services created a situation in which local people, in their daily life, increasingly had to travel to other locations. In contrast, the quarter-level socio-economic hub, which provided a wide range of good quality services, directly contributed to a dramatic decrease in travel to the CBD. At the district centre, local people's need to travel to other locations persisted due to the moderate range and quality of services in their neighbourhood.

The results also showed that the positive experience was much influenced by access to high-quality pedestrian environments and open space, rather than simply by access to the commercial land use at the transport node. This meant that people perceived greater benefit from enhanced accessibility to public space, which created high levels of social vibrancy and sense of place. We identified that negative experiences of daily life in the CBD were related to the limited access to open public space and to the poor-quality of pedestrian paths. In contrast, at the district centre, where the functionality and quality of the main

pedestrian paths were enhanced, stakeholders perceived higher levels of overall positive outcomes, despite limited access to commercial facilities in their neighbourhood. Overall, it was indicated that a higher level of quality of life was experienced than in the lowest urban hierarchy level.

The analysis of results at all three locations indicated that the highest level of social outcomes was perceived, not at the area with closest proximity to the node, but at the perimeter of walking distance from the node, where access to public facilities is highest and access to major shops at the node is moderate. At all three localities, local people clearly expressed a preference for living around 1000 m away from subway stations, since this provided better access to public facilities and open space, and offered a high quality of the local environment. Moreover, such locations were still within 10 min walking distance of major shops near the node, providing moderate access and little negative impacts from the high level of commercial development. This result could also be identified in the spatial analysis of the distribution of land use within 5 min and 10 min walking distance from the station (Fig. 1).

The focus groups also indicated that the spatial transformation after the subway expansion was closely related to the socially-differential distribution of benefits across the selected areas. Except for the CBD, the distributional effect was related to the agglomeration effects at the node, the poor level of accessibility to the node (i.e. due to greatest distance and lack of local transport), and to limited spatial development in deprived areas. The effect was most experienced in the quarter centre, where the newly-created quarter level hub brought much spatial change to the area, while the district centre experienced a relatively low level of distributional effects due to the moderate change in land use around the node. At the metropolitan scale, the subway development contributed to a fair distribution of mobility among the different urban hierarchy levels. This was also identified by the spatial analysis, which showed a similar number of destinations that could be reached from the node within a given time. However, gaps in accessibility to opportunities still exist due to the differences in the quality of commercial and public services among these localities, requiring that people still travel to higher-level centres.

6. Barriers and opportunities to enhance social outcomes from LUTI

6.1. Barriers at the local level

Our research identified that the local authorities were fully aware of various barriers to achieving the social outcomes from LUTI-oriented policy and processes. One dominant issue was the limitations of public-led spatial planning in controlling the quality of land development. Several planning officers indicated that the spatial planning policies could only have a limited role in facilitating developers to realize desired outcomes. In practice, officers cannot require that developers follow the spatial planning instructions: "the quality and range of land use is increasingly limited. The reality is … we cannot intervene in the decision-making of developers in terms of what and how they develop land". Moreover, it was identified that, due to limited incentives in the planning policy, local plan rarely functioned as a mechanism to operationalise the desired directions of LUTI policies: "the spatial planning policy offers few incentives but expects too many things from developers. Why on earth would they follow the suggested land use types or urban design if profitability cannot be guaranteed?" Thus, developers normally acted in a business-as-usual way, rather than embedding quality considerations into their development proposals.

The focus groups stressed the difficulties in enhancing accessibility to public facilities in the context of rapidly-increasing land prices and limited developable land. Local planning officers expressed concern about the inability of public investment to cope with the rapidly-decreasing level of access to social services: "we wish we had money and land to create whatever is missing from local neighbourhood. The reality is that, unless someone donates land for free, it is almost impossible to do anything." Several participants argued that it was ineffective and unfeasible to improve the quality of open space and the pedestrian environment, due to high cost of compensation and endless negotiations with all stakeholders: "although local people suffer from poor functionality of pedestrian paths, we have to consider many other priorities in enhancing social outcomes, such as a fair distribution of accessibility across the neighbourhood."

All focus groups emphasised that a critical barrier in realizing social outcomes was the top-down approach to implementing LUTI policy. Participants stated that local authorities had a limited role in making decisions about the local plans and had to follow directions from the SMG that focused on high-density commercial development around main nodes. They only had a limited budget and therefore there was little possibility to progress their key social priorities, such as to facilitate the equal distribution of accessibility, and to mitigate negative social impacts such as high pedestrian traffic. One officer stated that "the spatial planning policy set by the SMG focuses on large-scale commercial development at nodes, while our priorities are facilitating equal accessibility within our jurisdiction and enhancing local mobility. Without power and money, we can't achieve this". The participants indicated that some decisions made at the metropolitan level were not appropriate at the local level and just increased traffic and pedestrian congestion.

Our study also identified that the one-size-fits-all approach of the spatial planning policies of the SMG contributed to limited positive impacts across Seoul. All local planning officers emphasised that LUTI policies gave little attention to the different contexts of the CBD, quarter, and district centres – e.g. varying market demands, land values, centrality. They also illustrated that the guidance (e.g. the priorities and incentives in local plans) could not be adjusted to suit the varying contexts, and local authorities experienced many barriers to realizing the social outcomes in their neighbourhoods. In the CBD, a dominant issue was that the planning policy lacked measures to mitigate the negative impacts from the high-level of commercialisation in the residential area and on the main road. Planning officers argued that, due to the strict restrictions on land development in residential areas that are specified in the planning policies, they cannot manage the negative impacts on CBD residents from the expanding commercial development. An officer stated: "every year, we ask the metropolitan government to be less restrictive and to consider the increasing negative impacts in the CBD and the requests of local people. However, we are merely told that the municipal planning system must be fair to all areas [and therefore has to be consistent]." Moreover, companies were moving out due to decreasing affordability and quality of the local environment: "we want to facilitate favourable conditions to make people stay. However, this is not possible in the current planning policy."

In the quarter and district centres, a key issue was that the incentives set by spatial planning policies were too little to trigger more commercial development at the socio-economic hubs. Local authorities experienced difficulty in realizing the development direction set in their local plans, because of low-to-moderate market demand as well as little incentives to facilitate commercial or mixed development projects. A local planning officer argued that "our area is not like a CBD. But we keep receiving pressure [from the SMG] to facilitate commercial development as a quarter centre. Of course, we want increasing large-scale development, but how to do this with little incentives and not much locational advantage is a big question". Participants identified that they received increasing residential development around nodes in the quarter and district centres. They indicated that the limited number of large-scale commercial development projects meant that they had little chance to enhance access to public facilities by the contributions from private developers.

6.2. Opportunities at the local level

Our study identified some opportunities at the local level to enhance social outcomes from LUTI-oriented policies and practices. All

participants emphasised that, to realize desired outcomes, spatial planning policies should have more incentives for land development with clearer rules regarding what and how developers should contribute to local neighbourhoods. Several planning officers stressed the importance of taking proactive action – suggesting stronger incentives and requesting specific spatial changes needed for local neighbourhoods (e. g. open spaces and pedestrian paths, cultural facilities). They emphasised that "we learned it was essential to use our incentive system smartly, rather than just waiting for our dreams to come true. We focused on continuing to facilitate spatial development and on what our area needs most in order to enhance quality of life." The focus groups also revealed that local officers tried to decide what was necessary and urgent by collecting and evaluating local people's requests, rather than just following directions from the metropolitan government.

Participants also indicated that LUTI policies could facilitate improving the quality of the main commercial road, pedestrian roads and environs by engaging private developers and property owners in such actions. Several planning officers emphasised that property owners should take the lead in maintaining local environmental quality near the nodes, rather than the authorities investing heavily in the upkeep of public spaces along the pedestrian road: "we try to encourage property owners to maintain the quality [of their environs] on their own by providing various kinds of support and some financial resources. Over time, they come to agreement amongst themselves about how to revitalize their immediate neighbourhood." Some local authorities have designated some main roads as urban regeneration areas, and have encouraged the various stakeholders to reach agreement to look after the area, by providing funding and other incentives. The planners considered that such an agreement-based approach to urban regeneration was sustainable and effective for maintaining the socio-economic vibrancy around nodes.

At all three localities, we identified that utilizing unused public space or newly-available public land could help enhance accessibility to public facilities and open space. Local officers mentioned that, to cope with limited access to public facilities, they transferred some underutilized facilities into mixed land use that included educational or cultural facilities as well as residences. It was emphasised that local authorities needed to decide what and how to use such land effectively in collaboration with the metropolitan government and developers: "The opportunity was under-used public facilities and vacant land. We successfully transformed some into mixed-use facilities that now provide essential services to local communities." Such transformation was promoted as key to enhancing accessibility to public services in the context of high land values and increasing densification.

All planning officers argued that the different localities had to consider different strategies to maximize positive benefits from LUTI policies. The authorities of the three localities stressed that LUTI polices needed a localized approach that considered different opportunities and priorities at different urban hierarchy levels. In the CBD, participants emphasised that it was important to make the best of the developer contributions associated with large-scale re-development projects in order to facilitate high-quality and wide-ranging facilities. A planning officer stated that: "In the CBD, some large redevelopment projects still take place. We proactively used developer contributions to provide high-quality experiences to keep the CBD attractive and liveable." Moreover, rather than focus on costly refurbishment, the officer suggested soft policies to enhance the quality of living environment: "In the context of the limited land and extremely high price in the CBD, we have created many soft solutions such as holding public fairs or creating pocket parks. This benefits resident and business communities".

In the quarter and district centres, local authorities emphasised the importance of giving reasonable incentives and being more flexible with the types of land development in order to facilitate spatial development to realize local interests. A planning officer stated: "We needed to be pragmatic and realistic about what we could develop in our area. We sometimes allow residential development and plan carefully what contributions to receive from developers. The important thing is that we now take such development as an opportunity to cope with our challenges and priorities." The participants stressed the necessity to be in a strong position during negotiation with developers: "the local authorities in quarter or district centres often just accepted what developers proposed, even if negative social impacts were expected. This is so wrong. A fundamental solution to long-term success would be to provide more incentives and push developers to fulfil the quality criteria."

The focus groups identified that another critical issue at quarter and district centres was to facilitate equal distribution of access within the area by improving local mobility and connectivity to nodes as early as possible. A planning officer emphasised that "to mitigate the extreme spatial disparity in our area, we are making efforts to develop a local light rail network, which would go around within the quarter area. I wish this would have happened much earlier." An officer for a deprived area stressed that to fundamentally reduce social and spatial disparities, a specific local plan for disadvantaged areas should be made, rather than expecting spill-over effects from the socio-economic hub development.

All participating local authorities stressed that, to effectively operationalize a localised approach to LUTI, what is needed is to decentralise responsibility and decision-making power of the metropolitan government. Participants emphasised the need for an increasing power and roles of local authorities in deciding and operationalizing local plans – e. g. deciding the overall direction and key criteria for giving incentives, being responsible for giving developing permits, and negotiating with developers. Participants suggested that the SMG should continue to play its role in reviewing spatial development from a macro perspective. A planning office stated that "proactively dealing with needs and changes at the neighbourhood is so important. Decisions made at the local level can be screened by the spatial planning committees of the metropolitan government." Additionally, local authorities suggested that they should take the lead in setting a vision and priorities for a strategic district plan and developing strategic orientations for station area development by considering the key function and socio-economic context of their areas.

6.3. Barriers at the metropolitan level

The focus group with the planning officers at SMG identified barriers and opportunities from a macro-scale perspective. A dominant issue was the difficulty to set an appropriate level of restrictions and incentives to facilitate desired outcomes. A metropolitan planning officer emphasised that plans were only implemented to a limited extent by developers no matter how carefully they were made. Emphasis was put on the necessity to balance restrictive measures and development incentives in order to influence developers' decisions and realize social outcomes. Officers discussed a dilemma when they set rules for station area development: "too much restriction discourages development and could be infringement of property rights. Too little control might let developers negatively influence social outcomes. How to set an appropriate level of 'carrot 'and 'stick' is a big challenge for us."

The lack of flexibility in the spatial planning policies was also regarded as a barrier to facilitating the overall distribution of desired outcomes across the city. Participants emphasised that they had to apply the same rules across the city, irrespective of the varied socio-economic

contexts at different urban hierarchy levels: "We are supposed to treat every local area the same. It is not possible to give special advantage to a specific neighbourhood in order to facilitate a certain type of development." Planning officers stressed that such a static approach made it difficult to realize social outcomes in some quarter and district centres, where demand for development were low: "some local authorities could hardly ask developers to apply quality criteria or provide developer contributions while in the CBD, planning officers often requested developers to do this." The focus group also identified that differences in capacity between the CBD and other centres was also related to the distribution of social outcomes: "In the CBD, planning officers experienced many projects, which resulted in increasing urban planning capacity, while in other areas, officers rarely had dealt with large projects and had little capacity."

Another barrier was that decision-makers and planners at the local authorities primarily focused on realizing the interests of local stakeholders by facilitating as much spatial development as possible, while the metropolitan government had to consider the overall benefits for the whole city: "local authorities often act on behalf of developers or local stakeholders, promoting their own benefits, while we [the SMG] have to evaluate appropriateness and negative impacts of development projects from a macro-level perspective." The low level of commitment of local authorities in developing local plans was regarded as a barrier to realizing the desired outcomes. The planning officers at SMG argued that some local authorities were reluctant to make a good quality plan.

6.4. Opportunities at the metropolitan level

After discussing the barriers, the focus group identified opportunities to enhance social outcomes. First of all, metropolitan planning officers stressed the importance of mixing desirable and prohibited directions in spatial plans and facilitating negotiation on agreeable outcomes among developers and public authorities through a clear process: "we found that what matters most these days is that incentives and outcomes of each case are discussed, adjusted, and agreed by stakeholders through an accountable process." The metropolitan government established an 'Advanced Negotiation Procedure' to help developers and local authorities negotiate a reasonable level of incentives and restrictive measures before projects start. In addition, participants emphasised that it would be critical to formalize the incentive system by quantifying an adequate level of incentives for various contexts.

Metropolitan planning officers emphasised that the macro-level planning policy should allow a flexible approach to operationalizing LUTI policies at the local level in order to facilitate the overall distribution of positive outcomes across the city. A crucial need for having a tailor-made approach to realizing outcomes was promoted, especially for areas where local authorities had difficulties to facilitate development and negotiate social outcomes with developers: "Fundamentally, we must change the macro-level rule, which does not allow for flexible and context-specific approach to different urban hierarchy." The focus group indicated that collaboration between the metropolitan government and local authorities were needed to trigger spatial development at nodes in the localities with low market demand: "we minimized administrative processes by providing a one stop service and helping developers make development projects more creative and attractive".

Finally, focus group participants agreed that, if local authorities would be given a reasonable level of decision-making power, their capacity to negotiate desirable outcomes with developers would be enhanced. A planning approach that embraced multi-level governance was stressed: "the most important thing is that the local authorities should carefully reflect on the goals for spatial development around nodes, like conservation of the old city centre, regenerating the quarter centre, or maintaining socio-economic vibrancy in the CBD, while we [the SMG] should prevent the local authorities from taking improper advantage of their decision-making power, as well as check the significance and effectiveness of the proposed projects by considering

centrality and functions at different localities.

7. Conclusion

Our research establishes that Mega Urban Transport Projects (MUTPs) and land use and transport integration (LUTI) policy can be seen as necessary but not sufficient to ensure the achievement of desired social outcomes, such as enhanced access to opportunities and the increased wellbeing of the population across the whole of the city. In this paper, we show that high-density commercial land use around nodes does not necessarily enhance social sustainability (e.g. greater accessibility to life-enhancing opportunities for local stakeholders) due to limited access to local amenities, congestion, reduced local mobility, and poor street functionality. Connectivity to transport nodes in neighbourhoods might not increase, while connectivity across the metropolitan area can be improved by MUTPs. Furthermore, our research indicates that social outcomes from the implementation of LUTI policies vary according to the urban hierarchy. CBDs, which generally have rapidly-expanding, large-scale commercial development, can experience limited benefits due to a range of negative impacts, including limited affordability of services and the enclosure of local residential areas. In the localities of middle and lower urban hierarchy, positive experiences can stem from the moderate spatial changes around nodes and limited negative impacts on the quality of daily life. Concentrated development at the nodes in these levels can also contribute to socially and spatially differential benefits within neighbourhoods.

To enhance the long-term societal benefits of an integrated approach, LUTI-oriented spatial planning policies and processes must carefully address the various barriers and opportunities to achieving the desired outcomes. Our research indicates that to facilitate accessibility to high-quality services and to the wide range of opportunities, LUTI policy needs to have strategies to ensure the desired quality of land development, rather than just focusing on density and type of development around nodes. Setting an appropriate level of restrictions and incentives to developers with clear rules regarding how to contribute to realizing desired outcomes at neighbourhood is essential. Moreover, there needs to be cost-effective strategies to maintain socio-economic vibrancy on the main roads, especially in the context of increasing land prices and deteriorating environmental quality.

Facilitating a fair distribution of benefits requires a context-specific approach to implementing LUTI policy that would consider different priorities, opportunities, and levels of centrality at different localities. Our research establishes that the priority for action in CBDs includes creating high-quality, wide-ranging opportunities to maintain functionality as a socio-economic hub, as well as managing the interface between commercial and residential areas to mitigate the negative impacts on residents. At the localities of lower urban hierarchy (e.g. quarter centre and district centre), where market stimulus for development is lower, providing stronger incentives and being more flexible with the type of land development are necessary to encourage developers to achieve desired social outcomes. Fundamentally, operationalising a flexible approach that caters for context-specificity requires a multi-level planning approach that balances responsibility at the local and metropolitan levels. To ensure the delivery of desired goals across a city, the quality of development needs to be planned and monitored from both macro and micro scale perspectives. In the periphery, where local government tends to have limited capacity, multi-level collaboration is especially important.

Finally, to ensure socially and environmentally sustainable development in rapidly-growing megacities, we suggest that an integrated approach should be operationalised from the initial stages of MUTP planning. Especially in the context of rapid spatial changes and increasing land prices, it is necessary to establish well-functioning pedestrian paths and open spaces in proximity to transport nodes as early as possible. Public facilities should be located within the catchment area in order to enhance quality of life of local population. Priority

also needs to be given to enhancing local mobility within as well as between neighbourhoods in order to prevent increasing social disparity and environmental degradation at the local level. Furthermore, the planning of MUTPs should consider the varying rates of population growth and travel demand of the different localities across a city, which are related to the geographical and historical contexts of cities as well as structural economic change over time. We conclude that the key to realizing an integrated approach is that the desired social outcomes should be agreed upon and worked towards by all stakeholders at all levels, from the strategic to the operational stages of MUTP development. A failure to implement these recommendations will lead to increasing social and environmental costs, and to compromising the effectiveness of LUTI.

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Declaration of Competing Interest

The authors report no declarations of interest.

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