

## **Mobile based Coordination: the Influence of Smart phone Adoption on the Activities-Travel Scheduling of Mobile Professional in Indonesia**

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**Abstract:** Smart phones adoption grow rapidly in mobile professionals, i.e. segments who spend 20 per cent or more of their total working time to work away from their office. The type of their work, with greater unpredictability and heterogeneity than fixed node-workers, needs additional support in order to decrease the contextual constraints encountered while being mobile. In that case, smart phone may fulfil such needs. Smart phone potentially allow the restructuring of activity patterns of individual during work, therefore it can influence their travel pattern. To understand it, this study theoretically discusses how individuals of mobile professionals adopt smart phones, and explore how its implications on activities-travel scheduling through mobile based coordination. Additionally, the review is supplemented with empirical data in order to obtain the preliminary insight. As a result, there are indications of change in the dynamics of the activities-travel through (re)scheduling as the response of information received from smart phone.

**Keywords:** Activity-Travel Agenda, Mobile Professional, Smart phone, Mobile based Coordination, Activity-travel Scheduling

### **1. INTRODUCTION**

Information and Communication Technology (ICT) plays an increasingly important role in human life. For instance, as shown by the data at the end of 2011, which states that there are approximately six billion mobile phone subscribers in the world, with global penetration reaching 87%, and 79% in developing countries (ITU, 2011) and 89 per cent of users use it throughout the day (Google/IPSOS, 2011). Adoption is increasing due to the convergence of ICT has facilitated the transmission of large amounts of information with high speed and accuracy with a relatively low cost. It is then further strengthened with the arrival of smart phones, which is a contemporary type of mobile phone that integrates a number of technologies for computing capabilities and advanced internet connectivity (Charlesworth, 2009). This phone is built in with applications and internet access, digital voice, text messaging, e-mail, browser (browsing) web, and multimedia devices, so users can do many things on the go, anytime, with direct access and multi-function. Technological and social characteristics of this device make the users potentially change their behaviour; in particular on how, when and where people choose to use their time to conduct activities. more than the previous ICT. Mokhtarian (2009) argued that ICT is affecting where and how we work, learn,

shop, eat, play, reside – and travel. It is interesting to be investigated.

Smart phone market, itself, started out in the business segment (Nielsen, 2012; RIM, 2013) and especially so-called mobile professionals are important beneficiaries here. Mobile professionals could be characterized as individuals over age 20, employed full time in a professional occupation, who spend 20 per cent or more of their total working time away from their work environment (Ablondi and Elliot, 1992; Frohlich, 1995). The nature of mobile professional work differs in many ways from desk work or fixed-node workers to mobile-node workers. It occurs because of greater unpredictability and heterogeneity of works caused by contextual constraints (Kristoffersen and Ljungberg, 1999). The interesting thing about the mobile professional are: work can be done not only in their formal office but also at various locations such as in a house, at a client's office, hotel, cafe, and moving vehicles. Considering mobile professionals have less control over the configuration of their environment, therefore, they need additional support/information in order to decrease the uncertainty associated with the contextual constraints encountered while being mobile (Perry, *et al*, 2001). Apparently, smart phone may fulfil such needs.

The issue of the interaction between the developments of ICT in individual travel behaviour is not a new thing. It is often expressed in function of substitution, complementary, modification, and neutrality (Mokhtarian and Salomon, 2002; Niles, 1994; Salomon, 1986). On the substitution interaction, the telecommunications replaces transport, where the use of ICT acts to decrease travel. On the complementary interaction, telecommunications generates or completes transport by improving access to information, where the use of ICT stimulates travel. On the interaction of modification, the telecommunications does not replace or evoke travel but change the time, mode or route of travel. On the neutrality interaction, the use of telecommunications and transport do not affect each other.

The main concern in many previous studies is whether ICT increases or decreases the amount of travel demand, and it seems that complementary concept (ICT increases transport demand) still dominates today, stronger than substitution (Mokhtarian, 2009). Still in order to investigate the interaction, this study uses the 'activity based', particularly activity scheduling as an intermediary interaction between ICT and transport. Because it is very difficult to take account of the complexity of the possible interaction between ICT and transportation, thus to be more focused, the objects selected are a product technology (i.e. smart phone) and its effects to individuals (i.e. the individual mobile professional), the purpose of a trip (i.e. travel to work) and one dimensional travel considered (i.e. the use of smart phones in the coordination of activities performed while being out of office, through scheduling-rescheduling). Study that looked at the influence of ICT to transport is mostly done on an aggregate basis, but there is still a gap that can be filled, i.e. by looking at the individual and exploring how the mechanisms of influence occur. On the other hand, there are also researchers who are interested in researching how people perform their activity scheduling, but not take into account the effect of using a smart phone in it. Therefore there is still a gap that can be filled by this study. Research on mobile professionals in Indonesia is still very rare and is interesting to study, especially because they are different from the fixed node workers. The difference is at how they work out of office and spend most of the time in urban transportation network, e.g. travelling to the location outside his office.

This paper explores the impact of the use of smart phone technology to individuals of mobile professionals on how they organize activities and movement during work. Indonesia is researched as the case due to the adoption of smart phones in Indonesia reaches nearly 56 million and will continue to increase its penetration of the overall mobile phone subscribers in the country. It has reached more than 240 million (Nielsen, 2012; Nugraha, 2012). The rapid move towards the adoption and use of smart phone has provided people and organizations

with the ability to work in unpredictably novel ways. Thus, it is alleged that urban transport in Indonesia will certainly deal with the consequences of transformation behaviour due to the adoption of smart phone. Moreover, Axhausen and Gärling (1992) argued that the re-scheduling of activities is the central part of many of the changes in travel behaviour brought on by recent policy initiatives related to information technology and transportation demand management.

This paper reviews relevant research that has been conducted previously and completes the review with the first insight which is given from the results of the preliminary survey analysis of the semi-structured interviews with 20 smart phone users from mobile professionals in Indonesia, particularly in the Greater Jakarta Area. With this first insight, it is expected to gain a better understanding, and can be developed in subsequent phases of the study. The outline of the paper is as follows: section 2 describes the theoretical background, which contains: smart phone technology, the increasing number of mobile professional and the nature of mobile work, coordination of activities, and scheduling activities. In section 3, the research methodology presented contains the research design and expected outcomes, followed by section 4, the first insight as a result of the preliminary survey. The paper ends with a conclusion.

## → 2. THEORETICAL BACKGROUND AND HYPOTHESIS

### 2.1. Technology of Smart phone and Mobile Interaction

Recent Information and Communication Technology has the potential to transform everyday life: how to interact, privacy, social networking, economics, education, and urban transport (Miller, 2005). Taking into account that smart phone is evolution of mobile phone, it is first necessary to review the research that has been done on the mobile phone. Over the past two decades, there are so many studies that focus on the use of mobile phone (e.g. Palen, 2000; Fortunati, 2002, Katz and Aarhus, 2002, Ling, 2004). Most of the studies have tried to understand and explore how mobile adoption and its potential changes in behaviour due to the use of mobile phone, from the perspective of sociology, for example Geser (2002) who focused on how mobile phone changes the way a person interacts socially. It is perceptible that the use of mobile phone is influencing people's life and social relationships in significant ways (e.g., Kopomaa 2000; Townsend 2000)

In the first phase of the development of mobile phone, users use the phone as a function of supplement, which is only for receiving and making calls or messages outside home, office or other workplace. Mobile phone gives the possibility of new ways of doing activities and allows one to interact and carry out activities (Kwan, 2007), and this results in (1) increasing the spatial and temporal flexibility, (2) the impact on travel behaviour and the decision to make a trip (3) encouraging users to spend their free time outside home, (4) the emergence of changes in the function and role of the existing nodes in the urban transport system, (5) a new mode of mobility that can improve accessibility to opportunities, services and social networks of an individual, even for individuals with limited physical mobility.

After the convergence of ICT, the motive for adopting smart phones is more powerful and it makes mobile phone users quickly shift to smart phones. At the end of 2012, Portioresearch (2013) reported that one out of every six active mobile phone worldwide was smart phone. In IPSOS and HSHN study (2011), 51% of smart phone users agree that smart phone enables them to have access to more adequate information for the appropriate situation. It is assumed that for mobile professional, appropriate situation is the time conducting activity outside the office where they need access to information. Smart phone also offers applications

that might be used primarily for information gathering and entertainment and searching information concerning large number of topics. Moreover, it can be used as a location based service source (LBS) where locations of activities can be found and real time travel and route information can be gathered. Those utility of smart phone strengthens the link between daily activity and smart phone.

According to time-geography, three types of space-time constraints determine an individual's travel and communication behaviour through time and across space (Hägerstrand, 1970). Those are (1) capability constraints: human psychological limitations and instrumental limitations of material entities including ICT devices; (2) coupling constraints: a need to spend some time in a certain place to conduct some activity; (3) authority constraints: laws, rules and norms. These space-time constraints affect several determinants of action spaces (Dijst et al., 2002): (1) the locations of home and workplace ('base locations'); (2) time slots during which activities can be conducted outside base locations; (3) travel and other telecommunications speeds.

## **2.2. Mobile Professional and Smart phone usage during Work**

Nature and location of work are undergoing a shift. Work diversified, along with its increasing mobile workers and the use of ICT equipment (Kakihara, *et al*, 2002). There is a tendency that the workforce has to deal with an increasingly complex job. With the expansion and globalization of business activities rapidly increasing with higher consumer demand, the organization thinks that it needs to get used to the turbulent business environment. This trend leads to a growing demand for highly skilled labour and consequently it increases the number of mobile professionals.

Technology developments and changing organizational demands lead to the rise of the 'post-modern' professional (Kakihara and Sørensen, 2002; Al-Taitoon et al, 2002; Kakihara, 2003). Unlike modern professionals that emerged in the modern industrialized society that works for and within a certain firm, post-modern professionals are mobile in an operational, locational and interactional sense (Kakihara and Sørensen, 2002). In an operational sense, such professionals work in flexible organizational structures such as in project teams, task forces and virtual organizations. They conduct their work activities at different locations rather than spending much time in the office. ICT helps them organize to work at different locations. Moreover, post-modern professionals constantly interact with (a large amount of) different people both inside and outside the formal organization in a large geographical area. For communications, not only they use face-to-face but also virtual contacts (e.g. via email or phone). List of tasks of a mobile professional work are planning, acquiring, searching, analysing, organizing, storing, organizing programs, distribute, and market information (Jones, 2010).

Mobile work can be conceptualized in three types: traveling, visiting and wandering (Kristoffersen and Ljungberg, 1999). Traveling is essential for mobile work and is important because it affects the performance of the transport network. Aquilera (2008) calls work related travelling as business trip, i.e. work related trip to a place that is not fixed, e.g., work to visit clients, participate in a conference or a meeting with business relations. Looking at the nature of their work, there are no strict boundaries whether inside or outside the office, because anywhere can be their office. They penetrate the "regional" and "network."

It is undeniable that for mobile professionals working outside the office, smart phone is very useful in providing access to resources and result in improved efficiency and connectivity with the company. Smart phone is smaller in size than a laptop or net-book so it is very handy which makes it ideal for mobile workers in mobile interaction. The availability

of connectivity between the mobile workforce and its headquarters will mean greater efficiency for mobile workers, as well as they can be empowered and supported from a distance. Mobile professional even still stay connected on holidays and they still work while they are travelling or relaxing. With the advent of the function and connectivity to internet e.g. ability to send and receive email on a smart phone, which is not presented by earlier technology of mobile phone, the usage of smart phone during working is increasing. This is in line with statement of Ling and Haddon (2001) that most interactions with mobile phone occur at work.

### **2.3. Scheduling of Activity**

During the recent decades, the decision-making process of activity scheduling has become essential topic for transport researchers, including how people reschedule daily activities and travel in response to the change. Rescheduling decisions include modification/update with time, location/route, the people involved, the event/mode type, and attributes of activities/trips, as well as deletions and additions of new event (Clark, 2008). The scheduling decisions come up as part of an ongoing process over time, space and across individuals. Rescheduling decisions are made by people every day to revise and update their plans in an effort to resolve their daily activities and trips.

An activity agenda consists of a list of specific activities that would potentially be implemented, including a rare activity in spare time (Doherty and Clark, 2008). Scheduling is the process of how people organize activities and movements, including the decision of what activities to do, where to do, modes and routes used, where, when, how long and with whom (Doherty, 2005). When it tends to be done early in the morning for an outside work or activity, the duration and time of movement take a long time and a lot of people are involved. The area is how a planned activity (pre-planned) is implemented. Every activity on the agenda has unique attributes that affect scheduling, including the duration (min, max, average), the frequency, the time, the people involved, cost, location of people involved, the preferred location, and others. The process of dynamic scheduling begins with premises preplanning activities selected from the agenda, followed by re-planning and scheduling of continuous time, and ends with the pattern implementation of activity-travel schedule that can be observed.

### **2.4. Mobile based Coordination and Activity (re)scheduling**

Obviously, coordination is a common everyday activity for mobile professionals. In practice, people often make an appointment, to arrange a visit, manage schedules and synchronize activities. The need to coordinate the activities is the basic social function, especially in contemporary society, which is characterized by distributed residential location, car-based transport, and complex activity patterns (Townsend, 2002). The need to manage and coordinate daily schedules serves to reify everyday tasks and activities that require coordination, and thus generates the impression that the pace of everyday life is increasing (Southerton et al, 2001). Ling and Yttri (2002) found that for young people whom they studied, coordination means the extension of the control. They argued that interaction with mobile phone allow the coordination to do movements, so that meetings can be arranged and people can be easily contacted. They call a form of arising coordination as a result of the use of mobile phone as a "mobile based coordination "and identify three way occurrences, namely (1) midcourse adjustment, which refers to the transfer of the journey started and setting details of the meeting which has previously been agreed upon, (2) interactive coordination, which

refers to the progressive setting of the certain meeting, (3) improving the schedule, which refers to the potential for increasing the flexibility of schedule compared to coordination based on fixed time. It is assumed that that coordination is also experienced by mobile professional.

Sherry and Salvador (2002) as cited by Traxler (2010), argued that another aspect of changes observed in the mobile work activities is the emergence of 'effects like jazz' to continue not only to align some of the activities, some of which are directly observable and some are not, but also to harmonize the activities planned improvisation activities, and especially in the middle of doing the movement. Apparently what is meant by a mixture of planning and improvisation of activities is similar to "rescheduling of activities" which is revealed by Axhausen and Gärling (1992). It seems that mobile phone causes the mixing of planning the form of rescheduling, plus a shift towards coordinating with mobile based coordination and potentially rescheduling, while rescheduling logically impacts on aspects of space and time of movement through the space and sequence of events. It is alleged that mobile based coordination has the potential to have an impact on the travel behaviour through the concept of rescheduling. If mobile interaction based coordination using a mobile phone really has the influence on one's behaviour in the conduct of activities and travelling, in aggregate, as Graham and Marvin (2001) argued about ICT impact on transportation, these changes will have large impacts on the use and configuration of transport and communication networks and of urban networks.

Based on the literature review, we can say that travel behaviour will change with the usage of ICT especially mobile device. However, the changes will subject to a number of conditions. In this paper, the hypothesis, that there are significant subsequent changes and probabilities of adjustment after receiving the information from Smartphone through scheduling-rescheduling activities and making scheduling more dynamic.

### **3. RESEARCH METHOD**

The research objective is to observe the subsequent changes and probabilities of adjustment after receiving the information from Smartphone. This study examined the relationship between mobile interaction using smart phones, activity (re)scheduling, and travel patterns of mobile professionals. Methodology used is a combination of qualitative analysis and quantitative analysis in the form of facts obtained and given the interpretation that it becomes meaningful to the ideas that accompany it. Qualitative analysis is conducted using data obtained from interview, and quantitative analysis will be conducted using data obtained from questionnaire.

The study consists of two stages, preliminary and main study. The current research is the initial part of the study i.e. preliminary, thus this paper is not designed to provide a comprehensive study of mobile professional behaviour, but rather it is intended to be interpretive. Thus we will not discuss statistics data here, but we will explore the experience of use-practices of mobile work from mobile professionals.

Preliminary survey was conducted first to get the first insight about the phenomena. Considering that there is great diversity in the nature of work of mobile professional and their characteristic of technology use, therefore, it is important to recruit the interviewees: 20 mobile professionals from the Greater Jakarta Area (Jakarta, Bogor, Depok, Tangerang, and Bekasi), Indonesia from a range of different professions, who were representative of those differences. Participants were also pre-screened to represent various level of mobility in term of frequency of mobile, the flexibility of time, flexibility of work place. Occupation includes a variety professional from a range of consultant, project management, lawyer, journalist,

veterinarian, obstetric-gynaecologic, marketing, sales, customer service, managing partner, real estate developer, and government officer.

Semi-structured interviews are conducted in this stage with the aim of obtaining information on the context surrounding the mobile professional activities, for instance: why they make a trip, with whom they visit, what will they do with them, what they do with their mobile phone while travelling, and at a third location, how they use their phones, especially for work purposes, what has changed in their mobile work, as the implications of the use of smart phones, how they plan and make an activity-travel schedule, and how they execute the agenda (including how they reschedule the agenda).

Surveys consisted of mostly open questions. In the free response surveys we found typical day of nature work, purpose of usage, characteristic of usage and what had been changed in their mobile work as implication of their smart phone usage. All of interviews were conducted in bahasa Indonesia, and the quotes had been translated into English. Interviews were transcribed and analyzed for the identification and sorting of themes and core concepts at several levels of specificity. Data obtained from an initial interview indications are used as a basis to create the next step of the study. At this paper, citations to interviews conducted with captions using the three-letter code name of the initial capital of the interviewees. The main survey, which is the next stage of this study, will be conducted using questionnaire with a larger number of mobile professionals, representing proportional pursued gender, profession proportion grouped by similar properties of mobile work (e.g. mobile based field work includes project consultants, city planners, contractors, distinguished group with mobile work whose location cannot be predicted, e.g. journalists, lawyers, sales, account representative, veterinarian). Clustering should be done in a more detailed classification. Participant were provided with a specific scenario to know the respond if they face the specific situation during the execution of activity-travel agenda.

The study applies situational approach to understand the phenomena. Ideally we have to observed all of detailed information received from interaction using smart phone (e.g. forms, type of service, content, with whom, timing of interaction) and the attribute of activity at that moment (e.g. people involved, fixity, temporal attribute, spatial attribute, characteristic of joint the activity). Considering that every mobile professionals have a unique agenda and have abroad spectrum, situational approach is chosen. The purpose of this approach is a simplification to compose the basic patterns of activity change due to the interaction using smart phones. In this approach, some scenario of situations is generated on the storyboard that contains “most probably information gained” from smart phone, that requires immediate attention for re-scheduling decision (impulsion), as shown at figure 1.

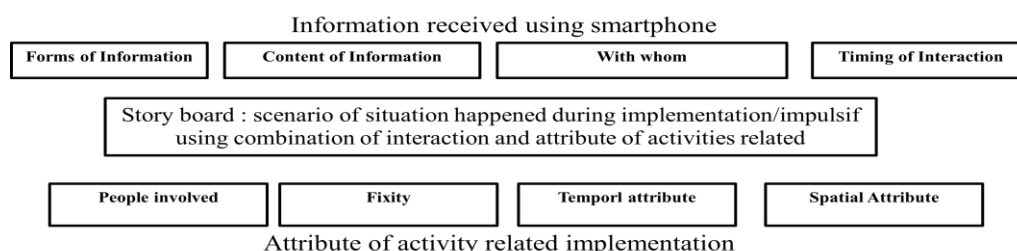


Figure. 1. Storyboard with scenario

The behavioural response to such a situation is recorded (whether addition/inserting, modification, deletion) and the basic pattern of activity execution is then analyzed.

In this approach, agenda of mobile professional is assumed to consist of two mandatory activities. The first one is optional activity and the other is repertoire activity, with

time window. During implementation, some situations might happen dealing with smart phone usage (access to real time information via interaction using smart phone) and it is assumed that a mobile professional makes a decision whether or not he or she reschedules his/her agenda, and what response he/he will choose.

Storyboards are prepared based on the experience of mobile professionals as told in the initial survey, i.e. results of the preliminary interviews. As the consequence of selection, the pattern of activity executed will be noticed and it is compared with the pre-planned activity pattern of agenda. This is also treated to the trip attached to them. With the addition, subtraction or modification of activities conducted, it is logically viewed that the impact on the travel pattern, whether it will potentially increase the number of trip, reduces the amount of trip, or changes the destination and timing of the trip. Thus, the better understanding of phenomena of smart phone usage effect, by comparing with and without using smart phone, could be grasped.

#### 4. RESULT OF PRELIMINARY SURVEY AND DISCUSSION

##### 4.1. Profile of Respondents

The survey was conducted on 20 respondents from professional mobile-smart phone users in the Greater Jakarta area (Jakarta, Bogor, Depok, Tangerang, Bekasi), with a variety of professions. The professions selected are based on a pre-screening that respondents are actually the target of research, i.e. more than 20% of the working time is out of office. The profile of the respondents is given in Table 1.

Table 1. Profile of Respondents

Item	Profile Respondent
Number of hours working outside the office	All of them work outside for more than 20% of working hours
Age range	35-55 years
Profession	Consultant (3), project management (1), journalist (2), lawyer (1), veterinarian (1), obstetric-gynaecologic (1), contractor (3), marketing (1), sales (3), customer service (1), managing partner (1), real estate developer (1), and government officer (1).
Type of smart phones user	early adopter of smart phone users and use it all the time
Income range	3 million IDR - >25 million IDR
Gender	18 Male and 2 Female
Education	Bachelor – Master
Managerial Position	Middle – Top
Cost of smart phone operation	300,000 IDR – 3.5 million / month
Type of working time	(1)8-4; (2) 9-5; (3) flexible
Transport Mode	(1)Public transport, (2)motor cycle, (3) private car
Travel distance range	30 – 100 km, (not <b>including</b> the flight)

In general, the activities carried out by the mobile professionals in office are internal management functions (such as planning and organizing) and administrative work. The typical daily activities outside office are very diverse. For example, for the CEO and GM, activities outside the office consist mainly of planning meetings, attending meetings and making decisions at the meeting. Mobile professionals from professional lawyer, insurance agent, sales agent, and account representative are engaged extensively to meet their clients,



both existing clients and prospective/potential clients. Similar to them, veterinarians and obstetricians work in mobile way mainly by visiting and treating patients, and they are often faced with an emergency situation. Consultants and Contractors, need mobile work not only to visit their client's office to present their plans and explain the progress of their work, but also to meet with colleagues involved in the project at different locations such as members of the project from construction companies, architects, government offices, administrative, and others. From the interview, it is found that CEO, GM, Sales Agent, and journalist are highly mobile.

The utility of the smart phone is averagely high, characterized by high monthly cost (ranged from IDR 300 thousand to IDR 3.5 million) and a higher frequency of daily use, such as the size of the calls made, emails sent/received/read, messages sent and received, in which five of the most commonly used features are the instant messaging, voice calls (dialler), short message (SMS), electronic mail (e-mail) and browser.

Because of its multi-purpose, all respondents said that they always turn on their smart phones throughout the day and anywhere. Some reasons why they always turn on their phones throughout the day are: (1) to avoid the frustration of the people who contact them, (2) to avoid accusations of being 'irresponsible', and to provide security to something urgent which needs immediate response. During the trip, all of the respondents admit that this is the most important moment they can always be connected. "Feeling more secured" and "feel comfortable" are other reasons they need to use smart phone during activity out of office. When they are in the office, an alternative device of communication is still possible (e.g. landlines phone, computer).

#### **4.2. Smart phone usage during Mobile**

When planning a business meeting, smart phone is used to making an appointment and determine whether or not the meeting is done. If the interaction is not too complicated, then communication with a smart phone can replace a face-to-face meeting, according to the role of smart phone as a function of equivalence (see Niles, 1994). The most frequently mentioned word, often repeated by all respondents is the word "coordination" as the intended use of smart phones, both internal and external coordination.

To attend a meeting, before a business trip, smart phone serves as verification of pre-trip. During a trip for business, smart phone used for traffic conditions investigates a travel and to monitor the work. Often it is also useful for gathering rearrangement, in the third visit and during the visit, where most respondents use smart phone to coordinate, collect information on work and monitor the work of subordinates in the office during the time of waiting and also they use it for personal purpose, in order to balance personal life and work.

#### **4.3. Implications of Smart phone Usage on Work Related Movement**

According to the DHD (a respondent whose job as an account representative, 39), "Smart phone is really a coordination support, usually if there is an immediate change, then I use smart phone to match the client's agenda and my activities. Activities and trips can be adjusted". It shows that smart phone is a coordination tool that helps modify travel in the event of a change of activities and arrange an adjustment in the form of rescheduling. The trip still occurs, so it is not substituted, and it would have occurred anyway, so it is not generated by the communication; but it is changed. This is consistent with the concept that will be revealed through this research that the phenomenon of mobile interaction based on coordination from Ling (2002). Some respondents claimed a relationship between smartphone

use and the way it works in an indirect relationship, such as experienced by a respondent named EMD, (IT Programmers, 40). For PJR (another respondent whose profession as a journalist, 44), the use of smart phone gives changes on the way of work and this then affects the number of trips that can be subtracted to achieve the target.

Some respondents felt the direct impact in the form of a reduction in the number of trips, such as experienced by a respondent's initial named NKL (GM mining company, 40). Equality interaction functions cause the occurrence of substitution. It can be understood that the potential for alternative modes of communication to substitute for one another is clear to most people. Specific telecommunications applications that have been hypothesized to replace their travel-based counterparts include telecommuting, teleconferencing, tele-education or distance learning, telebanking, teleshopping, telemedicine, telejustice, and televoting and other government applications (Mokhtarian, 2009).

A respondent named EDP (CEO, 40) is quite different from NKL. He sees a more dominant complementary interaction by saying, "The total trip seems to increase. Because there is more information, the opportunity is also more and more. If the opportunity is taken, it appears that the addition of new activities is increasing the number of my daily trip." It is interesting and has been stated by the other researchers, other examples of telecommunications stimulating travel can be produced, in which a phone call, letter, e-mail message, or fax prompts a trip, or in which individuals meet first over the Internet and then, finding common interests, arrange to meet in person. Generally, the increased ease of communication expands the size of our contact sets (Niles 1994; Gaspar and Glaeser 1998; Couclelis 1999) and therefore increases the number of opportunities for face-to-face interaction. Mokhtarian (2009) and (Gottmann 1983). argued that the increased availability of information about activities and locations of interest is also likely to whet the appetite to engage in such activities and visit such locations. It seems that dominant influence of smartphone in this case is generating travel.

#### **4.4. Smartphone Interaction, (re)Scheduling the Activity and Travel Pattern Change**

Based on the description given by the respondent, the characteristics of mobile interactions using a smart phone are made. Interactions can be categorized based on the form of information, feature/services used, information content, with whom the interaction is done and when the interaction is performed. Whereas the situation of ongoing activities can be categorized in fixity, timing of ongoing activities on the day, the people involved and the location of activities (approached by travel time).

From the interviewees, a description of how to use smartphone interactions is obtained which can lead to the rescheduling of activities and impact on the change trip. Combination of interactions made and combined with a situation of ongoing activities and agenda of the next event are considered by respondents in deciding whether they should reschedule activities or not.

One case for example is experienced by a respondent named ARD, (Lawyer, 55). For example "when I am still at home and make a plan in the morning, the first thing is I go to my office. Arriving at the office at 8:30, I monitor all the activities of my employees, and it will be much interrupted by communications with clients. My office is 1.5 hour driving from my house. As I monitor the entire work of my taskforce, wherever available to an extent, then I check whether there is a need for administrative approval. Again I check my smart phone, whether there are other appointments. I have made a schedule for tomorrow. Take a lunch at 12 o'clock. I have a lunch date with a director of Bank (A) at Pacific Place, after I finish my lunch there is an external meeting around Kelapa Gading, related to clients' business of

Cargo. I also have appointments with existing clients and he wants me to meet him in his house. I have already known where I will do my activities tomorrow. I have considered the travel time". However, during the implementation of this agenda, I use my smart phone and make a conversation while being mobile with another client. "On the way there is an impromptu incident, I could say "Sir, the man is arrested today". He is my new client. We cannot say "tomorrow" because it must not be delayed. So in the end I cannot delay it. It has to be done at the same day".

In this situation, after the information is received, the respondents see the level of urgency, and then evaluate the information by looking at the agenda of the next event, consider the travel time, and then make a decision whether to change the schedule or not. Based on the experience of the respondents, spatial-temporal graph agenda can be described during the day activities and the implementation of the agenda after the mobile interaction using a smart phone, as presented in Figure 2. It shows that, the number of trip is increasing as well as travel distance, because he inserted an unplanned activity to his agenda during execution after he receives information from his smart phone. In this case, indirect effect of smart phone effecting the trip is complementary.

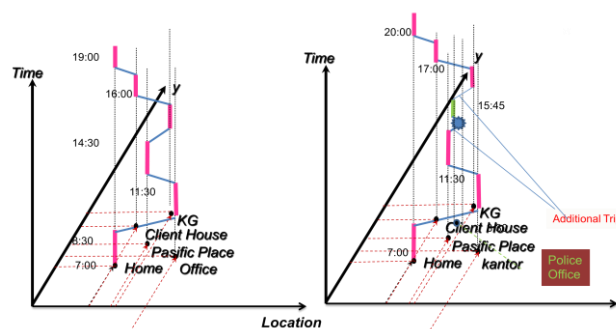


Figure 2. Case for example: adjustment of agenda as implication of mobile interaction and its impact to the total number of trip and travel distance

Another case is shown from RTP (Lecturer, Consultant, 49), "Yesterday afternoon I was not able to lunch out, because there were so many guests. I had to delay 13-hr meeting appointment to 14.30. They agree. I can leave the office at 14.20, and can conduct meetings with business partners from another company. We are so easy to adjust any change. I cannot imagine if I do not use smart phone". In this case, she did not delete or insert an activity, but modified the attribute of activity, i.e. duration of prior activity and changed the start time of the next activity. Implication of those changes, she has to modify timing of trip execution to the second activity. In this situation, smart phone indirectly modifies her travel pattern.

Based on the results of the initial survey, although it is done on a very limited number of samples and a variety of professions, it can still reflect a step forward in examining the relationship between smart phone and the movement, which is an indication that there are more indirect influences, through the process of change in the pattern of activities in advance. Taking into account the results of the interviews, where they are real experience of mobile professionals, they developed situations that may occur and potentially coordinate the changes based on mobile interaction and how the responses will be analysed. This would then invoke a scheduling response and subsequently change the activity and travel pattern. Thus, the activity schedule of mobile professional is more dynamic and flexible.

Conceptual frame as the result of the analysis of interview is shown in figure 3, which represents for the interaction from Smartphone and figure 4 explains how the activity would be rescheduled and influence travel pattern.

The key to success of the situational approach is in developing storyboard scenario. Scenario should be made as real as possible, and in most probable occurrence. The choice of options provided must also be made as close as possible to reality. Within this context, the storyboard is built based on the experiences expressed by the mobile professionals at the beginning of the interview, to make respondents more easily imagine the events in the scenario. Example of scenario is as follows: “In the morning, you are at the office, completing routine managerial matters, involving co-workers. Next event is a meeting with your customer (A), in the customer’s office, which can take 30 minutes drive from the current location and suddenly you receive information from your smart phone. Your client suddenly calls and tells you about some serious problems in the field, with a distance of 2 hours drive and need immediate treatment. Your presence on the field is awaited. What might you do?” or “You get the information through an application of traffic service on your smart phone about a traffic jam on the route to the next activity. What do you probably do?” The given answer options include patterns that might be selected by respondents, e.g. using word “insert” or “delete” and “modify”.

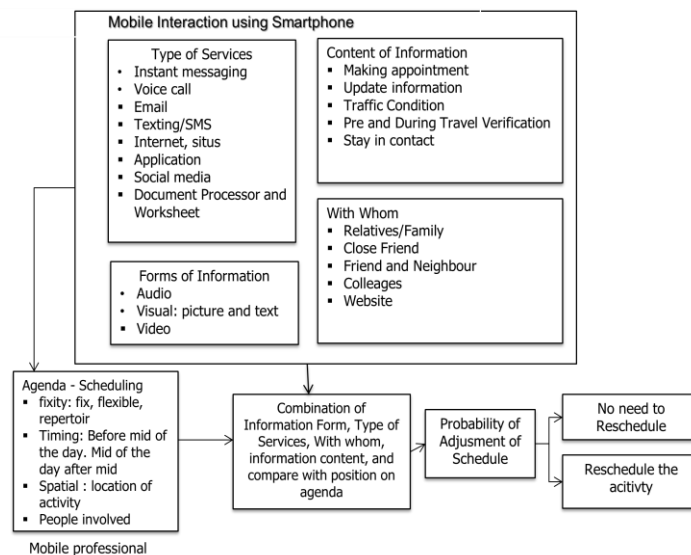


Figure 3 Conceptual frame: interaction using smartphone and activity rescheduling

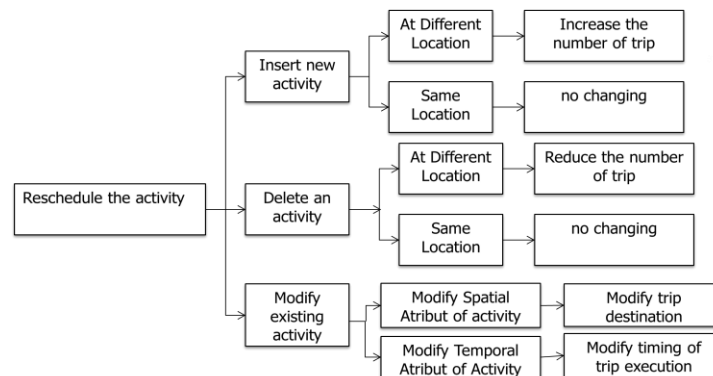


Figure 4. How activity rescheduling can influence travel pattern

The next step is to configure the basic pattern of changes that occur in the activities as well as on the travel pattern. Illustrations can be made using space-time graph, or by using the comparison between the pattern of pre-planned activities with execution. Using data from a

variety of responses to various scenarios situation developed, the basic typology of the phenomenon of changes in activity-travel pattern is expected to be compiled as the impact when a mobile professional intensively uses smart phone.

## 5. CONCLUSION

This paper is a part of on-going research and will continue to evolve to the next research steps. First insight gained from the preliminary survey shows that: there is a change in the nature of professional work as an implication of the use of mobile smart phones. Smart phone meets their needs for support of information in order to reduce the uncertainty associated with the contextual constraints faced while being mobile. Smart phone 'plays an important role when planning activities, before the trip, during the trip, and upon arrival at the third location (during the execution of the activity). Mobile based coordination using smart phone changes the way of real time coordination using instant messaging, voice call, email, browsing, application, and potentially led to rescheduling agenda of mobile professional and in turn changes the trip pattern (e.g. travel distance, number of trip). Thus, the activity schedule of mobile professional is more dynamic and flexible. Some professionals feel the direct impact on the reduction or increase in the movement, and others experienced indirect impact, through their impact on work activities in advance, especially through mobile based coordination.

For the next step, which is the stage of collecting main data, the research will be conducted to uncover patterns of communication and work practices of mobile professionals using situational approach, to answer the following questions. How is the patterns of usage of smart phones on a variety of different mobile professional group? How is the interaction patterns formed by mobile professionals to use a smart phone? How can smart phone affect their decision to adjust the schedule and change their attribute business trip? These questions can be answered through an analysis by completion of the next step of this study.

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