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Letter from the Editor-in-Chief

The Korea Myanmar Research Institute (KOMYRA) has supported the ongoing projects on the mutual development of Myanmar and Korea in the entire field of society, economy, culture, education, science, and related industry. As a part of our efforts to provide convenient access to understand Myanmar and Korea worldwide, KOMYRA has co-published the Myanmar Journal with Yangon University of Economics (YUEco) since August 2014, and now we release the Myanmar Journal Vol. 2, No. 1.

This issue features various topics that may be of international interest, such as academic and industrial researches mainly concerning economic and social changes, post-retire adaptation, agricultural and marine resources, analysis reliability, trade, financial market, and mobile roaming.

We hope this journal continues to promote understanding about the present status and the potential capacities of Myanmar and Korea, and facilitate in-depth international exchange and cooperation.

I would like to express my deep gratitude to the Editorial Board and the Staff of KOMYRA who have contributed their valuable supports towards the publication of this issue of the Myanmar Journal.

February 28, 2015

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The Myanmar Journal (ISSN 2383-6563) is the official international journal co-published by Yangon University of Economics (YUEco) and Korea Myanmar Research Institute (KOMYRA).

This journal aims to promote the mutual cooperation and development of Myanmar and Korea through intensive researches in the entire field of society, economy, culture, and industry.

It will cover all general academic and industrial issues, and share ideas, problems and solution for development of Myanmar.

Articles for publication will be on-line released twice a year at the end of February and August every year on the Myanmar Journal webpage.

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Articles

Thitsar-Yazar Hospital: A Case Study of Mandalay's Economic and Social Change

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Abstract

Located in Myanmar's northern capital of Mandalay, Thitsar-Yazar hospital is a private sector healthcare provider competing in a newly-opening economy making a transition from a command closed economy to one that is open and treading a path to democracy. This paper investigates the development of the local health service at a time of significant economic change through conducting a case study of a privately-owned hospital in Mandalay, which is the second city of the country and located in its north. It is shown that the hospital is required to overcome various infrastructural and human resources issues in order to achieve its goals. As Mandalay and Myanmar more generally undergo economic development, perhaps at a rapid pace, the healthcare sector will also rapidly develop and it is a sector of the economy which could prove to be of great value in the long-term.

Key words: economic development, healthcare, market development, Myanmar, private sector

I. Introduction

As Myanmar starts to move out of the shadow of military rule and into the comparative sunlight of democracy and openness to external influences, increasing attention is being focused on the nature of change in economy and society there. Much of that attention is driven by potential investors seeking means of making profits in an emerging economy but it is also possible to view change as the opportunity to provide better standards of living and quality of life

for the citizens of that country. At the time of independence in 1948, Burma (as it was then known) was considered the richest country in Southeast Asia and the one with the best prospects, albeit that WWII had seen aerial bombardments that flattened Mandalay and a great deal of the rest of the country's infrastructure had been destroyed (Callahan, 2009). Since then it has become the poorest country but the extensive natural resources remain and so too does the large domestic population which remains comparatively well-educated. As a by-product of British colonization, many Myanmar people are able to speak English and this represents a competitive advantage

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for people seeking overseas employment, which will become much more possible as and when the ASEAN Economic Community (AEC) scheduled for 2015 comes into force, as well as attracting foreign direct investment.

One area of particular interest in terms of economic and social change is the health service sector. This is because it has a direct and immediate impact on the quality of life of many people and the availability of comparatively cheap and reliable health care can prevent the threat of sudden, life-changing risks that people face if a family member contracts a serious condition that is expensive to treat. Relatively rich Myanmar citizens has been able to access high quality healthcare services across the border in Thailand (Noel & Johnny) but this represents a quite significant outpouring of resources from the country and is in any case well beyond the means of the great majority of the population. This paper investigates the development of the local health service at a time of significant economic change through conducting a case study of a privately-owned hospital in Mandalay, which is the second city of the country and located in its north.

II. Methodology

This paper draws upon face-to-face interviews in Mandalay combined with ethnographic observation on several visits during 2013-4. Interviews were held mostly at the Thitsar-Yazar Hospital and were held in English, with some assistance from a Myanmar interpreter for those respondents not comfortable with speaking in English. Extensive note-taking of the interviews took

place and transcripts subsequently completed as soon after the interviews as practical. Respondents were employees of the hospital in various positions and more than 20 interviews were completed. A semi-structured interview agenda was used to guide the interviews, which nevertheless were allowed to vary according to the particular interests and situation of the respondents concerned. The agenda covered work history, workplace issues, problems and constraints and future aspirations. The transcripts of the interviews were entered into a database together the contents of the research diary, which included ethnographic observations of the society and economy of Mandalay as a whole, as well as relevant secondary data records. Immersion in the database enabled content analysis to take place that was both exploratory in nature for those issues about which little knowledge existed (e.g. the nature of the hospital itself) and confirmatory in nature for those issues for which comparative data was already available (e.g. the process of social and commercial development of a geographical location as it comes under the influence of advanced capitalism).

The research is, nevertheless, limited in terms of both time and space and the method may have led to an overly homogeneous sample.

III. Mandalay

1. General Observations

Mandalay is the northern capital of Myanmar and, with Yangon, one of only two sizeable metropolitan areas. It was the last home of the Burmese monarchy and independence and is now a growing

economic and commercial centre as Myanmar makes the transition from military rule to democratic, perhaps guided democratic, rule. Indeed, Mandalay has been described as the Rome of Burma, owing to its hosting of royal sites and institutions (Maung, 1994).

It has a population of around one million people (ADB, 2013) and draws migrants from a range of close and distant provinces and regions. It is surrounded by agricultural land – Myanmar's economy remains predominantly agricultural in nature, although that will change increasingly rapidly once the country starts to settle in to the Factory Asia paradigm of import-substituting, export-oriented, intensive manufacturing with low labor cost competitiveness.

In addition to rice, agriculture involves tea and coffee, potatoes, onions, beans and husbandry. There are plenty of value adding opportunities here, particularly since Mandalay is scheduled to be linked with neighbouring countries via the Asian Highway Network. The city's two principal supermarkets contain numerous examples of Myanmar produced items, including not just fruit, vegetables, meat and fish but prepared dairy products, fried snacks, prepared meals and local delicacies such as pickled tea.

There is plenty of Chinese investment already, in health services, real estate, retail malls, jewellery industry and no doubt other less immediately visible sectors. This investment seems likely to increase in the future and will both broaden to cover a wider range of sectors and deepen so as to feature more stages of the value chain. Mandalay is also a longstanding centre of ivory carving, dating back to the time of King Mindon. Selling ivory from domestic, owned elephants is legal (Stiles, 2004).

Already, imported Chinese goods

represent a (generally) low-cost alternative to those from western countries (e.g. Japan and Europe). It is possible for ventures to choose a flexible mix of western and Chinese imported goods depending on the relative levels of cost, quality and value for money that each represents. This mix may change in the future as the different variables also change.

Those companies and local partners that established relationships with the market during the boycott years have some advantages over newcomers but new distribution channels are opening that might erode those initial advantages. Nevertheless, personal relationships based on trust (which reduces transaction costs) are likely to continue to be of significant importance for the foreseeable future.

If lasting peace can be established with various ethnic minority groups which have been engaged in a struggle for autonomy, then this will increase market size and production capacity, bring more workers and consumers into the system and reduce transportation and other transaction costs.

Prospects for the future would include a more obvious Chinese presence in the country if oil and gas pipelines are completed to link the Gulf of Thailand production sites with Yunnan Province. It is difficult to imagine that the Chinese state would easily allow such a strategically-important asset to be guarded by local elements, whether they are allied and supervised or not. As part of an ethnically diverse population generally, the population of the city is reported to include about 10% of overseas Chinese from various backgrounds, who speak a variety of languages or dialects from Mandarin to Yunnan to Tai (Lixia, 2008). Relations have

not always been harmonious. In 1968, for example, a large force of Chinese-Burmese Communists descending from the hills nearly seized the city (That, 2011:50-2). It was not until the 1980s that Chinese merchants began to return to the city.

There have been various reports that much of northern Myanmar has become effectively cut off from state control and placed under local autonomous authorities or as part of cowboy or frontier capitalist sites. Large contract farming areas, which are reported to be starting to occur across Myanmar, and investments in integrated leisure resorts has rendered some areas similar to those in northern Laos that have become understood to be more part of China than of Laos (Swe & Chambers, 2011). Northern Myanmar has historically been the home to extensive mining operations for various minerals and this continues to the present time (Wu, 2000).

Mandalay has old town and new town quarters and appears to have suffered from significant environmental degradation over recent years. This has led to problems with dust and reduced agricultural yields. Flash floods can occur during the rainy season and these contribute to water-borne diseases.

As in every part of Myanmar, business success depends on effective relationships with influential but sometimes hidden figures in both the public and private sectors. Development trajectories of other countries with this characteristic (e.g. South Korea and Taiwan) suggest that it will be eroded in importance as market development takes place and market institutions are strengthened. However, this is likely to take some years to achieve. Development will be facilitated by connection with the Asian Development Bank's Asian Highway Network,

as part of both the north and the west economic corridors and linking the city to Kunming and Bangkok, among other metropolises. This will make the concept of the Mandalay Dry Port more feasible (Black et al., n.d.). A dry port is an inland facility directly linked by road or rail with a seaport. Containerization means that goods may be very efficiently distributed by this means. However, the long-awaited Highway 102, which will link Mandalay and northern Myanmar with India in the west seems likely to be a source of some disappointment if Indian readiness does not improve (Bhattacharya & Daniel, 2012). The idea of a new Silk Road linking Thailand and the Mekong region with western Asia seems to be some distance away still (Chantanusomsiri, 2013).

Meanwhile, special economic zones and industrial estates are in the process of being developed (Mizzima Times, 2012) and connectivity through mobile telecommunications is improving rapidly (Wongsamuth, 2013), although from a low base.

The city remains a cash-based place. Credit cards are not widely used by Myanmar people because of a scandal a decade before when several banks offering credit cards folded with much loss of money; ATMs are opening in different locations across the city but they are not yet much used because people do not seem to trust them yet.

2. Education System

In terms of the education system, there are plenty of good universities, including Mandalay University, the University of Computer Studies, Mandalay Medical University and Mandalay Teacher's College.

However, institutions lack experience of international affairs after the country was closed for such a long period and hence individuals and institutions exhibit some lack of confidence.

International universities are also opening up, with mixed success. They supplement the various tuition schools. International universities include private sector institutions such as Shinawatra University, which operate in the absence of a specific law to cover their activities. Hence, although they do not do anything improper, they must be aware of the need to change their operations as and when any regulations do in due course appear.

Mandalay can draw upon a wide swathe of territory across northern Myanmar, although there are universities in all areas – two in Kachin province, for example.

3. Health System

After independence in 1948, a great deal of attention was placed on the need to take health care services to rural locations (Woodruff, 1967). As a result, Mandalay, the northern capital, was identified as the regional centre to which local and rural locations would be connected.

The health system is expanding, in part because of growing investment (cf. the RRH hospital which is the result of Chinese investment), as well as the presence of unmet demand. There are problems with public health resulting from lack of investment in water provision, which in Mandalay means that piped water includes untreated surface water from open reservoirs (ADB, 2013). Many border areas still have many thousands of refugees facing significant health risks (Galache, 2012), although some progress has been made in forging peace

between the central government and insurgent ethnic minority groups. Investment in the health service industry is primarily in the private sector, which is thought to offer a higher level of treatment and care. Nevertheless, there are still holes in provision. Training is good and can be transferred to incoming staff members.

More technology is being imported and more services are being offered, including some mental health services. However, there are some bottlenecks in terms of skilled staff (e.g. administrative and professional services) and office equipment such as computers and internet access. Health professionals have a hierarchy in status and, hence, pay, with doctors ranked above nurses, surgeons above general practitioners and so forth. Midwives are also not considered to have a high status and there are not enough of them. People without money will have childbirth at home. People aspire to having a clinic birth because it is believed to be much safer that way. Massage is another such case: it is very competitive between traditional and Chinese forms of massage, not to mention modern scientific massage. The older forms are more deeply embedded in local communities and local ways of life. Social relations and contacts make these activities competitive until the present. Research among young people in the city has indicated that both socioeconomic and cultural factors have had an impact on access to reproductive health services (Zaw et al., 2012).

Mandalay Medical University (UMM) is the centre of medical healthcare training. There is a great deal of discrimination in terms of gender. The boys get to occupy all the top-status positions. Lower status professions accept the girls, irrespective of their quality or exam scores. For example,

within therapeutic massage (there is another name), the class had 140 girls and 2 boys. This system, of course, reinforces the existing power structures and pay differentials. It also means that there are market failures because of such a great excess of professionals in some sectors, who cannot thereafter find work (although the forthcoming ASEAN Economic Community may provide help for some of them). This also means that there are no or next-to-no male nurses, who can be used for the heavy lifting aspects of nursing.

Since hospitals and clinics accept a great deal of money every day in the form of cash, it is necessary to provide security because they can be attractive places for criminals. In general, there are many members of the labour force who apparently operate at a low level of productivity but who can be called on for general assistance when required. This is a common phenomenon across most of the Mekong region and will change when new forms and levels of competitiveness are achieved.

IV. Case Study of the Thitsar-Yazar Hospital

The hospital acts as a magnet for famous doctors from all of Myanmar. They will have clinics in different hospitals and people will wait for the chance to travel to be seen by them (which is similar to the Singapore model). Doctors advertise their presence and share some of the revenue they earn with the hosting clinic, which provides premises and some basic services and support. It was felt by respondents that this was an approach to the benefit of the doctors rather than the patients or hospital but that it did

provide regional access to specialty medical services which would not otherwise be available.

The length of stay in the hospital will generally depend on the availability of rooms, which is a constraint. The nurses do not help with non-medical care (e.g. providing food and cleaning). There are dedicated cleaners (who are women who left school at 11 or 14 and so have little option but to accept manual labour jobs) but family members will need to be on hand to conduct regular domestic activities.

Electricity is a major constraint. Owing to irregular service and monopoly conditions, it is very expensive and unreliable. This means that hospital management (and managers of all enterprises) must prepare generators that will kick in automatically when required. Profitability is very difficult in these circumstances.

There are different grades within the body of nurses, which depends on the level of education and qualifications when entering the profession. Some have only secondary school certificates or diplomas from vocational schools. Training involves, first, study at the public sector school and MMU and then some additional on-the-job training in the private sector clinic when people have the opportunity to use the advanced medical equipment there for the first time.

Nurses take practicum sessions in government facilities – there is a 300-bed hospital, Mandalay Central Hospital, as well as some other smaller ones. Doctors rarely provide any training to the nurses, apart from a few practical things but senior nurses will pass on what they know. A nurse can also study further for a master's degree with the tuition supported by the government but

then would have to repay that by working in the government sector for a certain period of time to compensate for the tuition fees.

Some nurses and other healthcare professionals are ambitious and would like to work overseas if possible but there are bureaucratic, cost and family issues which can prevent this from being possible. People with degrees have to accept any jobs that are available); for example, the receptionist is a history graduate. Despite not having any medical education or training, she is the one who performs various triage activities in advising patients what sort of care they should ask for, which doctor to visit and so forth. Patients are able to exercise choice in this regard. The receptionists generally act as gatekeepers.

There are some issues to do with information. Doctors tend to be able to speak English but the nurses generally cannot. When sales representatives visit, they speak only to the doctors, who make the decisions and then instruct the nurses what to do. There is no guidance from the government in these cases – presumably they do not have the resources to be able to keep up with the new products and techniques.

Records are kept in books or on the computer when that is available. Since many of the patients are pregnant and so regular visitors, the receptionist recognises many of them and that helps in finding records. Nevertheless, records sometimes are lost and when this happens the receptionist will just search for them herself if she has time to do it or else send the patient to go and see someone else (presumably, to keep them quiet). They would use the computer if it were available and they knew how to do it. Patients are mostly directed around the hospital verbally. There are some signs.

They pay at the end and then might be directed to the pharmacist, if necessary. The fact that the hospital must handle large amounts of cash is a worry.

If patients do complaining, it is likely to be because of lengthy delays and there is not much that can be done; if it is an urgent matter, then the doctors could perhaps be hurried. Other complaints that have been received relate to the quality of the room and facilities such as the toilet and air conditioning.

The administrative and sales and bookkeeping staff are (nearly) all female and it is expected in Myanmar that they should take this role.

There are 22 cleaners altogether, all female and respondents claimed that men would not be able to do that job. The manager and the respective department heads will inspect for cleanliness. They all claimed to be happy enough, although sometimes tired. Occasionally, they may face the problem that they will be cleaning one room and then urgently called to clean another one and so might be criticized by users of the first room.

Some workers are migrants from rural communities some hours' travel distant. Women migrants need to earn money to support parents and other family members. They come from farms which grow crops such as tea, potatoes, onions and peanuts. There is also the production of indigenous chickens, which can lead to the sale of high-value fighting cocks in some northern parts of the division (Henning et al., 2006). Migrant cleaners receive US\$100 per month (the national average wage is reported to be US\$17(Viboonchart, 2012)) and the hospital pays the low amount of tax required, as well as providing free healthcare and lunchboxes.

V. Discussions

One of the best ways of understanding the changes that will occur in Myanmar generally over the next few years is through the lens of what Karl Polanyi called 'the great transformation' (Polanyi, 2002). This transformation describes the changes in society in which people move from a situation in which many institutions and practices are important in their lives, with the market being a small and relatively unimportant part of the overall combination, to a situation in which the market – as a place of both production and of consumption – has become the central and defining part of their lives. Both men and women reconfigure their social and familial relations through replacing domestic and emotional labour with what can be produced and consumed. It is well-established that capitalism involves creative destruction and so there will be both winners and losers in the various changes that do occur. Younger and more well-educated people are more likely to be able to adapt to those changes and may be able to move location and work. However, more vulnerable people are likely to be unable to adjust themselves and may suffer as a result.

The development that does take place will be highly uneven in nature and healthcare is an example of this. The number of people who will be able to take advantage of advanced medical care and technology will be comparatively limited in the foreseeable future and those people are likely to have some specific health issues that would not be representative of the whole population. There is likely, for example, to be more emphasis

on heart disease, stroke, mature onset diabetes and the other symptoms of an affluent society that will take some years to permeate the whole of Myanmar. Advanced healthcare is likely to take the form of small islands of development within an overall economy in which the general level of much lower standards of healthcare. This will be a result of and, to some extent, the cause of income inequality in Myanmar society and in indication of inequality of opportunities. There will inevitably be a rural-urban divide in this respect.

As Myanmar healthcare improves, it becomes possible for wealthy people to obtain the desired healthcare in their own country and not to have to travel overseas. A study of a major international hospital in Bangkok (Maung & Walsh, 2014) indicates that many Myanmar citizens travel for healthcare because of both regular check-ups and specific medical interventions. This indicates a level of unmet demand within Myanmar which represents a market opportunity for healthcare providers within the country. It is possible that there will also be an impact on the brain drain effect by which talented and skilled people take these talents and skills to benefit other societies. On the other hand, this is more likely to be counterbalanced by the outward migration of qualified healthcare professionals under the forthcoming ASEAN Economic Community (AEC), which is scheduled to take effect in some part of 2015.

In terms of Thitsar-Yazar Hospital, it is clear that its future success will not take place in a vacuum. Only if sufficient sectors of the economy thrive will there be enough demand for advanced healthcare in the country. The alternative of health tourism already exists and will be developed further

in Bangkok, for example, where it is recognised as being of strategic importance to the Thai economy as a whole (e.g. Tungsuwan, 2013). If there is insufficient demand, then the hospital will not be able to provide services with economies of scope and scale as to broaden and deepen the market as a whole. Its current strategy has been to increase its range of services and facilities through opportunistic diversification that is somewhat reminiscent of the most common understanding of the Chinese family business. Of course, the hospital is part of a family business and, although description of the rest of that business is beyond the scope of this paper, it is possible to conceive of the overall business in the same terms.

VI. Conclusions

At a time of rapid and profound political and economic change, it is inevitable that research of the kind reported on in this paper will need to be regularly updated and to be increased in scope and scale on both the vertical and horizontal axes. There is a definite need, in other words, for future research.

Private sector healthcare provision has a number of different purposes in a developing economy such as Myanmar, one of the more positive aspects is to act as a magnet for advanced technology and skills and to become a means, therefore, for inward technology transfer and as a way to connect international investment with local micro and small and medium sized enterprises (MSMEs). Currently, of course, the MSMEs of Mandalay and all of upper Myanmar are unable to meet the needs of quality assurance and reliability that would be required to form partnerships

with international companies. Helping MSMEs to improve in this way is one of the more important ways that government, together with international non-governmental organizations and donors of international aid and development, can promote economic development.

As for the case of the specific organization, its future progress will depend on a host of individual and behavioural factors which would be very complex to try to map extensively. At the moment, it seems to be well-placed to take advantage of early mover opportunities and to be ready to take advantage of emergent opportunities.

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Improvement of Reliability in Microbiological Assay for Folate in a Single Laboratory

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Abstract

Construction of reliable nutrient database of changing diet among nations is very important to government's nutritional policy for public health, national food trade, food labeling directives, and nutrient related studies. For the construction of reliable databases, evaluation and control of analysis performance are required. Reliability of microbiological assay for folate was evaluated by analyzing reference material (RM) and in-house quality control sample. Analytical results performed during the two periods, the first two months (Stage 1) and the latter three months (Stage 2) of this study, were compared. Growth curves of *L. rhamnosus* were irregularly fluctuated at stage 1 while stable at stage 2. Interday and intraday precisions of microbiological folate assay were much better at stage 2 compared to stage 1, showing about 6.3% and 16.9% decreases in RSDs, respectively. Quality control chart showed that microbiological assay was not under the control at stage 1 while all assay was under the control at stage 2. Assay values for folate of RM at stage 1 were out of the certified value (287~343 µg/100 g) provided by BCR while those at stage 2 fell into the certified range. These results indicate that use of RM and a quality control program could be powerful tools to improve the accuracy and precision of analytical results. In addition, continuous and rigorous monitoring of analysis performance is essential to resolve suspected analysis proficiency and needed for construction of reliable folate database.

Key words: folate, database, method validation, analytical quality control

I. Introduction

It has been known that diet plays an important role in the protection from health related chronic diseases. The diets and nutrient intakes of Asians have been changed over time affecting by the Western diet.

The composition of the diet has increased into intakes of animal fat and decreased consumption of plant foods. Accurate evaluation of nutrient composition of the changing diet among nations is very important to government's nutritional policy for public health. In addition, reliable nutrient database is essential to meet national food trade and food labeling directives, and to study relationships between diet and health. In Korea,

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national food composition table has been constructed based on the data produced by different laboratories of universities, industry and public institutions without control. It showed wide variations in nutrient contents indicating the lack of reliability. In order to update the changes in diet and improve reliability of database, the Korea Food and Drug Administration (KFDA) initiated the national Nutrient Analysis Project (NAP) in 2009. Data are produced by validated national laboratories and released for scientific and public use through the KFDA Nutrient Database. In addition, the National Food and Nutrient Analysis Program (NFNAP) was implemented in 1997 by the Nutrient Data Laboratory (NDL), U.S. Department of Agriculture, in cooperation with the National Institutes of Health, National Heart Lung and Blood Institute, in order to update and improve the quality of food composition data maintained in the USDA National Nutrient Database for Standard Reference (SR). For the construction of reliable nutrient databases, control of analysis performance is needed.

Folic acid is a water soluble vitamin belonging to vitamin B family. It has been well known essential factor for the metabolism of DNA and synthesis of essential amino acids such as methionine from homocystein (Donnelly, 2001). Folic acid deficiency has been known to cause neural tube defects in new-borns and megaloblastic anaemia (Ball, 2012). Human cannot synthesize folic acid so should take it through the diet. Folate is rich in green leafy vegetables, animal liver, legumes, egg yolk, yeast etc. In Korea, folate deficiency is not severe but the intake levels of expectant and nursing mothers, and female adults were reported to be relatively low, indicating that intake of folate through food and supplements are

needed (Chang, 1993; Kang 1993; Ball, 2012). Accurate information of the folate content in food is essential for government nutrition strategy for public health, food composition, folate related studies, food quality control and labeling regulation in food industry. Accurate assay of folate is not easy due to its multiple forms and complex extraction. For the construction of reliable folate database, analyst's proficiency as well as validation of analytical methods producing folate database are needed.

Various tools have been suggested for improvement of accuracy and reliability of analytical database produced by individual laboratories. The selection of analytical method appropriate for the purpose and the method validation by using performance parameters are essential before analyzing samples. In case of mid- or long-term study, a rigorous quality control program could be a key to enable independent verification of the accuracy and precision of analytical results. In addition, analysis of food control composites or commercially available reference materials (RMs) including standard reference materials (SRMs) and certified reference materials (CRMs) with the samples is one of the effective ways to resolve suspected analytical problems and to ensure the accuracy and precision of analysis results among laboratories.

HPLC is a good technique for folate determination because of high specificity toward folate isomers, reliable technique and clear identification of isomers. However, it has the lack of high equipment set up cost, standard preparation for all isomers, low sensitivity etc. (Arcot, 2005). Also, it requires a complex extraction and purification procedure before HPLC analysis. On the other hand, microbiological method has been

known as the most effective method for folate determination in food because of its sensitivity and selectivity (Grossowicz et al., 1981; Wilson and Horne, 1982; Shrestha et al., 2000; Arcot, 2005). However, microbiological assay is labor and time consuming work and analysts's proficiency is highly affecting accuracy of analysis results.

In this study, microbiological analysis for folate was evaluated by using micro-organism growth curve, reference material (RM), and quality control chart. Assay results performed for the first two months (Stage 1) and the latter three months (Stage 2) of study were compared. Accuracy and precision parameters were used for evaluating reliability of folate data. Benefits of RM and quality control chart were discussed.

II. Materials and Methods

1. Samples and Reagents

Folic acid standard, protease, and α -amylase were obtained from Sigma Aldrich (St. Louis, MO, USA) and folate conjugase(chicken pancreas) was purchased from Pel-Freeze Biologicals(Rogers, AR, USA). *Lactobacillus casei* subsp. *Rhamnosus* (ATCC 7469) used for folate assay was purchased from ATCC(Manassas, VA, USA) and folic acid casei medium, Lactobacilli agar, and Lactobacilli broth were from Difco(Beckton-Dickinson, Sparks, MD, USA). All reagents used in this study were in GR grade. SRM (standard reference material) samples (1846, infant formula) was obtained from National Institute of Standards and Technology (NIST, Gaithersburg, MD, USA).

2. Folate Extraction

Folate was analyzed according to Chun et

al (2006) using trienzymes(α -amylase, pronase, and conjugase). Briefly, sample was weighed in a 250 mL-flask and 20 mL of phosphate buffer (pH 7.8) and 30 mL of distilled water were added to the sample flask. The sample flasks were placed in a water bath and heated at 100°C for 15 min. After cooling sample flasks, 10 mL of phosphate buffer (pH 7.8) and 1 mL of protease solution(2 mg/mL) were added and incubated at 37°C for 3 h with shaking. The sample mixture was heated at 100°C for 5 min for inactivation of protease, 1 mL of α -amylase solution (20 mg/mL) and 0.5 mL of toluene were added to the sample and incubated at 37°C for 2 h with shaking. Then, 4 mL of conjugase solution (5 mg/mL, pH 7.8 assay buffer) was added and incubated at 37°C for 16 h with shaking. After heating at 100°C for 5 min, the digested sample was adjusted to pH 4.5 with HCl and volume up to 100 mL, and filtered using filter paper (Whatman No.1, GE Healthcare, Amersham Place, UK). The digest was directly used for microplate assay after appropriate dilution. An aliquot of the filtrate was made to the appropriate concentration of folate with pH 6.8 buffer if necessary. Enzyme blank sample and quality control sample were assayed with samples.

3. Microbiological Folate Assay (Microplate Method)

Microplate assay using *L. casei* subsp. *rhamnosus* (ATCC 7469) was applied for the folate determination according to Chun et al (2006). Briefly, *L. rhamnosus* stored on lactobacilli slant agar was propagated in depletion media (lactobacilli broth: folic acid casei medium=1: 1, v/v) at 37°C for 6 h, which gives about O.D_{600nm} of 1.2. Sample digests, enzyme blank, ascorbic acid (1 mg/mL), and folate standard solution (2

ng/mL) were filtered using 0.45 μm membrane filter (DISMIC[®] - 13CP, Toyo Roshi Kaisha, Ltd., Tokyo, Japan) before use. Exactly 150 μL of the sample digest, standard solution, and enzyme blank solution were placed to the corresponding well of 96-well plate and serially diluted with pH 6.8 buffer using a 12-channel pipette. The activated *L. rhamnosus* was inoculate to folic acid casei media (5 μL / mL of media) and then the filtered ascorbic acid solution was added to the assay media to give the concentration of 1 g/ 10 mL media. The folic acid casei media containing *L. rhamnosus* and ascorbic acid (150 μL /each) was added to all 96 wells of the microplate to give total volume of 300 μL . After mixing sample and media by using a 12-channel pipette, the microplate was covered and incubated at 37°C for 18~20 h. The absorbance of the microplate well was measured at 595 nm by using a microplate reader (Eon, Bio Tek Instruments, Winooski, VT, USA) after mixing thoroughly. Growth rate of *L. rhamnosus* against the serially diluted folic acid standards (0.003~0.200 ng/mL) was plotted by using analysis software (Gen5, Bio Tek Instrument, Winooski, VT, USA) and then folate was quantified based on the *L. rhamnosus*'s growth curve.

4. Evaluation of Analysis Performance

Analysis performance of analyst was evaluated by using the parameters of accuracy, precision, and quality control chart based on AOAC (2002) and ICH (1994) guidelines. Accuracy was determined by analyzing the National Institute of Standards and Technology (NIST) standard reference material (SRM) 1846 (infant formula) for folic acid. Precision expressed as inter-laboratory repeatability and intra-laboratory reproducibility was determined by

analyzing an in-house quality control enriched flour sample and respective relative standard deviations(RSD, %) were calculated. In order to obtain a quality control chart, analysis of in-house quality control sample for folate was repeated once a week with sample.

III. Results and Discussion

1. Comparison of Folate Standard Curve

Some organisms without synthesis capability of folate had been used for folate assay. *Streptococcus faecalis* (ATCC 8043) was formerly used organism but it is not recommended for folate assay. It is because *S. faecalis* does not respond to methyl folates and utilize pteronic acid which is not utilized by human. *Pediococcus cerevisiae* does not respond to methyl folates which can be used for human metabolism (Keagy, 1985). *L. rhamnosus* is an organism is the most commonly used assay organism for folate analysis because it responds to various folate derivatives, including 5-methyltetrahydrofolate, the predominant folate form (Krumdieck et al., 1983). The growth of *L. rhamnosus* is highly dependent on the concentration of folate. It should respond to the folate concentration in sample extracts only, but can be affected by analyst's analysis proficiency.

Growth curves of *L. rhamnosus* responding to the concentration of folic acid (0.003~0.200 ng/mL) were obtained by microplate analysis for Stage 1 and 2 (Fig 1). Fig 1-(A) and -(B) were obtained during the period of the first two months and the latter three months, respectively, under the same assay condition. Each point of the curves was the mean of three determinations and standard curve fitting was per-

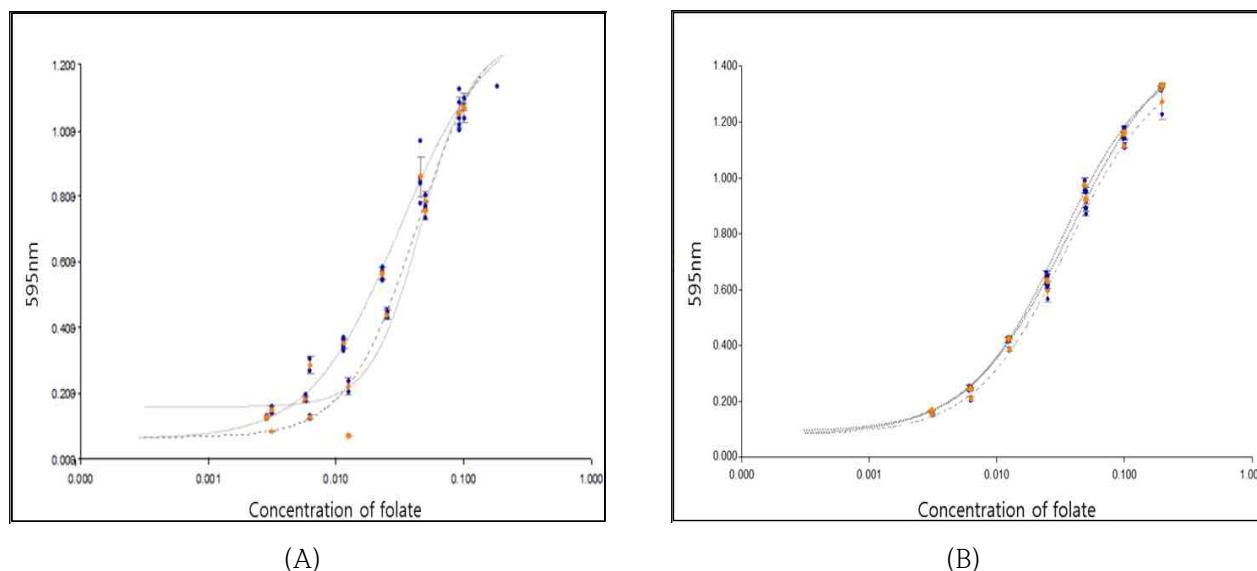


Fig 1. Growth curves of *L. rhamnosus* against the folate concentration. (A) and (B) were obtained during the first two months (Stage 1) and the latter three months (Stage 2) of the study, respectively.

formed by using data analysis software of Bio Tek Instrument. Fig 1-(A) shows shifting of the sigmoid growth curves in different ways, resulting in large variations (0.10 to 0.31) in the range of OD_{595nm} at the same folic acid concentration. However, the OD_{595nm} values were relatively close each other at the same folic acid levels in Fig1-(B), resulting in less than 0.12 of the OD_{595} range. These results indicate that microbiological analysis performance was not proficient during the first two months but it was improved during the latter three months of study. Repeatability and reproducibility of growth curves of *L. rhamnosus* are important in microbiological assay because they are directly used as a standard to calculate the folate concentration in test samples. Growth rate of *L. rhamnosus* can be fluctuated depending on microorganisms or assay conditions even though analyst is very proficient in handling microorganisms. However, this monitoring according to assay times and period can be a very effective tool to train analysts and produce reliable

data in microbiological assay.

2. Accuracy Evaluation

Accuracy indicates the closeness of agreement between a test result and the accepted reference value (Taverniers et al., 2004). In this study, accuracy of microbiological assay was tested by analyzing certified reference material (CRM) during the first two and the latter three months of study and results were summarized in Table 1. The test RM was a BCR-485 mixed vegetable with the referenced folate value of 315 ± 28 mg/kg. Analytical folate content obtained at the beginning of this study was 281.68 ± 15.06 mg/kg, which was lower than the range of the true value, 287~343 mg/kg. On the other hand, the analytical value of folate content (298.94 ± 2.05 mg/kg) obtained three months later belonging to the stage 2.

period fell into the range of the true folate content. The RSD of stage 1 (5.35%) was much larger than that of stage 2 (0.69%),

Table 1. Accuracy of trienzyme extraction coupled with *L rhamnosus* microplate method for folate analysis

BCR-485 (mixed vegetable) ^a	Folate content ($\mu\text{g}/100\text{ g}$) ^b	
	Stage 1 (The first two months of study)	Stage 2 (The latter three months of study)
Mean	281.68	298.94
Standard deviation	15.06	2.05
RSD(%) ^c	5.35%	0.69%
Acceptance ^d	Not acceptable	Acceptable

^a BCR: Bureau Community of References (Bureau Communautaire de Références), BCR-485: mixed vegetable.

^b The analytical folate value obtained by microbiological assay for the first two and the following three months in this study.

^c RSD: relative standard deviation.

^d The true value of folate content provided by BCR ($315\pm 28\text{ mg}/\text{kg}$) was used for determination of acceptance.

showing that microbiological assay done at stage 2 was more accurate and precise than that at stage 1. These results indicate that microbiological analysis was accurately performed at stage 2, which was much improved compared to that at stage 1. It would be due to stabilization in standard curve acquisition at stage 2.

3. Precision Evaluation

Precision indicates the closeness of agreement between independent test results obtained under stipulated conditions was determined by analyzing commercial fortified wheat flour during the stage 1 and 2 periods and shown in Table 2. Interday and intraday precisions were obtained by in-

dependent 5 determinations in triplicates for the same and different 5 days, respectively. RSDs for repeatability of microbiological folate assay were 7.38% and 1.12% at stage 1 and 2, respectively, showing a 6.26% decrease. Likewise, RSD for reproducibility at stage 1 was 19.51% and decreased to 2.59% at stage 2. These results indicate that microbiological analysis performance for folate determination at stage 1 was relatively poor and remarkably improved at stage 2. In other words, microbiological assay performed at stage 2 could produce precise analytical data compared to that at stage 1. All experiments were performed by the same analyst under the same assay conditions. Therefore, it can be concluded that the decrease in RSDs of precision is

Table 2. Precision of trienzyme extraction coupled *L rhamnosus* microplate method for folate analysis

Parameters ^a	Repeatability ^b		Reproducibility ^c	
	(Inter-day precision)		(Intra-day precision)	
	Stage 1 ^d	Stage 2 ^d	Stage 1	Stage 2
Mean($\mu\text{g}/100\text{ g}$)	165.64	170.83	141.63	171.37
SD	12.23	1.92	27.65	4.45
RSD(%)	7.38	1.12	19.51	2.59

^a SD: standard deviation, RSD: relative standard deviation(%)= $\text{SD}/\text{Mean}\times 100$

^b Repeatability refers to the results of independent 5 determinations in triplicates obtained by analyzing a QC sample five times on the same day.

^c Reproducibility refers to the results of independent 5 determinations in triplicates obtained by analyzing a QC sample once a day for 5 days.

^d Stage 1 and 2 indicate the first two and the latter three months periods, respectively.

resulted from improved analyst's proficiency.

4. Analytical Quality Control

Total folate content of commercial fortified wheat flour (in-house quality control sample) was analyzed once a week and plotted from the beginning to the end of this study for 5 months (Fig 2). Total 22 points were obtained for 5 months of study

line of folate quality control chart. Based on the 10 values, action and control lines were set up as shown in Fig 2 and utilized for quality control of folate analysis. Trial 3, 4 and 6 data points are outside the bounds of action lines, indicating poor analysis quality. This indicates that microbiological analysis performance was not under the control at stage 1, producing outliers against the action lines, but under the control at stage 2.

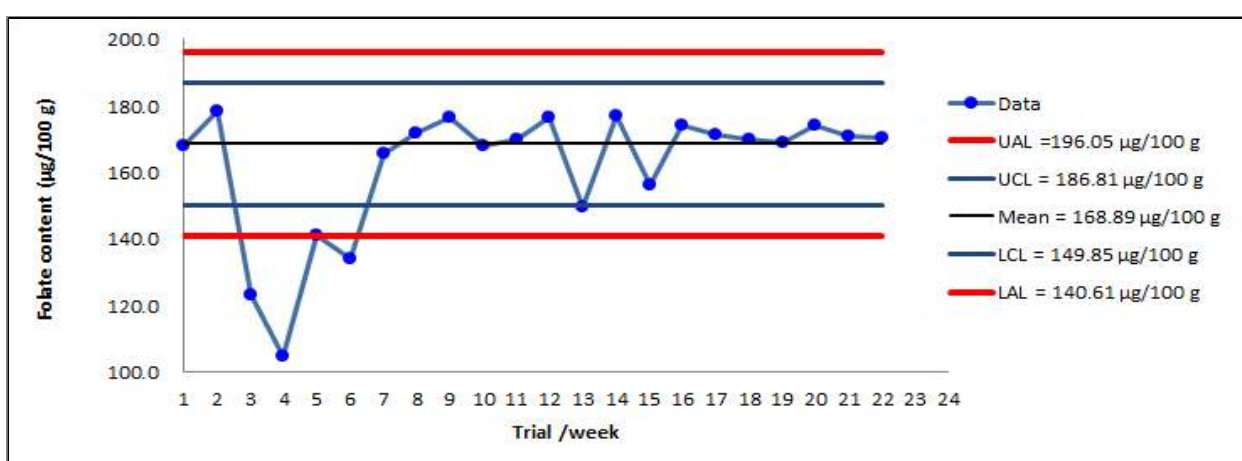


Fig 2. Quality control chart of microbiological assay for folate in commercial wheat flour (in-house control sample). UAL and LAL: upper and lower action lines, respectively; UCL and LCL: upper and lower control lines, respectively.

and mean \pm SD for folate content was 161.83 ± 19.52 $\mu\text{g}/100$ g, but the mean for the quality control chart for folate analysis in this study was expressed as 168.89 $\mu\text{g}/100$ g. AOAC (2002) and ICH (1994) guidelines recommended that about 10 data with CV less than 5% are desirable to set up the baseline of quality control chart. Therefore, data from trial 1 to 8 obtained for the initial two months were excluded for set-up of the baseline of quality control chart because they showed poor precision (148.41 ± 26.57 $\mu\text{g}/100$ g, RSD 17.9%). The following 10 points from trial 9 to 18 showed a 5.4% of RSD with 168.89 ± 9.24 $\mu\text{g}/100$ g and used for setting up the base-

In order to investigate how accurate analytical data can be produced depending on analyst's proficiency, reference material (BCR-485 mixed vegetable) was analyzed once every two weeks and plotted in Fig 3. The initial 5 data points (trial 1~5) were obtained for the period of stage 1 and the following 5 points (trial 6~10) were collected for the period of stage 2. The initial 5 points at stage 1 were out of the true value (287~343 $\mu\text{g}/100$ g) provided by BCR while all latter 5 data at stage 2 fell into the accepted value. Table 1 and 2 showed that both accuracy and precision of microbiological assay were poor at stage 1 while good at stage 2. In addition, quality control

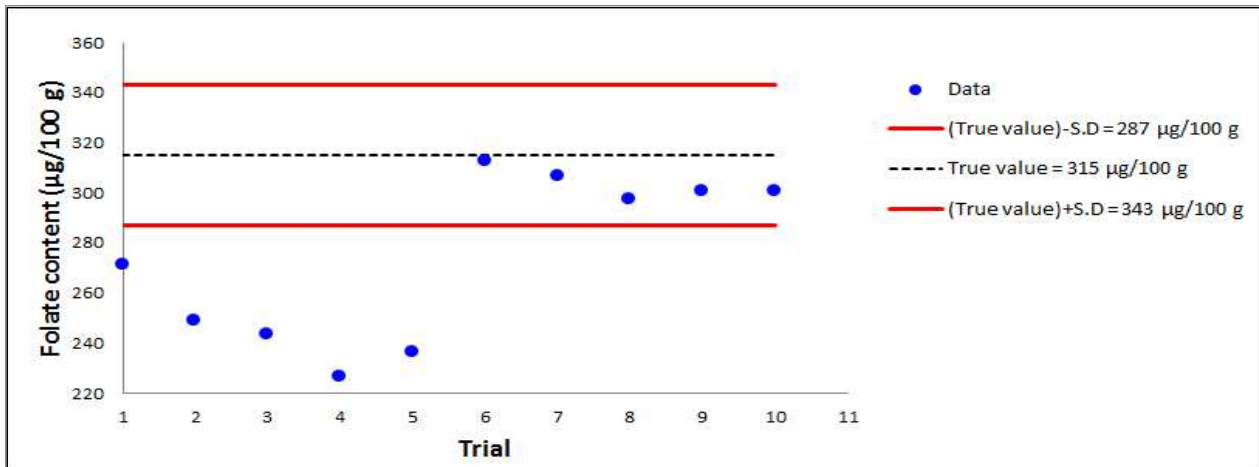


Fig 3. Changes in microbiological assay values for folate in BCR-485 (mixed vegetable) 5 months. The dotted and solid lines indicates the true folate content (mean±standard deviation, 315 ± 28 µg/100 g) provided by BCR (Bureau Community of References)

chart shown in Fig 2 proved that microbiological assay was not under the control. These all results indicate that reliable data can be produced by accurate and precise analysis and analyst's proficiency. Fig 2 and 3 showed a good agreement in that folate contents were underestimated during the stage 1 period but accurately analyzed during the stage 2. It suggests that quality control chart could be a powerful tool to control analytical quality when test samples were analyzed. Analytical quality control using a quality control chart is beneficial to save analysis cost by using a cheap and stable in-house control samples instead of expensive RMs.

IV. Conclusions

Reference materials (RMs) are defined by ISO in Guide 30 (Anonymous, 1992) as 'a material or substance, one or more properties of which are sufficiently well established to be used for the Calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials'. ISO Guide 30 defines a CRM as

'an RM one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body.' An example of a certifying body is the Community Bureau of Reference (BCR) of the European Commission (EC). A series of analysis is defined as a number of measurements carried out by one technician in a day, using one method, one batch of media etc. Analysis of the RM can be used for the preparation of a control chart. CRMs are used on an occasional basis as the availability of these materials is limited and the price high. CRMs play a critical role in validating the accuracy of nutrient data. Therefore, CRMs should be representative, homogeneous and stable (Griepink, B., 1989). The United States Department of Agriculture(USDA) had generated nutrient database for Standard Reference (SR) based on nationwide statistical sampling and chemical analysis of nutrient composition of key foods (National Food and Nutrient Analysis Program, NFNAP). For reliable folate database construction, CRMs have been

used extensively in the NFNAP to monitor the accuracy of microbiological folate assay for a wide range of foods. Currently available food CRMs with assigned values and uncertainty intervals for folate concentrations has summarized in Table 3.

A rigorous quality control program could be a key to enable independent verification of the accuracy and precision of analytical

V. Acknowledgement

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Table 3. Commercial reference materials (RMs) used for folate assay in the NFNAP designed by USDA

Reference	Materials (RMs)	NFNAP Foods
AACC VMA 195 (Fortified ready-to-eat cereal)		Snack crackers, filled cookies, Native American breads and tortillas
AACC VMA 399 (Fortified ready-to-eat cereal)		Bakery mix, yeast breads, egg noodles
BCR CRM 121 (Wholemeal flour)		Cooked and ready-to-eat cereals, crackers, snack cakes, pies
BCR CRM 485(Lyophilized mixed vegetables)		Fresh fruits and vegetables, canned fruit, spices
NIST SRM 1546 (Meat homogenate)		Frozen breaded chicken

USDA: United States Department of Agriculture; NFNAP: National Food and Nutrients Analysis Program (USDA); NIST: National Institute of Standards and Technology (Gaithersburg, MD, USA); BCR, Community Bureau of Reference, European Commission (Brussels, Belgium), obtained from RT Corporation (Laramie, WY, USA); AACC: American Association of Cereal Chemists (St Paul, MN, USA)

results. Analysis of commercially available RMs or CRMs with the samples and continuous monitoring of analysis performance are essential to resolve suspected analysis proficiency and to ensure the accuracy and precision of assay results. Development and use of these control materials to facilitate monitoring of the accuracy and precision of analyses are needed for construction of reliable nutrient database in long-period analysis study. Puwastien et al (2005) highlighted the use of RMs in a inter-collaborative study and stated that it is important to make the methods of folate extraction and detection, and the use of RMs uniform among laboratories.

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Lipid Constituents in Peanuts: A Review

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Abstract

Peanut is a good source of nutritional and functional components. In the peanut farms, four major market types, Runner, Virginia, Spanish and Valencia, are commercially grown. Peanuts are rich in lipids, containing from 47% to 50% on an edible weight basis. Reported fatty acid profiles of normal peanut oil expressed as percent of total fatty acids are 9.0-12.2% of palmitic acid (16:0), 1.3-3.2% of stearic acid (18:0), 41.1-61.7% of oleic acid (18:1n9), 23.4-41.9% of linoleic acid (18:2n6), 0.8-2.0% of arachidic acid (20:0), 0.7-2.2% of gondoic acid (20:1n9), 1.5-3.1% of behenic acid (22:0), and 1.0-1.5% of lignoceric acid (24:0), respectively; whereas, linolenic acid (18:3n3) exists in trace amount. In normal peanuts, tocopherol levels were found to be 10.9, 0.33, 8.5, 0.5, and 20.2 mg/100 g, respectively, for α -, β -, γ -, and δ -T and total tocopherols. Peanut oil contained total phytosterol levels of 251 ~ 315 mg/100 g oil, while two peanut butters contained 160 ~ 198 mg/100 g product. Lipid constituents in peanuts could be provided as a good source for fat-soluble nutrients.

Key words: peanuts, fatty acids, tocopherols, phytosterols

I. Introduction

Peanuts are a native South American legume, but the exact origin is unknown. According to the literature, peanuts were known as early as 950 B.C. Historical evidence suggests the plant originated in Brazil, where many wild species are found. They were carried to Africa by early explorers and missionaries and brought to North America via the slave trade. After the Civil War in 1865, peanuts were extensively used in the United States and production

became more widespread. The peanut industry was expanded by advances in technology that resulted in the development of equipment and machinery for planting, harvesting, and processing the crop (Acquaah, 2007).

In the peanut farms, four major market types, Runner, Virginia, Spanish and Valencia, are commercially grown. Each type has varying uses due to characteristics such as kernel size, and roasting characteristics. Since 1940, peanut production in the southeast has shifted to Runner peanuts due to higher yields and good roasting flavor. Runner cultivars are known for their consistent, medium seed size. Maturity is about 130-150 days, depending on the cultivar. Approximately,

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50% of Runner peanuts are used for making peanut butter. Virginia cultivars have the largest seed of all the types (500 seed/lb). They account for most of the peanuts roasted and sold shelled or in-the-shell. Their maturity period is about 135–140 days. Spanish cultivars are smaller (1,000–1,400 seeds/lb) compared to other types but are higher in oil content than other types. Their maturity period is earlier than the Runner cultivars (about 140 days). Valencia cultivars are sweet and usually roasted and sold as in-the-shell peanuts (Acquaah 2007). In this study, published papers on the fatty acid profiles, vitamin E and phytosterols in peanuts and peanut products were discussed and summarized in Table 1, 2, and 3, respectively.

II. Lipid and Fatty Acid Profiles

Peanuts are rich in lipids, containing from 47% to 50% on an edible weight basis. The lipid is highly unsaturated and susceptible to oxidation as indicated by its relatively high iodine value (84–100) (O'Brien 2008). Compared with other seed oils, it is relatively free of phosphatides and non-oil constituents (Cobb and Johnson 1973). The triglyceride content of peanut oil from normal cultivars is generally over 90% of palmitic (16:0), oleic (18:1n9), and linoleic (18:2n6) acids. The triacylglycerides from normal cultivars are comprised of approximately 80% unsaturated and 20% saturated fatty acids (Gunstone 2004). Generally, fatty acids in peanuts are even-carbon number fatty acids from 16 to 24. Reported fatty acid profiles of normal peanut oil expressed as percent of total fatty acids are 9.0–12.2% of palmitic acid (16:0), 1.3–3.2% of stearic acid (18:0), 41.1–61.7% of oleic acid (18:1n9), 23.4–41.9% of linoleic acid (18:2n6), 0.8–2.0% of arachidic acid (20:0), 0.7–2.2% of gondoic acid (20:1n9), 1.5–3.1% of behenic acid (22:0), and 1.0–1.5% of lignoceric acid (24:0), respectively; whereas, linolenic acid (18:3n3) exists in trace

amount (Brown and others 1975). Reports indicate that the fatty acid composition of peanut oil from normal cultivars varies significantly by genotype/cultivar (Isleib and others 2006; Davis and others 2008b), seed maturity (Hinds, 1995), production year and planting date (Andersen and Gorbet 2002), geographic location of production (Brown and others 1975) and environmental factors including temperature and other seasonal effects (Hashim and others 1993). From their study on the influence of year and planting date on fatty acid composition of high-oleic and normal peanut oils, Andersen and Gorbet (2002) concluded that biochemical relationships between variables of fatty acids were more greatly affected by genetic effects than environmental conditions.

Sanders (2002) summarized compositional properties of peanut lipids from normal cultivars with the following observations: (i) oleic acid (18:1n9) and linoleic acid (18:2n6) are the dominant fatty acids (75–85%), while palmitic (16:0), stearic (18:0), arachidic (20:0), gondoic (20:1n9), behenic (22:0), and lignoceric acids (24:0) are minor fatty acids; (ii) the ranges of oleic acid and linoleic acid in peanuts are from 41.3 to 67.4 % (weight %) and 13.9 to 35.4%, respectively.

In order to improve nutritional attributes and oxidative stability of the oil, peanut breeders have successfully modified the fatty acid profile of Runner peanuts creating new lines with an increased content of oleic acid (18:1n9) at the expense of linoleic acid (18:2n6) (Gorbet and Knauff 1997). Normal-oleate peanut genotypes have anywhere from 36 to 69% oleic acid (18:1n9) and 13 to 40% linoleic acid (18:2n6); whereas high-oleate peanut genotypes have ~80% oleic acid (18:1n9) and 2% linoleic acid (18:2n6) (Norden and others 1987). The high-oleate trait in tetraploid peanuts results from a reduction in the activity of microsomal oleoyl phosphatidylcholine (oleoyl-PC) desaturase. This enzyme (EC 1.3.1.35, an oxidoreductase) catalyzes the chemical

reaction {1-acyl-2-oleoyl-sn-glycero-3-phosphocholine + NAD⁺ + W1-acyl-2-linoleoyl-sn-glycero-3-phosphocholine + NADH + H⁺} and introduces a second double bond in oleoyl-PC giving linoleoyl-PC (Schwartzbeck and others, 2001). Loss of function of oleoyl-PC desaturase activity is solely responsible for the high oleic acid to linoleic acid (18:2n6) (O/L) trait found in these peanuts (Ray and others 1993). Characterization of oleoyl-PC desaturase has revealed that the activity of the enzyme is governed by two genes, namely ahFAD2A and ahFAD2B (Jung and others 2000a, 2000b; Brunner 2001). These genes share 99% nucleotide sequence homology in the coding region and both code for active desaturases (Brunner 2001). The enzyme activity of either ahFAD2A or ahFAD2B is sufficient for the normal-oleate trait, but a reduction in ahFAD2B levels and a mutation in ahFAD2 will produce the high-oleate trait (Jung and others 2000a, 2000b).

III. Tocopherols in Peanuts

Vitamin E is the generic descriptor for all tocol and tocotrienol derivatives of 6-hydroxychroman compounds that exhibit the biological activity of α -tocopherol (α -T) measured by the rat resorption-gestation assay (Eitenmiller and Lee 2004). It is considered to be a significant health-promoting component of peanuts and tree nuts and affords health benefits to those who routinely consume nuts (Resurreccion and others 2009, Sabaté and others 2010). Because peanuts and peanuts in the form of peanut butter are the most commonly consumed "nut," comprising over two-thirds of the total weight of nuts eaten in the United States, their contribution of vitamin E to the diet from a food source is significant (King and other 2008). Knekt and others (1994) as well as Kushi and others (1996) demonstrated that the tocopherol content in food is inversely associated with mortality from cardiovascular disease.

Vitamin E may play a key role in the reducing diseases such as aging, cardiovascular disease, cancer, and immune response (Schneider 2005; Traber 2007). Harman (1995) postulated that vitamin E may be protective against aging. Aging is due to accumulation of deteriorated compounds caused by free radical damage, and vitamin E acting as a free radical scavenger can possibly retard aging. The hypothesis that oxidation of low-density lipoprotein (oxLDL) is a major causative agent in the development of cardiovascular disease (CHD) has led to extensive research (Traber and others 2008).

Chun and others (2003) provided tocopherol profiles for Runner peanuts composed of undetermined cultivars. Twenty-seven samples collected over two years had tocopherol levels of 11.0, 0.4, 10.3, 0.8, and 22.5 mg/100 g for α -, β -, γ -, and δ -T and total tocopherols, respectively. Although details of the extraction procedure were not given, Isleib and others (2006) noted tocopherol levels in peanut kernels quite similar to those reported by Chun and others (2003) in a mixed sample of peanuts consisting of nine cultivars (i.e., six Runner and three Virginia). In normal peanuts, tocopherol levels were found to be 10.9, 0.33, 8.5, 0.5, and 20.2 mg/100 g, respectively, for α -, β -, γ -, and δ -T and total tocopherols. Significantly lower levels of α -T and total tocopherols and significantly higher levels of γ -T and δ -T were determined in a mixed sample of high-oleic peanuts consisting of four Runner cultivars and one Virginia cultivar. Reported levels in the higholeic sample were 9.0, 0.3, 9.2, 0.6, and 19.1 mg/100 g for α -, β -, γ -, and δ -T and total tocopherols, respectively.

Studies by Jonnala and others (2006a) and Davis and others (2008) provide somewhat conflicting data compared to the above cited work. The Jonnala and others (2006a) study used saponification and reported considerably lower vitamin E levels in five high-oleic Runner cultivars grown in Oklahoma. α -Tocopherol levels ranged from

6.8 to 7.4 mg/100 g, and total tocopherol levels ranged from 12.5 to 14.3 mg/100 g based on raw kernel content. The greatest α -T and total tocopherol quantities reported by Jonnala and others (2006a) represent 79.8 and 75.5% of the mean levels reported by Isleib and others (2006) for high-oleic peanuts. Data collected by Davis and others (2008) suggested that high-oleic peanut oils possessed greater concentrations of total tocopherols than non-high-oleic counterparts. Unfortunately, Davis and others (2008) did not present the compositional data necessary to convert the oil concentrations to a kernel weight basis. Total tocopherols in the peanut oils ranged from 25.5 mg/100 g to 42.5 mg/100 g, which represents high cultivar variability. The peanut oils were screw expeller oils and did not take in account complete oil extraction from the kernels.

IV. Phytosterols in Peanuts

Phytosterols or plant sterols are known to have a wide range of biological and physical properties in nature. Phytosterols are non-cholesterol sterols naturally occurring plant constituents. They are unsaponifiable triterpenes in the lipid fraction possessing a cyclopentanoperhydrophenanthrene ring structure, and are also referred to as 28- and 29-carbon 4-desmethyl sterols. They act to stabilize phospholipid bilayers in plant cell membranes just as free cholesterol does in animal cell membranes (Segura and others 2006; Lu and others 2007).

In nature, phytosterols and stanols exist as the free sterols or as four types of conjugated compounds in which the 3β -hydroxyl group is esterified to a fatty acid, a hydroxycinnamic acid, or glycosylated with a hexose (usually glucose) or a 6-fatty acyl hexose (Lagarda and others 2006). Esterified and glycosidic forms are generically called phytosterol conjugates. Free phytosterols serve to

stabilize phospholipid bilayers in plant cell membranes in a similar manner of the role cholesterol does in animal cell membranes (Moreau and others 2002).

The benefits of phytosterols in human nutrition led to the availability of the conjugated forms of steryl-esters or stanol ester for human consumption in food products such as margarine or milk derivatives. For phytosterol engineering, recent research led to the isolation and use of key component of the phytosterol biosynthetic pathway in plants to change phytosterol composition. The expression of the key enzymes in the biosynthesis of steryl-esters, 3-hydroxy-3-methylglutaryl coenzyme A reductase (HMGR), a sterol-C-methyltransferase (SMT1), and sterol acyltransferase (SAT), has been accomplished in developing rape and tobacco seeds. The co-expression of an N-terminal truncated HMGR and of a SMT1 in transgenic tobacco seeds was appeared to enhance carbon flux towards the desired end-products (Holmberg and others 2003). On the basis of this co-expression, Schaller (2004) noted that phytosterol profiles may be manipulated to influence linked metabolic events.

Phytosterols exist in all plant-based foods, such as fruit, vegetables, nuts, seeds, legumes, and cereals. Especially, plant oils contain phytosterols as naturally occurring constituents. Although peanuts are recognized as an excellent source of phytosterols, published data on the phytosterol content of raw peanuts is variable and difficult to interpret; many of these studies give phytosterol levels based on experimental growth conditions that do not reflect commercial production employing present-day agronomic practices. Moreover, data often represents peanuts from unknown cultivars and small sample sizes. Studies this century on the phytosterol content of peanuts and peanut products include research by Phillips and others (2005a), Jonnala and others (2006a), and Normén and others (2007). Phillips and others (2005a) reported on the phytosterol contents of

several nuts and seeds determined from composite samples obtained from USDA National Sampling Programs, designed to provide representative samples of products available in the country. The total phytosterol levels for peanut products were 135 and 137 mg/100 g in oil- and dry-roasted peanuts, respectively, and 132 to 146 mg/100 g for selected peanut butters. These values represent the “total sterol” content resulting from combined acid and alkali hydrolysis steps. Using a validated method, Normén and others (2007) reported the phytosterol levels of fatty foods consumed in Sweden and The Netherlands. From this study, a peanut sample (most likely roasted peanuts) was found to contain 116 mg total phytosterols/100 g sample. Two samples of peanut oil contained total phytosterol levels of 251 and 315 mg/100 g oil, while two peanut butters contained 160 and 198 mg/100 g product. These peanut butter levels are greater than those (i.e., 132 to 146 mg/100 g) reported by Phillips and others (2005a). Furthermore, both given in the USDA National Nutrient Database for Standard Reference (USDA 2009). Jonnala and others (2006a) reported very high and variable phytosterol contents for high-oleic and genetically-modified peanuts. β -Sitosterol levels ranged from 190 to 649 mg/100 g of oil, which is considerably higher than levels reported by either Phillips and others (2005a) or Normén and others (2007). Reasons for the high values given by Jonnala and others (2006a and b)

are not readily apparent. The USDA National Nutrient Database for Standard Reference, Release 22 (2009) value for the total phytosterol content of peanut oil is 207 mg/100 g, a lower value than reported by Phillips and others (2005b) and Normén and others (2007). In western societies, the average intake of phytosterols in men is approximately 100–350 mg/daily (Micallef and Garg 2009).

V. Conclusions

Peanuts are considered to be one of the most nutritious foods in the world. Peanuts are known to contain many significant dietary components that contribute to lowering of the risk of coronary heart disease and, potentially, other chronic diseases. Bioactive or functional components including tocopherols and phytosterols exist in the peanut oil. Recent research on oil components including fatty acids, vitamin E, and phytosterols have been provided in type, cultivar and other differences pertinent to peanut composition. This review for peanuts can be provided for the necessary information to allow the industry to increase per capita peanut consumption through marketing efforts that document beneficial compositional information and presents the peanut as a desirable package of nutrients and health-promoting components.

Table 1. Research Summaries of Published Papers on the Fatty Acid Profiles in Peanuts and Peanut Products

Samples	Objective	Observations	References
Cultivars which has the naturally occurring high oleate oil character	To determine of this single amino acid change was the cause of the decrease activity in the mutated oleoyl-PC desaturase that correlated with the high oleate trait in these peanut cultivars	The decrease in activity of the one gene, a consequence of mutation from aspartate 150 to asparagine, suggests that these alterations are the molecular basis of the high oleate phenotype in some commercial varieties of peanut	Brunner and others 2001
Ten genotypes (normal and high-oleic cultivars)	To determine the relative extent to which oil chemistry of high-oleic and normal peanut genotypes may vary with planting date over a three year period	The O/L ratio was 18:1 to 51:1 for high-oleic lines and 1.7:1 to 3.5:1 for normal genotypes; Oleic acid was inversely correlated to linoleic and palmitic acids ($r = -0.996, -0.959$)	Andersen and Gorbet 2002
Five high-oleic cultivars and one normal cultivar	To examine the chemical composition of Tamrun OL01, Tamrun OL02, TX 977164, and TX 977239	This study indicates that conventional genetic selection for high-oleic concentration does not cause substantial unintentional changes in peanut chemical composition	Jonnala and others 2005b
Five high-oleic and nine normal oleic lines	To determine whether the high-oleic trait was associated with increases in off-flavors in data collected as part of ongoing flavor quality studies	The high-oleic trait does not appear to have a major impact on sensory quality on average, although there were individual instances in which the trait was associated with shifts in sensory attribute intensities that may be perceptible to consumers	Isleib and others 2006
Nine Runner Cultivars	To describe density, dynamic viscosity and kinematic viscosity as a function of temperature for the oil from nine different cultivars of peanut	High-oleic oils had both the lowest densities and highest viscosities, with viscosity differences being most apparent at cooler temperatures.	Davis and others 2008a
Six new peanut cultivars	To evaluate the correlation between agricultural yield and nutrient properties as well as the nutrient components in six cultivars of peanuts	In six new cultivars, oleic acid ranged from 43.4 to 46.2%, and linoleic acid went from 32 to 32.6%; The total saturated and unsaturated fatty acid content averaged 17% and 79%, respectively	Campos-Mon dragón and others 2009
10 Runner cultivars	To reports on the fatty acid composition of normal, mid-oleic, and high-oleic Runner peanut cultivars	Runner peanuts were significantly ($P < 0.05$) different among the normal, mid-, & high-oleic peanuts investigated; O/L ratios were found to be 1.93 ± 0.30 , 5.25 ± 1.12 , & 16.9 ± 5.20 for normal, mid-, and high-oleic peanut lipids, respectively	Shin and others 2010a
10 Runner cultivars	To provide advanced information concerning the application of principal component analysis (PCA) to the fatty acid profiles of commercial Runner peanut cultivars	Correlation coefficient showed an inverse association between oleic and linoleic acids; Score plot generated between PC1 and PC2 (87.2%) successfully segregated normal-, mid-, and high-oleic peanut cultivars	Shin and others 2010b

Table 2. Research summaries of published papers on vitamin E in peanuts and peanut products

Samples	Objective	Observations	References
Raw Runner type peanuts (1998 and 1999 crop years)	To investigate the effect of peanut butter manufacture on vitamin E content of peanuts and to provide more complete data on the vitamin E content of peanut products	No significant differences were observed in tocopherol values between 1998 and 1999 crop raw peanuts or between raw peanuts and peanut butter except for γ -T ($P > 0.05$); Retention of total tocopherols during peanut butter manufacture was 95%; Mean α -T values (mg/100 g) of commercial peanut products ranged from 12.3 to 4.1	Chun and others 2003
Virginia type (NC-7 and ÇOM)	To determine the physical and chemical properties of peanuts and peanut butter products	In kernel, NC-7 and ÇOM showed 4.47 and 3.87 mg/kg for α -T; Alpha tocopherol in butter products showed 3.17 and 1.50 mg/kg in NC-7 and ÇOM, respectively	Özcan and Seven 2003
Peanut oil	To determine tocopherol contents in nut oils (peanuts)	Peanut oil contained 87.9 μ g/g for α -T, and 60.3 μ g/g for γ -T	Maguire and others 2004
16 genotypes (normal and high oleic types)	To determine whether the high-oleic trait was associated with increase in off-flavors	High oleic cultivars had significantly higher γ -, and δ -T; Normal cultivars showed significantly higher α -T ($P < 0.05$)	Isleib and others 2006
Dry-roasted peanuts, and boiled peanuts	To provide new information on vitamin E contents	In the dry-roasted peanuts, 10.0 and 1.4 mg/kg for β -T ₃ and γ -T ₃ were detected, respectively; Boiled peanuts also showed 3.2 for β -T ₃ and 1.1 mg/kg for γ -T ₃	Franke and others 2007
Cold pressed peanut oil	To determine the tocopherols and tocotrienols in plant oils by Reverse Phase-HPLC	By RP-HPLC, 10.92 mg/100g for α -T, 11.08 mg/100g for β - + γ -T, and 0.88 mg/100g for δ -T were detected, respectively.	Gruszka and Kruk 2007
Nine commercial peanuts	To describe physical and chemical characteristics for the oil from nine different cultivars of peanuts	No obvious correlations were observed in plots of the individual tocopherols, α , β , γ , and δ and oil physical properties; The increased content of tocopherols in the high-oleic oils may minimize viscosity changes in these samples under conditions that promote oxidative deterioration	Davis and others 2008b
Six new peanut cultivars	To evaluate the correlation between agricultural yield and nutrient properties as well as the nutrient components in six cultivars of peanuts	Tocopherol levels varied from 390 to 707 ppm; The highest tocopherol levels corresponded to the cultivars with the lowest yield; The α -T content was estimated at 90-150 ppm, while γ -T was 270-570 ppm	Campos-Mondragón and others 2009
Runner cultivars	To provide tocopherol data to the USDA for consideration of inclusion in their Nutrient Database for Standard References	Mean α -T in Runner peanuts was 10.5 ± 1.5 mg/100g, which is 26.7% greater than imputed value for peanuts, all types (NBD 16087) provided by the USDA Nutrient Database	Shin and others 2009

Table 3. Research Summaries of Published Papers on Phytosterols in Peanuts and Peanut Products

Samples	Objective	Observations	References
Peanut oil	To report unsaponifiables in refined vegetable oil from Nigeria	The % distribution of sterols in peanut oil was 64 (β -sitosterol), 15(campesterol),9(stigmasterol), 8(Δ^5 -avensterol), 3(Δ^7 -stigmasterol)and 1(Δ^7 -avenasterol)	Itoh and others 1973
28 peanut cultivars	To characterize chemical properties of peanut seeds from Ecuador, and aboriginal peanut seeds from Peru and Bolivia and various wild species	The sterol composition showed higher concentration of β -sitosterol followed by campesterol, stigmasterol, and Δ^5 -avenasterol; β -sitosterol wasthepredominatesterolinallsamples	Grosso and Guzmán 1995a, 1995b Grosso 1997,
Peanut oils	To develop a simple method based on GC to analyze the free and esterified sterols in animal fats and vegetable oils	Peanut oil contained campesterol (22.4 and 9.5 mg/100 g for free and esterified sterols), stigmasterol (12.7 and 5.0 mg/100 g), β -sitosterol (129 and 35 mg/100 g), Δ^5 -avenasterol(2.9and3.0 mg/100 g), Δ^7 -stigmasterol(2.9 and 4.9 mg/100 g), and Δ^7 -avenasterol(0.3 and1.3 mg/100 g),respectively	Choong and others 1999
Raw and roasted peanuts	To evaluate peanuts and its products as possible sources of phytosterol, especially β -sitosterol in the American diet	Sterol contents (mg/100 g) were 61-144 for roasted peanuts, 207 for unrefined peanut oil, 144-157 for peanut butter, and 55-60 for peanut flour; Sterols were quantified after saponification by GC; Values do not reflect glucoside forms	Awad and others 2000
Peanut butter	To develop and validate a precise and accurate method to quantify β -sitosterol and β -sitosteryl glucoside in foods and dietary supplements	Sterol glucosides made up 16.7% of total sterols in peanut butter; Steryl glucoside represent a significant portion of total sterols in most foods	Phillips and others 2005 (a, b)
Various peanut cultivars	To examine the effect of breeding on nutritionally beneficial bioactive peanut components	β -Sitosterol was the major phytosterol comprising of 75-90% of the total phytosterols in all samples	Jonnala and others 2006 (a, b)
Peanuts and peanut oil from Sweden and the Netherlands	To develop a valid phytosterol database of fatty foods	Peanuts and peanut oil contain 15 and 37 mg/100 g of campesterol, 13 and 21 mg/100g of stigmasterol, 76 and 166 mg/100 g of sitosterol, 0.7 and 5.8 mg/100 g of sitostanol, and 12 and 22.2 mg/100 g of Δ^5 -avenasterol,respectively	Normén and others 2007
Six new peanut cultivars	To evaluate the correlation between agricultural yield and nutrient properties as well as the nutrient components in six cultivars of peanuts	In six new cultivars, stigmasterol, β -sitosterol, and campesterol were studied; β -Sitosterol was the most abundant and the three accounted for 90% of total phytosterols; Two higher yielding cultivars showed lower sterol levels	Campos-Mondragón and others 2009

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VII. References

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Potentials of Myanmar Development and Trade Relationship between Korea and Myanmar

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Abstract

This paper explores the potentials of economic development of Myanmar. And this also explores the prospectus of trade relationship between Korea and Myanmar. Myanmar is evaluated to have potentials for economic development. Not only the abundance of natural resources but also latent comparative advantage in labor intensive industries are the major source of economic development. Maintaining the membership of trade organizations will ease the barrier to enter the global market after lifting economic sanction. There is expected to have gains from trade between Korea and Myanmar. Different economic structure as well as the Korean experience helps expand the trade between the two.

Key words: Myanmar trade, Korea trade, trade structure

I. Introduction

Recently Myanmar is of interest in the global economy because the economic sanction against Myanmar is being removed. It also prepared to open its economy and

welcome investments and trades from world market. Korea is also interested in economic cooperation with Myanmar. But Myanmar is not well known to Korea as well as the global economy.

Most of research on Myanmar is exploratory. Most of research is purposed to provide investors with information for business opportunity. Consulting companies and international development banks

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released reports. PWC released Myanmar business guide for foreign investors. It provided brief information on Myanmar and its institutions.(PWC (2014)) ADB explained opportunities and challenges of the economic transition of Myanmar.(ADB (2012)) The Export-Import Bank of Korea published a report to support small and medium size enterprises to enter Myanmar market. KOTRA also published several reports to help Korean business to analyze and enter the market. These reports are focused on providing brief information of Myanmar, regarding it as an unopened area to the world market. Much of literature is related to the effects of the removal of the economic sanction on Myanmar.(KIEP(2011, 2012a, 2012b), KOTRA(2013)) Another topic of research on Myanmar in Korea is related to international aid. As the foreign aid of Korea is increasing, the cooperation

focuses on trade relationship between Myanmar and Korea, since international trade is important sector related to the removal of the economic sanction and the economic transition of Myanmar. This paper studied trade structure of Myanmar before and after the economic sanction. And this looks at the trade structure of two countries, Korea and Myanmar, before and after the sanction. The potential and direction of trade between two countries are discussed.

This paper consists of five sections. Trend of trade of Myanmar is reviewed in the second section. The third section analyzed the structure of export and import of Myanmar. The trade relationship between Korea and Myanmar is analyzed in the fourth section. The fifth section discusses and derive conclusion.

Table 1. Trend of Total Trade of Myanmar

(unit: Million US dollar)

Year	Export		Import		Trade balance	
	Volume	Rate of change	Volume	Rate of change	Volume	Rate of change
2004	3,157	14.14	3,459	7.12	-302	-34.77
2005	3,716	17.71	3,564	3.04	152	-150.33
2006	4,543	22.26	3,912	9.76	631	315.13
2007	4,839	6.52	5,595	43.02	-756	-219.81
2008	6,277	29.72	6,976	24.68	-699	-7.54
2009	5,911	-5.83	7,075	1.42	-1,164	66.52
2010	6,454	9.19	9,945	40.57	-3,491	199.91
2011	8,315	28.83	13,689	37.65	-5,374	53.94

Source: www.kita.net

in ODA of Korea with Myanmar is of interest. In this topic, not only economic development but also the social development are related to the plan for ODA of Korea.(KIEP(2011))

This paper is in the line of the existing literature exploring Myanmar. However, different from the existing literature, this

II. Trend of Trade of Myanmar

The volume of trade of Myanmar is startling because it has been increasing at two digit rate even during the sanction. In 2011, the increasing rate of export was 29% compared to previous year. But it is not good for Myanmar that the import has

been increasing higher than exports. In 2010, the rate of increase of import was higher than 40%. Thus the trade deficit has also increased as the trade increased. Myanmar is shown to have chronic trade deficit. This implies that Myanmar stayed

have comparative advantage if it participates in the global market.

First of all, Myanmar exports depending on primary products. The top ten export commodities consist of natural resources and agricultural products. In 2010, natural

Table 2. Top Ten Export Commodities of Myanmar

(Unit: Million US \$, %)

Rank	Year 1992				Year 2010			
	SITC3	Commodity	Vol	Share	SITC3	Commodity	Vol	Share
1	247	Hard wood	127.0	28.25	343	Natural gas	2936.0	38.50
2	054	Vegetable	107.8	24.00	667	Pearl and jewelry	1871.0	24.54
3	042	Rice	40.4	8.99	054	Vegetable	890.0	11.67
4	036	Crustacean	31.3	6.97	247	Hard wood	553.9	7.26
5	222	Edible oil	25.5	5.67	034	Frozen fish	226.1	2.97
6	248	Timber	18.0	4.00	231	Natural rubber	194.9	2.56
7	667	Pearl and jewelry	17.1	3.81	841	Textile and knit	177.0	2.32
8	843	Textile and knit	15.7	3.50	042	Rice	156.3	2.05
9	231	Natural rubber	11.5	2.55	845	Other clothes	110.4	1.45
10	075	Spices	10.9	2.43	036	Crustacean	79.7	1.04
		others	44.1	9.82		others	429.7	5.64
		total	449.4	100		total	7625.2	100

source: UN Comtrade, comtrade.un.org/db/

connected with foreign countries even when it is disconnected with the western countries. But its industrial competitiveness seemed to be weakened.

III. The Economic Sanction and Trade Structure of Myanmar

1. Export structure of Myanmar

This section looks at the structure of export of Myanmar. The commodity structure and market structure are analyzed. The structure is helpful to understand the changes of Myanmar economy. This section takes the following perspectives of analysis of the structure. One question is what are effects of the economic sanction on its trade. Another question is what industries

gas and jewelry take top ranks with share of about 60%. This implies that Myanmar economy depends on primary industry such as natural gas and jewelry. Myanmar economy is very vulnerable to fluctuation of prices of primarily products.

Second, the commodity structure of export in 2010 is very similar to that of 1992. In 2000 in which the economic sanction was not introduced, Myanmar exported manufactured products such as clothes and textiles that are labor intensive. In 2000, clothes and textile took about 42% share of total exports of Myanmar. But in 2010 when the economic sanction was effective, the major export products are from mining industry such as natural gas and jewelry. This commodity structure of 2010 is very similar to that of 1992 before the economy sanction. Thus the economic

sanction turned its economy back to twenty years ago.

However, one important fact we need to notice is that textile and knit stayed in top ten export commodities. The exports of textile and knit maintained substantial share in the total export. This implies that Myanmar has potentials to have comparative advantage in labor intensive industry such as textile and knit.

Turning to the export market structure of Myanmar, it exported to neighboring countries such as Thailand, India, and China. Because of economic sanction, it could not export to western countries so that its neighboring countries are the major trade partners. This market structure of export is different from other newly developing countries in Asia such as China, Vietnam and Cambodia. Those newly developing countries export to US and European countries intensively. This implies

2. Import Structure of Myanmar

Commodity structure of import is more differentiated than that of export. The share of top ten import products takes about 50% of total imports while that of export products takes about 90% of total exports. Since domestic manufacture industry has not been developed, import demands are made to satisfy domestic needs. Therefore, Opening her economy will increase the imports to support the increase of domestic demand.

Secondly, the commodity structure of import has not been changed by the economic sanction. Myanmar imports chemical and heavy industry products because of weak manufacturing industry. Recently, oil product and artificial fiber take large share of total imports. This seems to be related to economic growth.

The market structure of import is

Table 3. Top ten export market of Myanmar

(Unit: Million US \$)

Rank by	2005/2006	Country	2005/2006	2006/2007	2007/2008	2008/2009
1		Thailand	1354.37	2354.15	2821.74	2390.11
2		India	489.1	733.57	727.98	731.31
3		China	365.79	614.09	696.35	558.71
4		Hong Kong	256.14	402.96	649.2	601.83
5		Singapore	263.81	182.27	401.57	773.06
6		Japan	136.05	165.67	185.56	167.63
7		Malaysia	93.02	88.29	118.57	286
8		Indonesia	65.49	88.08	86.66	25.85
9		Korea	38.57	61.54	73.71	57.9
10		German	65.65	74.79	66.55	48.93
11		Others	428.79	457.52	585.39	529.97

Source: Myanmar Central Statistic Office (C.S.O)

that Myanmar's potential of economic growth is large. When the economic sanction is removed, there should be a way for Myanmar to export to the western countries.

concentrated in Asian countries as that of export. In the top ten importing countries, eight countries are in Asia while German and US are the ninth and tenth largest importing countries. Because of the economic sanction, Myanmar tended to

Table 4. Top ten import commodity of Myanmar in 1992, 2001 and 2010

(Unit: Million US \$, %)

Rank	Year 1992				Year 2001				Year 2010			
	SIT C3	Commodity	Vol	Share (%)	SIT C3	Commodity	Vol	Share (%)	SIT C3	Commodity	Vol	Share (%)
1	422	Oil product	6.22	10.05	334	Oil product	30.88	10.66	334	Oil product	91.36	21.94
2	674	Artificial fiber	5.70	9.22	653	Artificial fiber	25.71	8.88	723	Artificial fiber	21.87	5.25
3	784	Crude oil	4.48	7.25	333	Crude oil	21.70	7.49	653	Crude oil	19.03	4.57
4	782	Trucks	4.21	6.81	782	Trucks	18.03	6.23	793	Ship, vessel	17.22	4.13
5	562	Civil eng. machinery	1.83	2.96	723	Civil eng. machinery	11.68	4.03	422	Nonvolatile vegetable oil	16.80	4.03
6	778	Other plastic	1.62	2.61	575	Other plastic	7.21	2.49	542	Medicine	16.02	3.85
7	514	Medicine	1.51	2.44	542	Medicine	5.70	1.97	679	Pipe	12.83	3.08
8	625	Processed food	1.44	2.32	727	Processed food	5.67	1.96	575	Other plastic	11.31	2.72
9	761	Nonvolatile vegetable oil	1.40	2.27	422	Nonvolatile vegetable oil	5.00	1.73	676	Shape steel	10.02	2.41
10	334	Tube pipe	1.35	2.18	679	Tube pipe	4.91	1.70	661	Cement	9.71	2.33
		Others	32.1	51.88		Others	153.1	52.87		Others	190.3	45.69
		Total	61.8	100		Total	289.6	100		Total	416.4	100

Source: UN Comtrade, comtrade.un.org/db/

Table 5. Top Ten Importing Countries of Myanmar

(Unit: Million US \$)

Rank by 2008-2009	country	2005/2006	2006/2007	2007/2008	2008/2009
1	China	467.49	728.10	994.34	1096.36
2	Singapore	557.71	1031.16	815.78	952.12
3	Thailand	236.88	304.30	383.50	358.46
4	Japan	105.11	155.91	242.57	151.40
5	Indonesia	57.85	93.89	207.11	189.91
6	India	80.07	159.42	173.47	146.17
7	Malaysia	139.56	110.36	115.52	328.68
8	Korea	85.82	84.69	107.34	171.21
9	German	21.14	30.46	30.16	43.42
10	USA	82.35	43.15	22.10	75.02
11	Others	147.88	186.95	254.75	632.88

Source: Myanmar Central Statistic Office (C.S.O)

import neighboring countries rather than the western countries. Also, it is noticeable

that Myanmar's dependence on China is increasing. Not only the volume of import

from China but also the increasing rates are large.

But as Myanmar opens and participates in global economy, its imports from the Western countries are expected to increase

3. Trade Policy of Myanmar

Since Myanmar is under the economic sanction from the western countries, it is expected that it has high trade barriers and separated from global economy. But it has

Table 6. Top ten export commodity of Korea to Myanmar in 1992, 2001 and 2011

(Unit: Million US \$, %)

Rank	Year 1992				Year 2001				Year 2011					
	SIT C3	Commodity	Vol	Share	SIT C3	Commodity	Vol	Share	SIT C3	Commodity	Vol	Share		
1	054	Vegetables	0.337	56.358	333	Petroleum oils	2.981	58.816	841	Men's or boys' cloth	11.366	38.053		
2	247	Wood	0.097	16.276	634	Veneers, plywood	0.991	19.556	842	Women's or girls' cloth	7.542	25.250		
3	075	Spices	0.089	14.894	054	Vegetables	0.207	4.090	845	Articles of apparel	3.400	11.385		
4	231	Natural rubber	0.040	6.750	292	Crude vegetable materials	0.149	2.948	058	fruits prepared	2.136	7.152		
5	292	Crude vegetable materials	0.020	3.264	841	Men's or boys' cloth	0.145	2.860	231	natural rubber	1.315	4.401		
6	899	Miscellaneous manufactured articles	0.006	0.939	764	Telecommunications equipment	0.129	2.544	054	Vegetables	0.790	2.646		
7	635	Wood manufactures	0.006	0.932	842	Women's or girls' cloth	0.087	1.712	042	rice	0.740	2.478		
8	821	Furniture and parts	0.001	0.195	845	Articles of apparel	0.082	1.624	844	women's knit	0.473	1.583		
9	248	Wood simply worked	0.001	0.156	036	Crustaceans	0.079	1.565	843	men's knit	0.462	1.545		
10	792	Aircraft and associated equipment	0.001	0.094	056	Vegetables prepared	0.037	0.739	851	Footwear	0.461	1.542		
Others			0.001	0.142	Others			0.180	3.544	Others			1.184	3.965
Total			0.598	100	Total			5.068	100	Total			29.868	100

Source: UN Comtrade, comtrade.un.org/db/

because the manufacture industry is not developed enough to satisfy domestic needs. Also, the heavy and chemical industries are not developed to support its economic development. Therefore, imports from the western countries are expected to increase as Myanmar engaged more in global economy and receives foreign direct investments.

maintained memberships of international economic cooperative organizations. It is a member of WTO from the time when GATT is founded as well as a member of IMF and World Bank. It also became a member of ASEAN in 1997.

Also, Myanmar has relatively low import tariff as a developing country. According to WTO, the average rate of import tariff is

83.4%. The average of import tariff on non-agricultural industries is 23% while that on agricultural industries is 103.4%. This is related to its structure of comparative advantage. Since manufacturing industries are not competitive enough to obtain comparative advantage by import tariff, tariffs on non-agricultural industries are not high. Therefore, the import barriers for manufacturing industries are not so high that it prohibited imports of manufactured products.

As shown above, it has maintained international relations with global community under the sanction. And it stayed trading with neighboring countries. It is expected

that it should enter the global economy smoothly when the sanction is removed completely

IV. Trade Relationship between Korea and Myanmar

1. Export from Korea to Myanmar

The pattern of export of Korea to Myanmar is different from the commodity structure of total exports of Korea. In 2011, Korea's major export commodities to World are ship and vessels and oil products. And the second largest exports

Table 7. The Commodity Structure of Imports of Korea from Myanmar

(unit: million US\$, %)

Rank	Year 1992				Year 2001				Year 2011					
	SIT C3	Commodity	Vol	Share	SIT C3	Commodity	Vol	Share	SIT C3	Commodity	Vol	Share		
1	054	Vegetables	0.337	56.358	333	Petroleum oils	2.981	58.816	841	Men's or boys' cloth	11.366	38.053		
2	247	wood	0.097	16.276	634	Veneers, plywood	0.991	19.556	842	Women's or girls' cloth	7.542	25.250		
3	075	Spices	0.089	14.894	054	Vegetables	0.207	4.090	845	Articles of apparel	3.400	11.385		
4	231	natural rubber	0.040	6.750	292	Crude vegetable materials	0.149	2.948	058	fruits prepared	2.136	7.152		
5	292	Crude vegetable materials	0.020	3.264	841	Men's or boys' cloth	0.145	2.860	231	natural rubber	1.315	4.401		
6	899	Miscellaneous manufactured articles	0.006	0.939	764	Telecommunications equipment	0.129	2.544	054	Vegetables	0.790	2.646		
7	635	Wood manufactures	0.006	0.932	842	Women's or girls' cloth	0.087	1.712	042	rice	0.740	2.478		
8	821	Furniture and parts	0.001	0.195	845	Articles of apparel	0.082	1.624	844	women's knit	0.473	1.583		
9	248	Wood simply worked	0.001	0.156	036	Crustaceans	0.079	1.565	843	men's knit	0.462	1.545		
10	792	Aircraft and associated equipment	0.001	0.094	056	Vegetables prepared	0.037	0.739	851	Footwear	0.461	1.542		
others			0.001	0.142	others			0.180	3.544	others			1.184	3.965
total			0.598	100	total			5.068	100	total			29,868	100

Source: UN Comtrade, comtrade.un.org/db/

of Korea are electronics and communication devices. Different from this pattern, the major export commodities of Korea to Myanmar are civil engineering devices and construction related products such as shaped steel and tube steel. This reflects the demand of Myanmar that has been driving economic growth. Korea's exports to Myanmar can be expected to increase after the sanction is removed.

Comparing the export patterns of Korea to Myanmar before and after the sanction, the patterns have been changed sharply by the economic sanction. In 1992 and 2001 before the sanction, oil products and other textiles were the major export products of Korea. Different from this pattern, in 2010 and 2011 after the sanction, civil engineering machinery and shaped steel are its major exports to Myanmar. In the duration of economic sanction, the investments of Myanmar decreased so that demand for construction was not large. The release from the sanction triggers the investments and demand for constructions.

of Korea from Myanmar cannot be changed sharply. As the relationship between two countries is improved, the import of Korea from Myanmar can be increased.

V. Discussion and Conclusion

Myanmar is a kind of rising star in global economy. The economic sanction against Myanmar is being removed gradually. In order to identify business opportunities and challenges in Myanmar, evaluation of its potential are of interest for the global economy. Even though it is not easy to evaluate opportunities and challenges of a developing country, Myanmar can be

estimated by reviewing current economic status as well as its past before the economic sanction.

Currently, Myanmar is evaluated to have large potential to develop as the economic sanction is removed. The fundamental reason is its abundance of natural resources such as natural gas, jewelry, and timber and forth. These natural resources are the major export products that are taking about 90% share of its total exports. Its economy seems to depend heavily on primarily industry. But this abundance can be a barrier for its economic development. The more is the economy dependent on the mining industries, the more difficult is to develop manufacturing industries. The profits of mining industries it enjoys may hinder the transformation of economic structure toward manufacture oriented industries. It may be trapped in the Dutch disease that natural resource abundant countries have experienced. Thus, it is required to develop policies to transfer to economic structure led by manufacturing industries.

The second reason for the potential is that it used to have maintained a comparative advantage in some labor intensive industries. Even though it depends on the agricultural and mining industries, the potential comparative advantage in light industries will be a steppingstone for Myanmar to develop. Participating in global division of labor will give a chance to develop manufacture industries. The membership of trade organizations with neighboring countries as well as WTO under the economic sanction will help join in international trade with other countries.

Therefore, international trade will be more important to Myanmar. Trade is the

channel to participate in global division of labor that triggers economic structural change. Trade can shift its economy depending on mining industries to the manufacture industries oriented economy.

This situation emphasizes the importance of the relationship between Korea and Myanmar. Korea is the country that achieved economic development through international trade. Trade between the two is expected to create gains from trade.

First of all, the industrial structure is different from each other. Korea specializes in manufacturing industries and heavy and chemical industries. These are the major industries that support economic development of Myanmar. There are few conflicts to open trade relationship between two.

Secondly, trade of two countries can be increase if the relationship is improved. The pattern of trade between two is different from theirs with the world. The major exports of Myanmar are natural gas and other natural resources that are the major imports of Korea. But these industries are not traded largely between two countries. These are promising areas in which both get gains from trade.

This paper is limited to understand the trade of the two countries. Because of the scarcity of data, this could not analyze to concrete results. However, this finds a few research directions to the relationship between the two. The application of Korean experience of transition to manufacture oriented economy can be one direction of future research. Also, cooperation of the two through ODA is another topic for the future research.

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Stock Compensation Cost, Value Relevance, and Information Contents

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Abstract

The purpose of this study is to analyze value relevance of compensation cost resulting from share-based compensation. This study attempts to positively analyze the effect of compensation cost from share-based compensation on corporate value and information contents. Share-based compensation is to encourage employees to voluntarily contribute to the corporation by granting stocks or stock options to employees and service providers who either contributed or have capacity to contribute to establishment, management or technological development of the corporation. The results of preceeding studies on share-based compensation can largely be divided into two. First result is that share-based compensation has positive influence on firm value. Second result is that share-based compensation does not have influence or has negative influence on firm value. In this study, value relevance of compensation cost and influence on information effect are analyzed based on the model by Ohlson(1995). Specifically, value relevance is analyzed by examining compensation cost based on earning and expense prior to reflection of compensation cost on net income. Synthesizing the results of this studies, stock compensation cost was found to have positive influence on firm value. However decomposition of stock compensation cost in the income statement did not show any information contents. The meaning of this study is in positive demonstration of positive effects by compensation cost on firm value.

Key words: compensation cost, corporate value, information contents, value relevance

I. Introduction

This study positively analyzes value relevance of compensation cost occurring from share-based compensation of Korean

International Financial Reporting Standard (K-IFRS) no. 1102 and appropriateness of account classification. Share-based compensation refers to transaction in which a corporation has obligation to pay a supplier when the corporation or a consolidated entity is receiving goods or services from the supplier.

The purpose of share-based compensation is to encourage employees to voluntarily

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contribute to the corporation by granting stocks or stock options to employees and service providers who either contributed or have capacity to contribute to establishment, management or technological development of the corporation. Accounting of share-based compensation is regulated in K-IFRS no. 1102 'Share-based Compensation.' Here, share-based compensation is classified into three types including stock settlement, cash settlement, and selective.

Share-based compensation provides manager a right to purchase stocks of the company after prescribed period at a specific price, reducing compensation risk of the manager from decrease in stock price through accordance of interests of stockholders and manager, and inducing long-term decision making by the manager for increased corporate value (Lee et al. 2005). Share-based compensation will not only maximize corporate value through relief of interest relation between manager and stockholders, but is expected to increase corporate value by taking the role of performance-based compensation that leads to motivation for stock compensation.

In accounting, an asset is defined as a thing either acquired by business entity or brings controllable future economic benefit as a result of trade or event in the past. Since share-based compensation is ultimately related to future economic benefit, it has a more desirable role as an asset compared to expense, which causes reduction in benefit occurring during certain period from an important business activity of a corporation. Therefore, by analyzing the effect of share-based compensation on firm value, a positive analysis will be conducted from informational perspective based on asset property of compensation cost resulting from share-based compensation, examining

whether share-based compensation has positive effect on firm value.

An interesting fact about compensation cost is that it can be evaluated as an asset in capital market, despite its reflection in the income statement. The meaning of this study is in positive demonstration of positive effects by compensation cost on firm value.

II. Preceding Studies

Preceding studies on share-based compensation mainly focused on introduction of the system, reaction of stock price according to introduction of the system, earnings management by manager according to introduction of the system, characteristics of corporations introducing the system, and corporate performance according to introduction of the system. The results of past domestic and overseas studies on share-based compensation can largely be divided into two. First result is that share-based compensation has positive influence on firm value. Second result is that share-based compensation does not have influence or has negative influence on firm value.

Madrick(2003) argued that while certain amount of share-based compensation has positive relationship with firm value, firm value can actually be reduced if the level of share-based compensation exceeds a certain point. As in corporations like Enron, World Com and Global Crossing, they presented that decision making by managers becomes too risky due to reckless increase in share-based compensation.

DeFusco et al.(1991) reported reduction in investment opportunities from reduced research and development and increase in non-productive waste by managers after

selection of share-based compensation system. If managers can exercise influence on deciding compensation method, excessive share-based compensation on managers can reduce incentive effect on them. Accordingly, they argued that share-based compensation can have negative influence on firm value.

Brickley et al.(1985) showed through 83 NYSE listed corporation that announced long-term compensation plan that announcement of share-based compensation results in positive abnormal earnings. Seol and Kim(2003) analyzed whether share-based compensation on managers improves long-term performance of corporations. There was no significant difference in long-term performance and benchmark profit of corporations with share-based compensation. However, while corporations with stock price higher than exercise price when share-based compensation reached exercise period had higher performance than benchmark profit, corporations with lower stock price than exercise price showed lower performance than benchmark profit.

Sesil et al.(2000, 2002) suggested that corporations with share-based compensation have high increase in productivity, sales, and Tobin Q, granting motivation to employees and enhancing corporate performance.

III. Research Design and Sample Selection

1. Research Design

In this study, value relevance of compensation cost and influence on information effect are analyzed based on the model by Ohlson(1995). Specifically, value relevance is analyzed by examining compensation cost based on earning and expense prior to reflection of compensation

cost on net income. Ohlson(1995) model is a model that combines dividend discount model, clean surplus relation between capital, net income and dividend, and primary auto-correlation of abnormal earning in time series. It is expressed as a linear combination of capital and earning as follows.

$$P_t = a_1 BV_{t-1} + a_2 E_t + a_3 dt + a_4 vt \text{ ----- (1)}$$

where, P_t is stock price at the end of March in year $t+1$,

BV_{t-1} is book-value per share at the end of year $t-1$,

E_t is earning per share in year t ,

dt is net dividend per share in year t ,

vt is information other than book-value, earning and dividend per share in year t .

To deduce a model used in positive analysis, methodologies of preceding studies were applied to modify Eq. (1) as below. First, net dividend (dt) in Eq. (1) was moved to the left side equation. Information other than abnormal earning (vt), which is difficult to measure, was replaced by intercept and error term. Annual dummy variable ($YRkt$) was added to control economic environment in specific year(Myers 1999; Barth et al. 1998). Also when earning is negative (-), negative (-) earning (NEG_E_t) was included in the model to control discriminant relation between earning and stock price (Hayn 1995; Collins et al. 1997, 1999). Earning (E_t) was classified into earning to reflection of compensation cost ($A E_t$) and compensation cost ($S E_t$). The following model was presumed from the above details.

$$P D_t = 0 + 1 BV_{t-1} + 2 A E_t + 3 S E_t + 4 NEG_E_t + k 5k YRkt + vt \text{ ----- (2)}$$

Where, $P D_t$ is stock price with dividend in

year t,
 BV_{t-1} is book-value per share at the end of year t-1,
 AEt is earning per share prior to reflection of stock compensation cost in year t,
 SEt is stock compensation cost per share in year t,
 NEG_Et is negative earning with net loss in year t for deficit firms and 0 for surplus firms,
 YRkt is a dummy variable with the value 1 if firm-year of year t belong to year k and 0 if not.

Eq. (2) is a model that analyzes value relevance of compensation cost in corporations that use share-based compensation. In this study, share-based compensation relieves interest relation between managers and stockholders to maximize corporate value, predicting an increase in corporate value from the role of performance-based compensation followed by motivation on stock compensation. Compensation cost resulting from share-based compensation is expected to have amicable evaluation in capital market. Therefore, regression coefficient 3 of stock compensation cost (SEt) will have significant positive (+) coefficient.

$$PD_t = \alpha_0 + \alpha_1 BV_{t-1} + \alpha_2 Et + \alpha_3 NEG_Et + \alpha_4 YR_{kt} + \alpha_5 vt \text{ -----(3-1)}$$

$$PD_t = \alpha_0 + \alpha_1 ABV_{t-1} + \alpha_2 AEt + \alpha_3 NEG_Et + \alpha_4 YR_{kt} + \alpha_5 vt \text{ -----(3-2)}$$

Where, PD_t is stock price with dividend in year t,
 BV_{t-1} is book-value per share at the end of year t-1,
 Et is earning per share in year t,
 ABV_{t-1} is adjusted book-value per share at

the end of year t-1,
 AEt is adjusted earning per share in year t,
 NEG_Et is negative earning with net loss in year t for deficit firms and 0 for surplus firms,
 YRkt is a dummy variable with the value 1 if firm-year of year t belong to year k and 0 if not.

Eq. (3) is a model that analyzes information effect of share-based compensation. If share-based compensation relieves interest relation between managers and stockholders and sufficiently performs the role of a performance-based compensation to increase firm value so that compensation cost from share-based compensation can receive amicable evaluation in capital market, information effect (adjusted R²) when share-based compensation is appropriated as an asset is anticipated to be larger than information effect (adjusted R²) when compensation cost is appropriated as an expense.

2. Sample Selection

Financial data necessary for this study were collected from KIS-VALUE III database of Korea Investors Service and Data Analysis, Retrieval and Transfer System (DART) of Financial Supervisory Service. Period during which data used for positive analysis exist will be selected as sampling period. Sample corporations are non-financial corporations, with following restrictions.

- ① Corporations that never had been included in issues for administration
- ② All financial data necessary for positive analysis must be available for use

The reason for exclusion of financial industry in sample corporations is because financial industry has different business

characteristics and account titles of financial statement compared to other businesses.

Since most of corporations included in issues for administration have lack of stock trades and sometimes result in trading halt for certain period, there may be problem in continuity of data.

Looking at Table 1, there were 1,308 firm-year (excluding financial industry) that settled their accounting in the end of December and had stock price and financial data based on Audit Reports of 2009-2011. In order to remove the effects of outliers in the process of positive analysis, 49 firm-year with the size of major regression variables outside + or - 1% range were excluded. Final samples are composed of 1,259 firm-year.

Table 1. Sample selection

	Sample
Total sample:	1,308
Available data of non-banking firms with December fiscal year-end	49
(-) Outliers	1,259
(=) Final sample	1,259

IV. Empirical Results

Table 2 shows the statistics of major variables used in this study. First, the mean (median) of stock price with dividend (PDt) in year t is 43,626 (15,183) won. The mean (median) of book-value per share (BVt-1) in year t-1, an account of the balance sheet, is 41,670 (19,253) won, which is slightly lower than price with dividend.

Book-value per share (ABVt-1) prior to reflection of stock compensation cost in year t-1 showed a mean (median) of 41,678 (19,253) won. As accounts of the income statement, earning per share (Et) in year t showed a mean (median) of 4,299 (1,410) won. The mean (median) of earning per

share (AEt) in year t prior to reflection of stock compensation cost was 4,306 (1,410) won. The means (medians) of stock compensation cost per share (SEt) in year t and negative earning per share (NEG_Et) in year t are respectively 7 (0) and -45 (0) won.

Table 3 shows the result of pearson correlation analysis between major variables needed to test the hypothesis. First, stock price with dividend (PDt), book-value per share (BVt-1) and earning per share (Et) are showing significantly positive (+) correlations. And stock compensation cost (SEt) show a significantly positive (+) correlation with stock price with dividend (PDt). This suggests that stock compensation cost can be evaluated positively in the

capital market unlike normal expenses and losses due to the expectation of improved future management performance. In addition, there is no statistical significance between stock price with dividend (PDt) and negative earning per share (NEG_Et).

Table 4 provides the results of regression analysis on value relevance of stock compensation cost. As shown by the above results, recognition of stock compensation cost is an item recorded as a expense in the income statement. However, since it brings improved future management performance, stock compensation cost is evaluated more positively in the capital market.

Table 5 provides the results of regression analysis on information contents of stock compensation cost. Model (3-1) is the model

prior to decomposition of stock compensation cost in the income statement, and Model (3-2) is the model after decomposition of stock compensation cost in the income statement. Adjusted R^2 of Model (3-1) and Model (3-2) are respectively 0.6918 and 0.6923. As shown by the above results, there is no statistical significance between

Model (3-1) and Model (3-2). Synthesizing the results of table 4 and table 5, stock compensation cost was found to have positive influence on firm value. However decomposition of stock compensation cost in the income statement did not show any information contents.

Table 2. Descriptive statistic

Variables (N=1259)	Min	Median	SD	Min	Max
PD_t	43,626	15,183	83,438	700	1,063,779
BV_{t-1}	41,670	19,253	64,083	918	618,558
ABV_{t-1}	41,678	19,253	64,090	918	618,558
E_t	4,299	1,410	7,685	-6,164	77,057
AE_t	4,306	1,410	7,692	-6,164	77,057
SE_t	7	0	52	0	941
NEG_E_t	-45	0	328	-6,164	0

a variable definition : PD_t is stock price with dividend in year t, BV_{t-1} is book-value per share at the end of year t-1, ABV_{t-1} is adjusted book-value per share at the end of year t-1, E_t is earning per share in year t, AE_t is adjusted earning per share in year t, SE_t is stock compensation cost per share in year t, NEG_E_t is negative earning with net loss in year t for deficit firms and 0 for surplus firms.

Table 3. Correlation

Variables (N=1259)	BV_{t-1} (p-value)	E_t (p-value)	SE_t (p-value)	NEG_E_t (p-value)
PD_t	0.686(0.000)	0.820(0.000)	0.151(0.000)	0.023(0.413)
BV_{t-1}		0.74153(0.000)	0.087(0.001)	-0.001(0.945)
E_t			0.129(0.000)	0.119(0.000)
SE_t				-0.000(0.995)

^a two-tailed tests

Table 4. Value relevance of stock compensation cost

Variables (N=1259)	Model 2
-Intercept	-2962(-1.2)
BV_{t-1}	0.196(6.38) ***
AE_t	7.722(29.73) ***
SE_t	68.834(2.72) ***
NEG_E_t	-16.013(-3.96) ***
F-value	476.14
Adj R^2	0.6938

^a Two-tailed tests (*, **, ***: significant at less than 10, 5, and 1% levels, respectively).

Table 5. Information contents of stock compensation cost

Variables (N=1259)	Model 3-1	Model 3-2
Intercept	-2557.67(-1.03)	-2607.55(-1.06)
BV _{t-1} (ABV _{t-1})	0.195(6.33)***	0.195(6.32)***
E _t (AE _t)	7.798(30.06)***	7.797(30.10)***
NEG_E _t	-16.197(-3.99)***	-16.197(-3.99)***
F-Value	565.84	567.00
Adj R ²	0.6918	0.6923

V. Conclusions and Limitations

The main purpose of this study is to analyze value relevance of compensation cost resulting from share-based compensation. Share-based compensation is not only expected to accomplish maximization of corporate value through relief of interest relation between managers and stockholders but also to perform the role of a performance-based compensation followed by motivation of managers for stock compensation.

Based on such discussion, this study attempts to positively analyze the effect of compensation cost from share-based compensation on corporate value and information contents. Analysis results of this study are anticipated to become more specific and positive data on validity of compensation cost as an expense, as permitted by share-based compensation standard by K-IFRS.

Since share-based compensation is ultimately related to future economic benefit, it has a more desirable role as an asset compared to expense, which causes reduction in benefit occurring during certain period from an important business activity of a corporation. Therefore, by analyzing the effect of share-based compensation on firm

value, a positive analysis will be conducted from informational perspective based on asset property of compensation cost resulting from share-based compensation, examining whether share-based compensation has positive effect on firm value.

An interesting fact about compensation cost is that it can be evaluated as an asset in capital market, despite its reflection in the income statement. The meaning of this study is in positive demonstration of positive effects by compensation cost on firm value. However decomposition of stock compensation cost in the income statement did not show any information contents.

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Case Study on International Mobile Roaming Regulation: *Focusing on EU and Singapore-Malaysia cases*

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Abstract

Together with globalization, demand of international mobile roaming services is increasing faster and faster, however the high price of the service has been obstacle of its expansion. This paper reviews the cases of roaming regulation in EU and Singapore-Malaysia. The EU has been the precursor of roaming price regulation and Singapore has taken the initiative in roaming price reduction within ASEAN region. Implications for developing countries from these cases are identified. Initial steps, regulatory measures, and enhancing consumer awareness are discussed.

Key words: international mobile roaming, EU, roaming regulation, Singapore, Malaysia, roaming rates, retail rate, wholesale rate

I. Introduction

Roaming service in mobile telecommunication refers to a service of providing connection for voice and data services to a user of mobile communication, when the user is out of his/her subscribed mobile network, through the network of a mobile operator with coverage in that area. International mobile roaming is a service of providing connection for a subscriber of mobile service through different networks between countries when this person is travelling abroad. Lately, the globalization trend has been expanding faster than ever,

and the demand of international mobile roaming service has been also increasing rapidly. Many of mobile operators in different countries had been providing *international mobile roaming* (here after 'roaming') service to fulfill such needs of their customers.

The demand of roaming service is increasing but the price for using the service is high comparing to the domestic mobile service charges that hinder use of the roaming service. Furthermore, users of roaming service are experiencing "bill shock" due to sometimes unreasonably high roaming charges charged to their bills after using the service. Such problem of high roaming charges has been globally recognized and international organizations, regulatory authorities, and governments have been

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putting a lot of efforts to reduce the charges.

The EU (European Union) has been the precursor of dropping roaming charges by imposing price caps within EU region since 2007. International organizations such as the international Telecommunication Union (ITU), World Trade Organization (WTO), Organisation for Economic Co-operation and Development (OECD) took part in analyzing roaming charges and issues to resolve the issue. More recently, some countries and regional groups brought initiatives of lowering the roaming charges more actively. New Zealand and Australia, Singapore and Malaysia, and Singapore and Brunei have come up with bilateral agreements to lower the roaming prices.

The issue of high roaming charges has been studied and analyzed by many organizations and governments, and there are many factors need to be considered to lower the prices. As international roaming is a service made available by the agreements established between mobile operators in different countries, thus inherently involves issues of multiple countries. Every country shows different level of economic development, level of network development and penetration rate, culture, and it is not viable to apply a single rigid regulation to all countries. In this paper, the discussions and achievements made from regulatory authorities, international organizations, and governments is reviewed to derive implications for developing countries, especially for some countries in ASEAN region to improve their roaming services.

II. International Mobile Roaming Pricing Issues

The roaming charge is composed of wholesale tariff and the retail margin. The wholesale part of the tariff is called Inter Operator Tariff (IOT) and, and when two operators make agreements for roaming service provision, this IOT is negotiated and set by the two parties. By adding the IOT and the retail margin, retail roaming price will be set.

The range of retail roaming price varies significantly from countries to countries and even operators to operators in the same country. The Figures 1, 2, and 3 shows these differences. If a traveler in Switzerland calls Australia with operator A, it costs about 4.1USD/min, but if the same traveler calls Norway with operator A, it costs about 1.2USD/min. Not only voice calls but SMS and data cost varies significantly among the countries shown.

It is reasonable to ask why the difference between countries so significantly. There are several factors that affect the pricing of roaming service. Firstly, there are demand side factors of per capita income of the country, percentage of population that travel internationally, mobile penetration rates and different growth rates in mobile penetration, and differences in the level of demand for travel to different destinations. Secondly, from supply side, there are factors of

wholesale roaming rates, mobile termination, international transit, access of substitutes, and other structural factors.

There are many factors being considered in pricing the roaming service, but in the analysis performed by the OECD explained that one of the major factors contributing to the high price is high wholesale tariff, namely IOT, between operators. According to the analysis, the IOT accounts for 3/4 of the roaming price on average. This IOT can vary widely from each operator to operator, and

some reasons for such variation come from 1) a sole operator dominating within a certain market, 2) negotiation power based on imbalance of traffic volume between two operators, 3) discount rates applied to IOT based on the traffic volume.

As IOT is a confidential piece of information to operators, there is less motivation for operators to reduce this IOT. In 2009, the average profit of operators from roaming service was known to be 5 times higher than the actual cost. Furthermore, fundamentally, roaming service is a service

provided by individual agreements between two operators from different countries. Each agreement and terms should be different, and the IOT is set based on each party's negotiations and agreements. Therefore, it is difficult to control the roaming price all at once as the regulatory authorities control the domestic call rates. Since roaming service is only used by subscribers traveling overseas, the proportion of revenue made by roaming service takes up about 5 to 10% of the total revenue, less drive can be made by operators to lower the price. In addition,

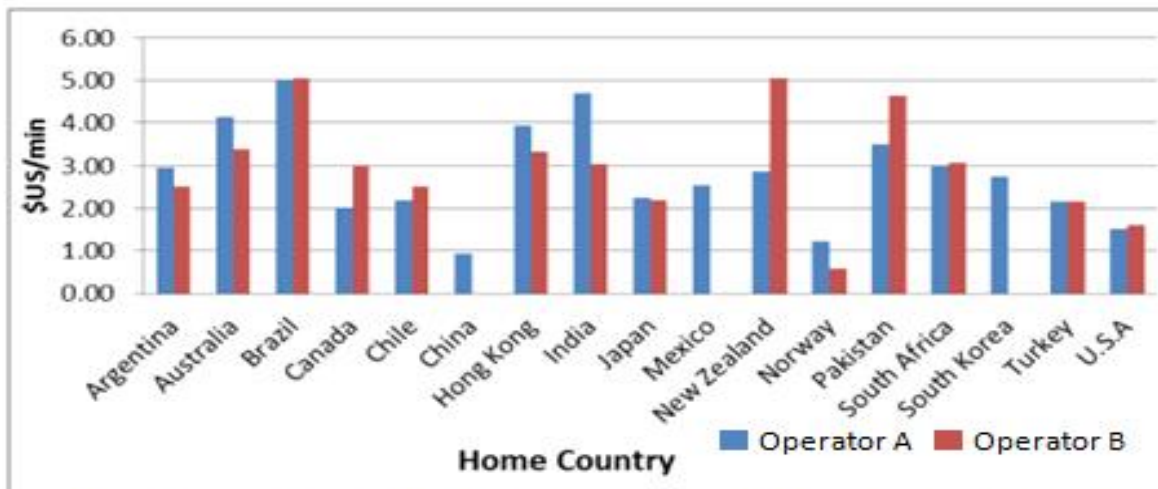


Fig 1. Roaming price for a traveler calling back home from Switzerland

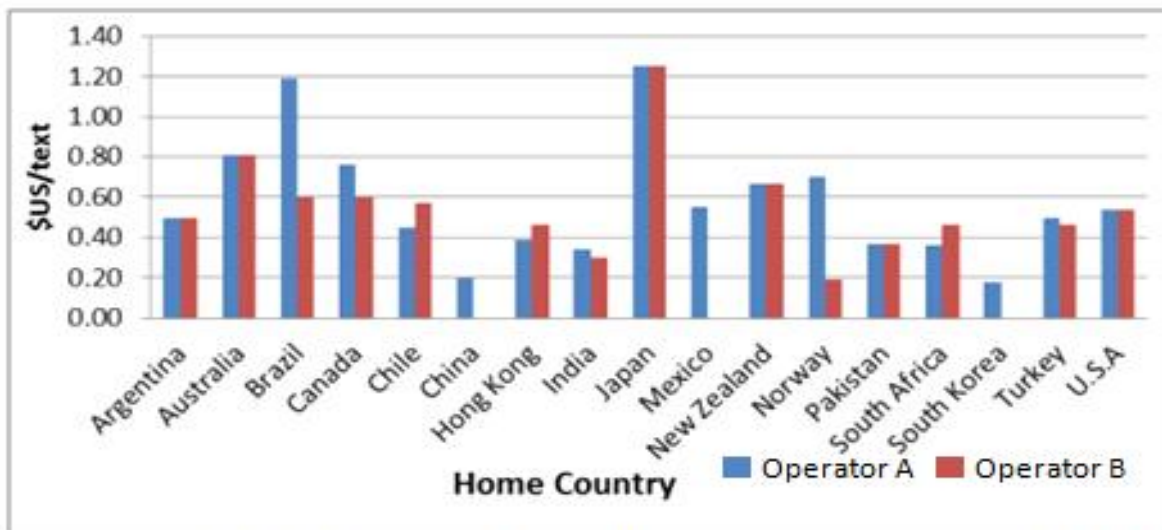


Fig 2. Roaming price for a traveler sending text back home from Switzerland

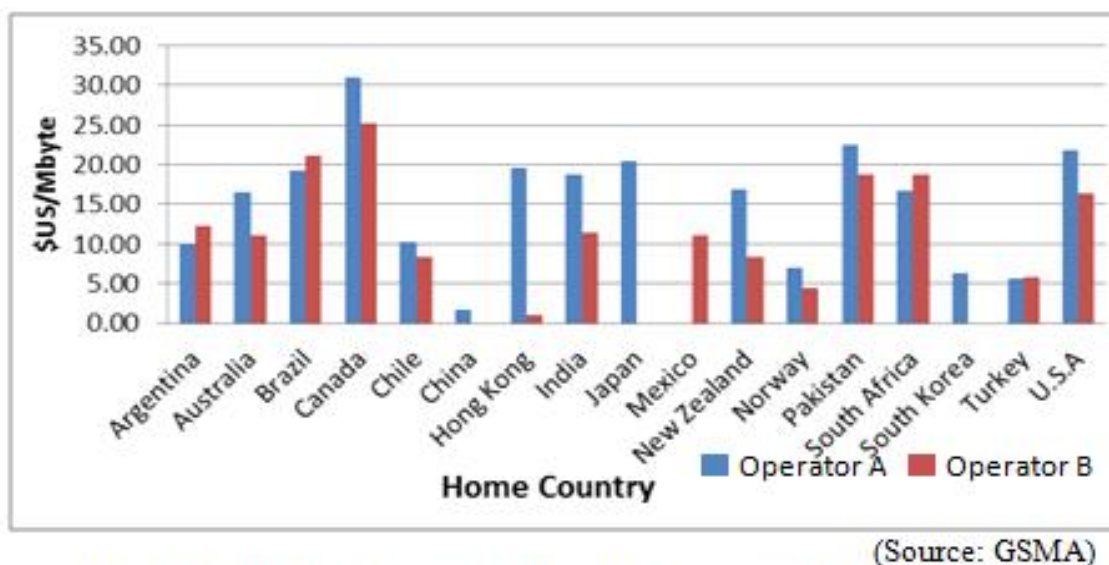


Fig 3. Roaming price for a traveler using data service from Switzerland

60% of the customers of roaming service are business travelers who show low price elasticity of demand. Moreover, roaming service is sold to mobile subscribers within a bundle package and shows characteristic of supplementary service. This implies that subscribers do not have flexibility in choosing a separate roaming service provider, which also means roaming service market is a less competitive market.

While understanding the above described high pricing issues, many organizations and authorities have made efforts to reduce the roaming prices. In the following section, those cases and their effects are investigated.

III. Efforts Made to Reduce International Mobile Roaming Price

Regulatory authorities, international organizations, governments of some countries took more active initiatives to resolve the

high roaming price issues. One of the earliest and most effective initiatives was approaches taken by the EU. Many international organizations took initiatives to analyze and provide guidelines for lowering roaming price. This includes the ITU, OECD, and WTO. There are also regional initiatives from Asia Pacific Telecommunity (APT), Asia-Pacific Economic Cooperation's Telecommunications and Information Working Group (APEC-TEL), the Arab League, Southern African Development Community (SADC), etc. Furthermore, there are countries took initiatives to regulate the roaming price by achieving bilateral agreements. Recently in 2013, Australia and New Zealand decided to regulate roaming prices based on the studies of the market. In 2011, Singapore and Malaysia made bilateral agreement for regulating roaming prices and in January 2015, Singapore's agreement with Brunei to regulate the roaming prices between the two countries will take in effect. In this section, approaches taken by the EU, ITU, and Singapore and Malaysia will be reviewed in more detail.

1. The EU Approach

1.1 Regulatory Measures

The issue of high roaming has been around for more than a decade. It had been an excessive service that many people would not easily approach to use and the EU had started to investigate the roaming market to lower the price. At the beginning of the discussion, around early 2000s, there had been approaches to reduce the price through ex-ante national regulations and ex-post EU regulations. However, none of these worked since roaming had the characteristic of involving multiple numbers of countries to provide the service. The average roaming voice call price was 5 times higher than local calls in 2005. The EU understood the need of regulatory intervention, and decided to regulate the prices.

In June 2007, the European Commission of the EU introduced 'Eurotariff' which is to set price caps on both wholesale and retail tariff of roaming service within EU countries. It was to benefit the people to make use of the service within the region without worrying about so called 'bill shock' by creating a single market for roaming. Three phases of the regulation was applied. The first phase, Roaming I Regulation was applied from 2007 to 2010. Price cap on wholesale and retail voice rates were set and a glide-path approach was applied. It means that the price cap was reduced on a step-by-step basis. Also, transparency of the roaming price information had to be implemented to protect the users. For example, operators should notify the call rate information when a roamer arrives at the destination country. During this first phase, the prices for voice service were dropped by 15.4% on average.

In the second phase of the regulation framework, Roaming II Regulation was

applied from 2010 to 2012. During this period, price cap for SMS/MMS wholesale and retail charges and wholesale charge cap for data service were introduced. Additional reduction of voice price cap was applied and the call charges were accumulated on second basis rather than minute basis. As same as the first phase, glide-path approach was applied. More transparency measures were introduced. Users were able to set a data service bill cap, the operators had to send out SMS on the update of amount of roaming usage, the roaming service had to be automatically blocked once the total roaming bill reaches 50EUR. During the second phase, the prices for voice service were dropped by 15.3% on average.

In the third phase, more remarkable changes to the regulation have been made. The Roaming III Regulation was to be applied from 2012 to 2022. The price cap for retail charges of data service was introduced. In this phase, other than reducing the price cap of the roaming services, more structural changes has been considered to facilitate the roaming market. The proposed structural changes were to separate selling of roaming service from domestic services and provide wholesale roaming access to subscribers by July 2014, and to remove retail price caps for voice, SMS, and data by July 2016. In addition, mobile operators should open connection of their network to Mobile Virtual Network Operators (MVNO).

Now, the EU is in its third phase of regulatory intervention. In 2013, the vice president of European Commission for the digital agenda, Neelie Kroes, took the drive to reinforce the regulation faster and more rigidly, by removing roaming charges within the region, that is to let users use their mobile service at the same rate as their domestic rates when traveling overseas. In

2014, the European Parliament voted to ban roaming charges within the region taking effect from 15 Dec 2015. As a result, the proposal was approved by the European Parliament by 534 votes to 25, and it was sent to Europe's Council of Ministers for approval so that it could become law. Surprisingly, the EU member states voted against the plan, and the original Regulation III will remain in place until at least 2018.

1.2 Impacts

By implementing a single regulation among many countries in EU, the roaming prices, both wholesale and retail, within EU was dropped significantly since the introduction of the regulation. Comparing the prices from 2007 with 2013, the prices were reduced by 80% across a range of roaming services. Figure 4 shows the recent drop in charges.

As the regulation imposed transparency measures regarding roaming services and roaming prices, consumers were able to understand what to expect when using roaming services. Such measures reduced

incidents of 'bill shock', and roamers are able to make use of the service with reasonable price. It is unfortunate from consumers' side that the initiative to ban roaming charges and implement domestic call prices for overseas traveler, however, EU citizens are taking the most benefit from roaming service in terms of price with this regulation.

From the operators' side, it is not evident that there had been any positive drive for business. According to GSMA, even though there was a slight increase in roaming traffic, the overall profit was reduced. Comparing to the level of profit in 2005, it was reduced by 30% in 2009. Furthermore, roaming service now needs to compete with the substitutes of roaming services. GSMA claimed that the benefits of the regulation were transferred from non-roamers who are sensitive to the price level to roamers who are less sensitive to the price. This implies that the operators would charge more to the majority of subscribers on their domestic call charges to recover the costs and to make up the profit loss incurred from the roaming

		From 1 July 2012	From 1 July 2013	From 1 July 2014
Data (per MB)		€70	€45	€20
Voice-calls made (per minute)		€29	€24	€19
Voice-calls received (per minute)		€8	€7	€5
SMS (per SMS)		€9	€8	€6

(Source: New price caps for mobile data roaming)

Fig 4. The maximum roaming rate within EU

regulation. There is also a study showing that the EU regulation may have caused a waterbed effect to countries in other regions. The study by the Department of Broadband, Communications and the Digital Economy in 2008 compared the roaming prices among different regions and showed relation to the increased retail charges when subscribers of countries in other regions traveling in the EU region.

2. Singapore-Malaysia's Bilateral Approach

2.1. Regulatory measures

There have been many initiatives around the world to lower the roaming charges other than EU. Asia regional groups have taken initiatives and ASEAN regulators also reviewed the operation of the South East Asian regional voice roaming market in 2008. This study also found that ASEAN roaming charges are significantly higher than local substitutes such as making international calls in roaming destinations, and the major factors contributing to high charges are high IOTs and high retail price margins. The regulatory authorities, the Infocomm Development Authority of Singapore and the Malaysian Communications and Multimedia Commission (MCMC) took the study results more aggressively and worked closely together to study this issue.

Singapore, as an international business hub within ASEAN, to facilitate telecommunication market and international business, was motivated to reduce the roaming charges for the benefit of their economy and people. Malaysia had the vision of economic and social development of the country and supported roaming price reduction to enhance the benefits of consumers. Both countries'

effort together brought about a remarkable result by agreeing to regulate the roaming prices between the two countries from May 2011.

Singapore and Malaysian agreement imposed reduction of the charges by up to 30% for voice calls and 50% for SMS, both wholesale and retail. Table 1 and 2 shows the agreed retail roaming rates.

2.2. Impacts

The significant reduction in roaming charges through a bilateral agreement between regulatory bodies of different countries can be viewed as a notable initiative in achieving a lower price for the roaming users. However, there are many other factors and environmental differences that need to be carefully considered when imposing such regulation.

Secondly, there was no evidence yet that the expectations of the two countries, which were promoting each country's business and economy by providing cheaper and easily accessible communication service, were achieved by this regulation. Considering that the evidence can be evaluated by the level of increase of roaming traffic, the estimates suggested by Axiata show that there was no increase in traffic volumes of roaming service after the implementation of the regulation. Although, the analysis was made in the very early stage, right after the implementation, in the third quarter of 2011, thus more data is required to analyze the effect of regulation. Figure 5 shows the traffic volumes in 2011 between Singapore and Malaysia.

Furthermore, we can assume that the roaming traffic volume shows inelastic property as the price reduction did not directly drive the increase in roaming demand. Thus, the profit from roaming

Table 1. Singapore to Malaysia retail roaming rates 2011-2012 (USD)

Singaporeans travelling to Malaysia	1 January 2011	From 1 May 2011	From 1 May 2012
Receiving an incoming call	0.56-0.80	0.45-0.64	0.39-0.56
Call to Malaysia number	0.40	0.32	0.28
Call to a Singapore number	0.47	0.41	0.37
SMS	0.48-0.49	0.33-0.42	0.24-0.25

(source: IDA)

Table 2. Malaysia to Singapore retail roaming rates 2011-2012 (USD)

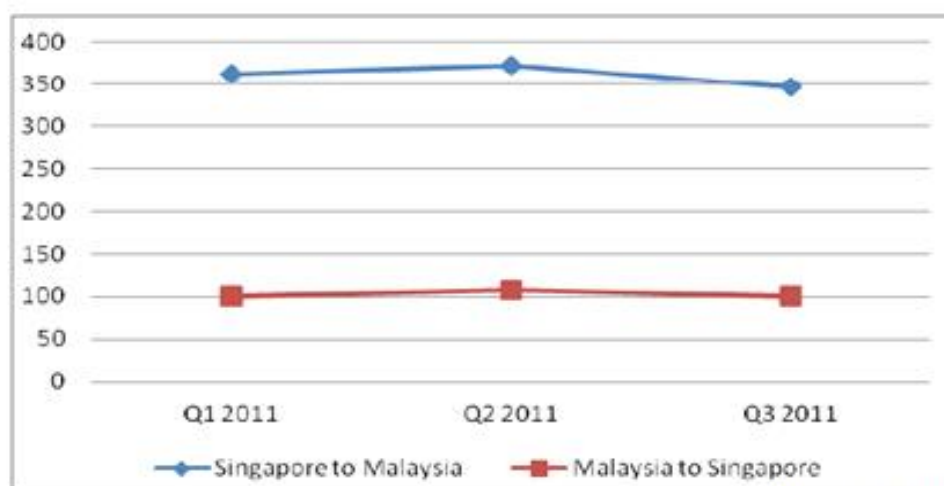
Malaysians travelling to Singapore	1 January 2011	From 1 May 2011	From 1 May 2012
Receiving an incoming call	0.65-0.81	0.52-0.65	0.45-0.24
Call to Singapore number	0.57-0.78	0.45-0.62	0.40-0.55
Call to a Malaysian number	1.27-1.57	1.01-1.26	0.89-1.10
SMS	0.32	0.23	0.16

(Source: MCMC)

service was reduced by the regulation in this case, but it also implies that the total cost of conducting the same level of Singapore-Malaysia business was reduced. It can be inferred that there was a transfer of benefits from the telecommunication sector to other business sectors and there is no

evidence that there have been overall enhancement in economic development.

Third, there is huge difference between the economy of Singapore and Malaysia. The GDP per capita of Singapore and Malaysia were \$43,117 and \$8,423 respectively in 2010. Considering that most of the roaming

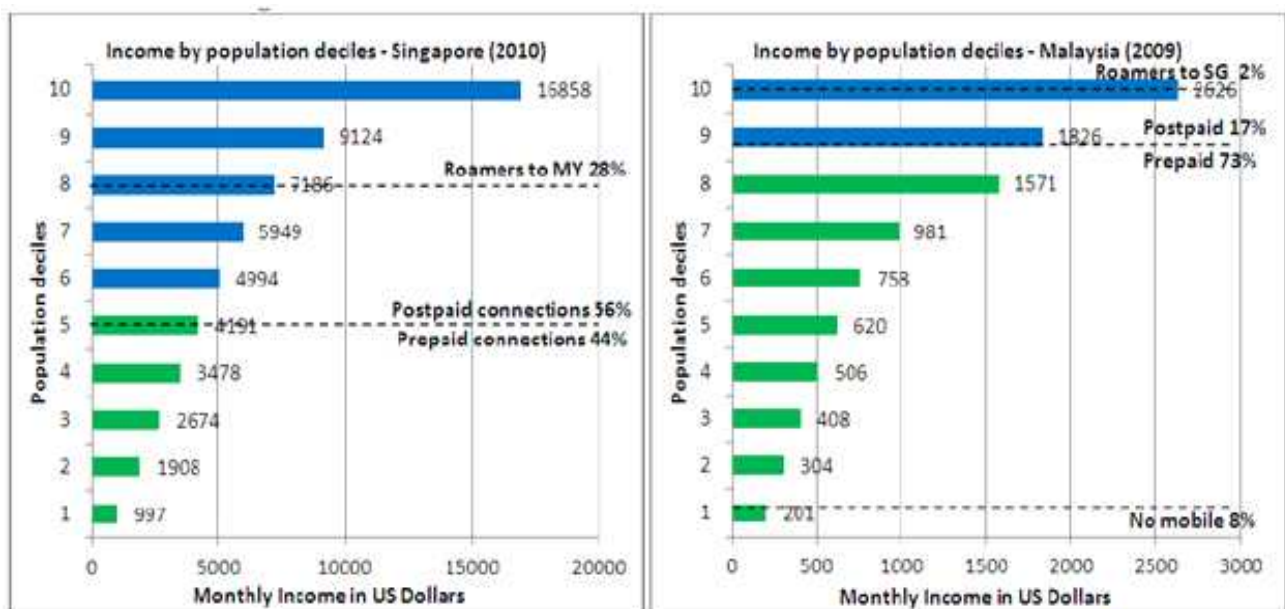


(Source: Axiata)

Fig 5. Bilateral minute traffic volumes in 2011 (Q1-Q3)

users would be post-paid subscribers than pre-paid subscribers, there is also a significant difference in percentage of post-paid users between the countries. The percentage of post-paid users in Singapore was 56% while it was 17% for Malaysia in 2009. In addition, there were much higher percentage of people roaming to Malaysia from Singapore, which was 28%, which is equivalent to 1.5 million people, while the vice versa was only 2%, equivalent to 0.6 million people. Figure 6 shows this dissimilarity of roaming population between two countries.

reduction in profit for Singaporean operators while bringing 42% reduction in profit for Malaysian operators, with the assumption of the same amount of traffic volume as before the regulation. This analysis implies that a single regulation on the roaming markets with different characteristics can lead to transfer of benefits to richer customers and higher economic benefits to richer countries. Thus, careful analysis on the telecom market as well as the overall economy should be conducted when imposing a significant regulatory framework of this kind to maximize benefits for all.



(Source: Singaporean and Malaysian Gov'ts, GSMA Asia Mobile Observatory/AT Kearney 2009)

Fig 6. Customer segmentation and benefit

It is evident that there is a huge roaming traffic volume imbalance between the two countries, and the estimates suggest that the numbers of Singaporean mobile customers benefiting from the regulation is three times greater than the number of Malaysian customers benefiting.

An interesting analysis conducted by Axiata shows that the regulation brings 15%

III. Implications for Developing Countries

The two cases studied above may not be the best examples that can have direct implications for developing countries with less developed telecom infrastructure. However, these cases illustrate important

considerations and factors that affect the roaming market as well as the whole economy, and we have extracted best practices that can be applied when considering roaming arrangements.

1. Initial Steps

When in doubt that there is a need for an intervention in the roaming market, the regulatory authority or government should conduct a full investigation on the market before making any decisions on roaming arrangements. The full investigation should cover a wide range of topics from each country's economic development to specifics of the telecom market. Before initiating the investigation, it is necessary to determine which authority should be leading the work. It varies from country to country, and there can be separate regulatory authorities and government ministries, with different roles and power. Some authorities may have access to sensitive market information, while other authorities would act as ex-post regulating bodies. The ITU-D report [] suggests that there are several advantages for a government to lead the investigation than regulatory authorities. Those are the threshold for intervention may be more flexible than regulators, they have access to wider range of obligations, and there is a capacity to manage "most favored nation" concerns. However, there are downsides of possibility of causing regulatory error as regulating the market is not of their major area of focus.

Once the leading entity for the investigation is decided, the full investigation should be conducted. As roaming service involves multiple numbers of countries, it is necessary to investigate the economy and market of the countries involved. The EU was able to regulate the region as a whole

because it has a distinguished structure that no other regional groups has. The EU has a legal framework and structure already existing to aiming for a single economy and the roaming rates could be regulated on the basis of the framework and instruments available. For other countries, if it were to resolve roaming issues among a group of countries sharing interests, it would take lot more work to come up with certain measures than EU approaches. The high roaming price issues had been around for more than a decade, but it was only after when the EU imposed price control as a regulation that brought a significant reduction in price. Considering there are no other group of countries having similar interventions or measures to the EU to resolve roaming pricing issues, multilateral approach for roaming service negotiation can be very ineffective in making progress to lower roaming charges. Bilateral agreements had been showing remarkable results, as shown from Singapore–Malaysia example and Australia–New Zealand and more recently Singapore–Brunei approaches.

There should be certain countries that a country share interests regarding roaming agreements. The leading body should fully investigate the other country's economic development and market status on top of their own. It might be difficult to investigate other country's latest market and economy. The leading bodies of the countries can have a memorandum of understanding or some type of agreement to cooperate on the roaming studies, and work on the issues together. This approach is what Australia and New Zealand took. They have conducted extensive study before agreeing on the bilateral agreements on roaming service, and it is worthwhile to make such investment in the analysis. Further investigations should be

made with more recent data, however, the Singapore–Malaysia case shows that the roaming agreement can transfer the benefit towards richer country. In order to prevent any biased benefit spread, the economy of the countries, including population, GDP, and thorough study on the market should be conducted. For telecom market, penetration rate, technologies employed and network infrastructure development should be considered. Moreover, type of roaming packages offered, numbers and frequency of travelers both in and out, roaming demand, inbound/outbound traffic balance, pricing and revenue of roaming service should be studied.

One of the most important aspects of the study is to understand the pricing scheme and the revenue generated from the service. There is information publicly available regarding pricing, normally retail prices offered by operators, and also there is commercially sensitive information, which is confidential wholesale rate, IOT. New Zealand and Australia first studied the market with publicly available information then moved on to the study incorporating commercially sensitive information. This study based on publicly available information compared retail pricing, service quality and features of roaming between the two countries, from 2007 against 2010. This study also compared prices with other countries of frequent interaction, Singapore, US, and UK. The results showed little improvement over the period. The governments of the two countries were concerned about the results and conducted expanded study incorporating commercially sensitive information. By having wholesale rate information, deeper insight on the issue can be gained and more accurate regulatory measures can be applied based on the given

factual data. The operators may be hesitant to provide commercially sensitive information, however, it may lower their risk of having to implement a erroneous regulatory decision that would hinder the business.

2. Regulatory Measures

Undoubtedly, it takes a lot of effort and time to implement any regulatory measures to reduce roaming prices. The regulation of controlling the roaming rates would show immediate effects in short term, but there may be long term consequences which will appear as time goes by. As described above, due to complexities involved in establishing a regulation, bilateral initiatives would make the most use out of regulatory measures.

Some regulatory measures that can be incorporated are setting a price cap on retail charges, or wholesale charges, or both. Setting a price cap on wholesale charge only may have adverse effect of increasing the retail price as the mobile operators would want to compensate the loss from wholesale charge. Setting a price cap on retail charge only may reduce profit of the operators and incur negative return on investment that would hinder the development of the market. Setting price caps on both wholesale and retail charges need to be careful as it would not be effective if there are substitute services offered at a much lower price.

As described in section II, the wholesale rates can vary widely from each operator to operator, and some reasons for such variation come from 1) a sole operator dominating within a certain market, 2) negotiation power based on imbalance of traffic volume between two operators, 3) discount rates applied based on the traffic volume. The level of price cap will be affected by these reasons, but if the negotiation is made in a more transparent

manner involving regulatory authorities of the two sovereignties, downsides of the negotiation power game may be alleviated.

Other than setting price caps, unbundling of roaming service can be another regulatory approach to enhance roaming price competition. Currently, most of operators provide roaming services as a bundle of mobile subscription and there are limitations for users to choose the operators for roaming service. If users can choose roaming operators separately from their usual mobile subscription, the roaming market would become more competitive, which implies competition in price. The EU included this unbundling of roaming service in the Roaming III Regulation.

Since the ultimate purpose of the regulation would be promoting the roaming service and mobile market as well as the whole economy and consumer benefits, the regulatory measures should minimize any consequences that would hinder its ultimate purpose.

3. Enhancing Consumer Awareness

The most effective and immediate approach of reducing roaming rates would be establishing a regulatory measures such as setting a price cap on the rates between countries. However, there are many other measures that can be employed within each country with their sole sovereignty to enhance consumer awareness on the roaming services. Many international organizations and regional organizations recommend this approach of enhancing consumer awareness and transparency. Among them, the ITU-T SG3* Recommendation D.98 recommends *member states to explore ways to protect and empower consumers in determining their*

best choices among the array of options available to them in the rapidly evolving mobile marketplace. There are many practical approaches that can be implemented that comply with this recommendation. The following shows some examples.

- Providing clearer and more transparent roaming information (prices, plans offered, usage simulation) on mobile operators' websites
- Launching a website dedicated to roaming service managed by government agencies to provide the latest update on roaming service
- Operators sending SMS notifications to roaming service users on roaming rates on their arrival to destination countries
- Operators regularly sending SMS notifications to roaming service users on usage amount for users to keep track of their usage of roaming service
- Operators providing users capability of setting up a cap or automatically setting up a cap on the total amount of usage to block roaming service when exceeding the cap
- Roaming users being able to block roaming service prior to departure
- Offer unlimited voice/data package plans

IV. Conclusions

As the trend of globalization expedites, the demand of roaming service is increasing faster than ever. In addition, the demand for mobile internet is expanding vigorously and it is also true for data roaming service. One major obstacle to roaming market expansion is relatively high price for using the service. Understanding this issue, governments and

*International Telecommunication Union
Standardization Study Group 3

international organizations worldwide took initiatives to reduce the roaming prices.

The EU has shown great impact on reducing the roaming price within the EU region. They implemented roaming regulations on a step-by-step basis. Since its implementation of the regulation in 2007, roaming prices were dropped by 80%. In ASEAN region, Singapore has been taking the lead in reducing roaming prices. In 2011, Singapore achieved bilateral agreement with Malaysia to regulate the roaming price between two countries. Starting from Jan 2015, Singapore and Brunei will have a regulated roaming price caps. Although, Singapore and Malaysia achieved significant reduction in roaming prices, it is not evident that it resulted traffic volume increase, and the regulated price brought promotion of the roaming market and economic development of the two countries.

Some implications for taking actions on reducing roaming prices were identified from these cases. Roaming service involves multiple numbers of countries that it requires many countries to negotiate roaming rates, thus involves wide range of complexities. The EU has distinguished characteristic of sharing similar goals of progressing towards a single economy and there are structural basis that drove EU to establish effective regulatory framework for roaming services. There are not many cases where more than two countries are involved to achieve remarkable solutions to reducing roaming prices. However, when two countries are involved, there have been progresses, thus bilateral approaches can be a better approach. When a bilateral discussion is initiated, it is essential to investigate the both countries economy and roaming market thoroughly. If it is agreed to regulate the price between two countries, the price level

should be carefully set not to result unwanted consequences. Other than working with multiple numbers of countries, there are many approaches that can be applied domestically to improve consumer benefits and transparency.

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A Study of Post-Retirement Adaptations of the Male Retirees in Korea

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Abstract

The purpose of this study is to examine the degree of adaptation perceived by male retirees for the elevation of their quality of life, and to identify how such degree of variables affects post-retirement adaptation of male retirees. The subjects were 307 males older than 55 years of age within 5 years of retirement, residing in S and Y City in Jeonnam. Performed statistical analysis were reliability, frequency, percentage, mean, standard deviation, ANOVA, correlation and stepwise multiple regression analysis. The results of this study were as follows: First, the degree of family member's acceptance on retirement was 9.97 (median value 12), while the degree of post-retirement adaptation was 30.81 (median value 33). Second, the degree of post-retirement adaptations were significantly according to economic state, health state, education, religion, spouse, living state, monthly living state, the family member's level of acceptance on retirement, and the family member's income activity state. Third, the variables that affect the post-retirement adaptations level were economic state, health state, education, family member's level of acceptance on retirement and religion, which explained about 35% of the total variance.

Key words: male retiree, family member's acceptance on retirement, post-retirement adaptation

I. Introduction

Retirement in an aging society with low fertility rate has recently been increasing due to the rapid social and economic changes, as well as the flow of values in Korea. This does not only present idio-graphic dimension on the issue of quality of

life after retirement, which has become relatively longer than the past, but also presents diverse social and economic challenges.

Meanwhile, as the instability of the employment environment intensifies due to social structural issues such as the change of industrial structure and the deregulation of labor market along with the continuing economic depression, the trend of lower retirement age and the phenomenon of early retirement had proliferated. Hence, retirement has become a life event experienced not on-

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ly during old age but much younger, at the middle to old middle age in Korea. According to the Korea Labor Institute (2012), the average age of retirement of Korean companies is 57.4, and the average of actual retirement age is shown to be lower, which is 53. However, considering that the average of the desired life expectancy of Korea is 81.3(Statistics Korea, 2013), which is expected to continuously increase in the future, the life expectancy after retirement is at least 25 years, which is predicted to be over one-third of an individual's life.

Likewise, prolonging an individual's life after retirement and the changing of one's life cycle constantly requires that male retirees adapt to new lifestyle, which changes after retirement and brings about the problem regarding how to manage these changes. In addition, retiring during middle to late middle age falls on the stage of moving towards old age, which lies on the life cycle series. Hence, how to spend the period after retirement during the middle to late middle age even affects the adaptation and life at old age. This can be considered as a major factor in determining all sorts of problems and the quality of life at the old age.

However, in terms of the preparation of life after retirement of male retirees in Korea, retirement is made even when the individual is unprepared. This is done not only by the retiree himself, but is affected by alternatives on the level of institutional and political sectors, along with the low fertility rates and the aging population phenomenon that are rapidly progressing. Furthermore, the retirement of an aging baby-boom generation (born in 1955-63)—the major population group that caused rapid population increase—is being pushed despite the prediction that this will act as a major factor, especially in aggravating the problems

brought about by the many changes needed to adapt to the retired life.

As the range of retirement age of male retirees increased, retirees had diversified. Because of this, they are noted for having strong heterogeneity from the qualitative aspect, as well as for having great desire for a productive and meaningful life after retirement as they entering into a stage in their old age where their diverse experiences affect their desires, which can now differ from their younger years (Jung, Son & Park, 2010). Thus, the post-retirement life is presumed to be different, and the current social system and welfare infrastructure are very limited in comparison to the needs of male retirees brought about by changes in social welfare and the expectation on the quality of life. Besides, the efficiency of the current social system, or the approach of social welfare, is evaluated to be insufficient for preparing the aging era for the future, as Korea has had a short preparation period for its aging population. It should be noted that at this current growth rate of the aging population in Korea, the country will become a super-aged society in 15 years. Thus, these male retirees are experiencing difficulties in adapting to the changes caused by retirement, and this adaptation problem is expected to have a great influence on their quality of life. The problem with regard to the quality of life caused by the retirement and aging of this particular generation is causing the retiree and his family serious problems. This is due to the fact that this is linked with the continuous phenomena of low fertility and aging aside from social and economic variable, and it is expected to cause diverse ripple effects throughout the social economy of Korea. This can ultimately lead to the a national increase of social security expenses that it is indeed a great burden.

The aspects of post-retirement adaptation are very diverse and largely depend on the individuals. However, from the general perspective of viewing retirement, many researches (Burgess, 1969; Miller, 1965; Phillipson, 1993) describe retirement as a great crisis of facing many changes through physical, psychological, and mental experiences due to a decrease of income, loss of key roles, positions, self-identity and social fellowship, unproductive leisure time, and the social awareness that they are considered as incompetent while adapting accordingly to their situation. Lack of preparation for the post-retirement period would be unhelpful, as maladjustment by male retirees in Korea who have maintained the role of the provider with work as the center of their life. Retirement can be a serious crisis not only to the retiree, but also to the family who has to accept that he is retiring. However, the researches by Floyd et al. (1992), Shin and Cho (2011), Sung and Choi (2010) all reveal that although retirement is an important transitional period, most people manage to adapt well to the post-retirement period and are satisfied. Bosse et al. (1991), reported that there are cases in which not all retirees are unsatisfied, but rather feel lighthearted after being relieved of heavy responsibility and roles after retiring. They satisfactorily adapt to post-retirement life as they considering it a good opportunity to pursue new goals, interests and activities. Freter et al. (1988) said that early retirement has an ambivalent characteristic and may cause a sense of loss for some people. For others, it may present as a feeling of relief, a deviation from career life, as well as an opportunity for a new life. These imply that issues regarding the quality of post-retirement life depend on how the retirees, who are adapting to a new environ-

ment and lifestyle, accept and adapt accordingly various changes caused by retirement.

Retirement for male retirees of the present generation will have a different meaning of retirement as compared to the earlier generation. Thus, the preparation of appropriate countermeasures is necessary, keeping in mind that there would be differences in post-retirement adaptation. However, the reality is that the appropriate countermeasures with suitable targets that meet the changes in policy are still insufficient. Thus, this research aims to find a measure to successfully lead post-retirement adaptation and further improve the quality of life by looking into post-retirement adaptation perceived by the retirees, as well as by examining the main factors that influence the post-retirement adaptation of male retirees in Korea.

Research questions are as follows:

- 1) How is the post-retirement adaptation of male retirees in Korea?
- 2) How is the post-retirement adaptation of male retirees in Korea different depending on socio-demographic features?
- 3) How is the relative influence of social-demographic features on the post-retirement adaptation of male retirees in Korea?

II. Literature Review

1. The Concept of Retirement

In the past, retirement was regarded as one of the major life events. It is referred to as a state of no longer having any economic activity by withdrawing from one's main job, but retirement in modern society is achieved through a series of processes and understood to have diverse properties (Kang,

2008). Taylor (1972) also recognized retirement as an incident promoting significant changes on the actions, or as another process parallel to other processes. Choi and Kim (1983), and George (1980) view retirement as an official event of withdrawing from work that includes all of activities, roles, and processes. At the same time, it is viewed as an extensive process that includes a preparatory stage to carry out the new role as a retiree in the post-retirement adaptation stage.

Similarly, retirement has diverse meanings, and no standards to define retirement exists as it is used very differently depending on the research topic and the researcher. Furthermore, the definition of retirement varies depending on the standard determining the retirement, as various ways to regulate retirement should be considered because research results may be different depending on how the retirement state is regulated. Thus, when the definitions of retirement in accordance with the determining the standards of retirement that are most frequently used in existing researches are regulated, these are largely classified into age, pension, participation in economic activity, reduction of labor hour or wage level, respondent's subjective evaluation on retirement (Han et al., 2001; Kim, 2007), or classifying them by combining various definitions.

The regulation on 'retirement' of the research is defined as 'in case of not working or working in the level of pastime, suspended from regular activity of earning, or in a state of having no intention to work aside from pastime works as long as there is no special change,' following the method regulated at Korea Labor and Income Panel Study used by Korean Longitudinal Study of Aging (Shin, 2007). This method explains the standard of judgment on retirement to the

respondents and appropriately considers participation in any current major economic activity and the past labor experience through a subjective method, judging whether an individual is a retiree or not following the standard, and defines the retiree as a person without a specific occupation after retirement and who has not passed five years.

2. Post-Retirement Adaptation

1) The Concept of Post-Retirement Adaptation

Life events such as admission to school, employment, marriage, birth, marriage of children, retirement, etc. experienced in the cycle of life requires diverse psycho-social changes and adaptation by the individuals, as these events are the significant transitional incidents that become a turning point in changing the role an individual has had, as well as changes in self-concept or identity, goals in life, expectations for future, etc. Among these events, retirement from work is a landmark incident notifying that one is facing a transitional period to the late stage in life, confronting adaptation to new life brought about the changes caused by retirement. Hence, retiring from the occupational world where one spent most of his adulthood requires developmental tasks in order to adapt to a newly restructured everyday life that has changed after retirement. Thus, how well a male retiree adjusts himself to the changes and accomplishes harmony by accepting these changes has a major impact on the life (Kim & Yoon, 1995) of the male retiree. In addition, considering the fact that life after retirement is getting longer than what was experienced in the past, and the life cycle as well is changing depending on the sudden increase of early retirement, factors such as the extension of

average life span, and the enhancement of physical condition, how to spend the period immediately after the retirement would be important in determining not only the present livelihood but also the quality of life during old age for male retirees in Korea.

Originally, 'adaptation' in a wider sense refers to the interaction between an organism and the environment, and it means to appropriately adjust and take individual action with regarding to the demand of the opposing party caused by their personal relationship, or regarding the norms of a community(Sung, 1999). Hence, adaptation in later years after retirement is shown when the male retiree takes appropriate action by adjusting well to the changes of post-retirement life. This is treated as a significant notion in the researches conducted against the retirees(Sung, 1999), With the same perspective, Sung (1999) said that from the idiographic dimension, the notion of post-retirement adaptation embraces the integral content of life, accepting the physical and social changes, positively perceiving the goal of life and well responding to the surrounding environment in everyday life.

Through examining previous researches on post-retirement adaptation (Byun et al., 2007; Kim, 1995; Kim, 2007), it was found that retirees are confronted with different circumstances to adapt, such as economic changes, changes in the family, mental and physical changes, etc. Preceding researches consistently reported that the lower the economic standard a retiree adheres to, the more difficult one feels in adapting to post-retirement life by emphasizing that the economic aspect is the most important factor in retirement adaptation for the retirees. This is because the retirement age of the retirees in Korea is low in average, and because of that they are unable to prepare economically

after retirement, a period that is considered to have the greatest amount of expenditures in a life cycle. For the retirees currently in a period where the independence of their children is delayed and the necessary support given by elderly parents is increasing due to the extension of the average life span, the loss of economic power because of retirement is indeed a great burden to the individual as well as the family.

In addition, qualitative change is also experienced in the relationship with the family and the society due to retirement, and the male retirees experience temporary depression, anxiety, anger, fear and confusion, along with a sort of sense that one is shrinking, which could be coming from the reduction of the social relation network such as weakening of social relation, absence of sense of belongingness, loss of opportunity to participate in social activities related to work, etc (Byun et al., 2007; Kim, 1995; Shin et al., 2001). The biggest change in the life of retirees is that they have to adapt to new circumstances as their social roles and life centered on their work has reduced and as their leisure time increased compared to life prior to retirement. According to previous research most (Lee, 2011; Statistics Korea, 2009) of the male retirees in Korea are spending most of their time with passive leisure activities such as watching T.V. and listening to the radio rather than active leisure done after searching for things they want to do while maintaining social relationships. Such research results provide significant implications that despite the high expectation on the quality of life and multilayered desire on leisurely activities, male retirees are consuming and managing their leisure time in a passive manner rather than a productive one. The problem on how to spend their leisure time after retirement is

the core factor in determining the level of the general quality of post-retirement life. Thus, a way to help male retirees to have a productive and meaningful life is by guiding their leisure life towards a positive route through productive roles, opportunities, or challenging activities.

On the other hand, although retirement is a life event experienced by an individual, it will become an important shift in one's life where the retiree himself and the family members who have to accept the retiree will experience the problem of newly restructuring their lives by adapting to different circumstances. In other words, retirement for the male who had continued the role as the family's main provider weakens his authority and position as the head of the family. This will require adapting to the changes in the family life, and such problems regarding adaptation have a high possibility of leading to maladjustment to retired life. Thus, at times, retirement may become a serious crisis of life becoming a burden to the retiree himself as well as the family. However, the family, including spouse, is the source of emotional support for the male retiree, and support within the family is a positive influence on the adaptation process, increasing the likelihood of good post-retirement adaptation. Previous research(Henken, 1999; Sung, 1999) also reveals that the retiree adapts well when the family accepts his retirement in a positive way. The family's acceptance of retirement is considered to have a great influence on the process of post-retirement adaptation of males. Similarly, the adaptation of the male retiree causes problems to the retiree himself as well as between family members as post-retirement adaptation is directly linked to the characteristics of the family system. In which case, the male retiree is considered to be in the

transitional period to build new roles and create a new identity within family, as well as to reconstruct the meaning of life because of adaptation problems. Thus, it is necessary to approach this by considering the fact that the subjective awareness and evaluation of the retiree on how family members are recognizing and accepting his retirement may have a consistent influence on the psychological adaptation of the retiree.

For the human being, work and occupation are not only the means and driving forces that provide resources that are necessary in life, but it plays an important role in satisfying mental and psychological desires. In other words, work does not only play the role of providing the meaning of economic resources in our lives, but it also has a self-realizing meaning because it brings out the identity of the individual and forms values regarding the self and self-esteem(Chung & Chung, 2006). Therefore, 'work' for males is recognized as the most fundamental resource constituting their self-esteem and identity aside from being a mere means of life or a tool for economic support. So despite the presence of the capability and desire to work physically and mentally, being 'unable to work' can be a great stress inducer for men and further affects psychological and emotional adaptation (Han et al., 2002; Kim, 2007; Kim et al., 1995; Lee et al., 2008). In this sense, Peck (1968) referred to the significance of psychological adaptation after retirement as the re-establishment of the individual value system and that establishing the diversity of the self by re-evaluating and re-determining the individual values of the activities or roles capable of doing after retired from work is the overall condition for successful aging for the retiree.

2) Major Factors of Post-Retirement Adaptation

The post-retirement life of an individual can be affected by diverse factors and environment instead of a single condition. Thus, there are a variety of factors affecting the post-retirement adaptation of male retirees. However, this research aims to focus on the age, level of education, occupation prior to retirement, religion, presence of spouse, type of residence, health condition, monthly cost of living, economic condition, presence of income activity of the family member and the degree of acceptance of the retirement by the family members perceived by the male retiree.

First, age is the accumulation of the time one has lived, and it also includes the individual experience and social change within the lifespan of an individual, so the perspective of viewing retirement may vary depending on the age. There is a contradictory result regarding the influence of age on the retirement adaptation, and Kim and Yoon (1995) stated that the lower the retirement age, the higher the sense of loss of purpose and economic difficulty will be. Freter (1998) emphasized the positive idea that earlier retirement provides a sense of relief and the opportunity for a new life. In addition, preceding researches (Kim & Yoon, 1995; Kim & Song, 2009; Kwak, 2010; Son, 2010) stated that the retirees who retired late—at an age above 60—considers retirement as an opportunity to pursue new things and their post-retirement adaptation and satisfaction of life are higher. On the contrary, retirees between the ages of 56 to 60 have a tendency to see retirement in a negative light because a change of work or re-employment in one's late 50s is realistically difficult than earlier in life. Other factors making retirement a major concern in the aging society is the big change in one's life cycle due to the con-

sistent increase of desired life expectancy of the Korean and the relatively low retirement age. Thus, the period of labor in one's life has reduced and the retirement period has extended. However, retirement is considered to be a problem, causing maladjustments where the individual and social structural environment through productive activities have not yet been constructed for the maintenance of the quality of life even if the retirees leave their primary work.

The level of education is known to be very intimately related to the participation of leisure time and adaptability of retirement. According to previous research (Lee, 2011; Sung, 1999), a higher the level of education of retired elderly is a positive influence to post-retirement adaptation because the time consumed for leisure is increased, and they consider retirement as an opportunity to start new things instead of viewing it as a loss or crisis. To contrast, there also is a research showing that if the level of education is high, there is a possibility that the work position prior to retirement is also high. Thus, there is a possibility of a low post-retirement adaptation due to the recognition of retirement as the loss of reward and privilege obtained from the work position (Kim et al., 2011; Kim & Kim, 2003; Sung, 1999). Hence, the level of education also has no consistent research results. However, the level of education economy of the baby-boomer generation of Korea where retirement had already been started based on 2010 numbers are expected to increase, as a better count of male retirees spending post-retirement life more actively are expected. Their adaptability after retirement may become a significant element for their retirement life.

With regard to the influence of work on post-retirement adaptation, Simpson et al., (1966) said that specialized jobs have been

considered as work with large internal satisfaction or work identity. It also has a high dignity of work such that retirees of specialized jobs recognize retirement as a negative life event and experience difficulty in adaptation. However, they may have been seen making a successful life at work that their retirement can also be considered as an opportunity to spend everyday life comfortable, deviated from the achievement-oriented life at work, hence, the showing ambivalent sides. In the case of retiring from clerical, technical, service and sales, farming and fishing and simple labor works, because the retirees had managed relatively simple and repetitive work before they retired, retirement may be a shift in life deviating from work. Meanwhile, Sung and Choi (2010) claimed that a career is not greatly related to post-retirement adaptation. However, because the experience of career life prior to employment can be an opportunity to exhibit one's ability after retirement and is related to the expectation of re-employment (Sung, 1999), the work prior to retirement and post-retirement adaptation are closely related.

Religion leads to the positive recognition of life and becomes the energy to search for meaning and purpose of life. Thus, religious life becomes an important personal resource for psychological adaptation after retirement, and that the elderly with religion is reported to have a positive post-retirement adaptation and a higher life satisfaction than those without religion (Kim, 2010; Kim & Park, 2000; Koenig, 1995; Lee, 2011; Park, 2006; Sung, 1999).

Meanwhile, most preceding researches (Lee, 1995; Lee, 2011; Shin, 2007; Shin & Cho, 2001; Yoo et al., 1991) report that retired elderly with spouses has a higher social and psychological adaptation as well as the

life satisfaction. The adaptation on retirement is not just the problem of an individual but it perhaps is the problem of the couple. If the time the couple spends together increases due to the extension of the desired life expectancy after retirement, the marital relationship is expected to have a greater influence on the adaptation of the retiree. Generally, the retired husband seeks a couple-centered life by sharing various activities with his wife, and the wife's support and stable marital relations causes significant influences the adaptation process of the retired husband that when the wife's support is lacking or there seems to be a problem between the couple (Shin & Cho, 2001), the retirement adaptation of the husband will face more difficulty.

The type of residence of the retiree, which refers to the problem of who the retiree is living with, has an intimate relationship with post-retirement adaptation (Park, 2003; Shin, 2007; Sung, 1999). According to Hong and Kwak (2007), as the nuclear family became communized, the parents' generation prefers to live independently after retirement instead of living with the children. There is such a research result (Sung, 1999) stating that one who lives alone or the couple that lives alone has a lower life satisfaction compared to those living with elderly parents, adult children, or grandchildren. Similarly, although there is no consistent result on the type of residence after retirement, and the size of the most baby-boomer households during old age, a single household is still desired. Despite the type of residence, if one decides to individually select his desired way of residence, the post-retirement adaptation is expected to increase.

The health condition of the retiree can affect him psychologically, and it can be the most important predictor to the post-retiree-

ment adaptation because the health condition is the basic condition for social relation and activity that it is important in maintaining the independent life and positive self-image (Chee & Cho, 1991; Kim et al., 1998; Kim et al., 2011; Kim & Song, 2009; Shin & Cho, 2001). However, according to the research by Seok (2011), retirement has a strong negative influence on the subjective health condition of all retirees regardless of early retirement. Similarly, despite the fact that health is the most fundamental factor of retirement life, if the retirement negatively affects the health, it may bring about undesirable results to both the individual and the society due to the fact that it can increase the medical costs and health investment cost, and this problem will possibly become more severe as the aging of population progressed.

The degree of economic condition and the monthly cost of living of the retiree is the variable intimately related to retirement adaptation. According to the research by Kim et al. (2011), higher subjective economic satisfaction of the male retirees is shown to result in the recognition of a high quality of life. Moreover, Yoon and Lee (2006), through qualitative research on male elderly, investigated that difficult subjective economic conditions result to psychological instability. Lee and Lee (2005) stated that post-retirement adaptation is affected due to economic conditions, pointing out that the reason why young male adults and the elderly want to work again after retirement. Furthermore, Kim et al., (1998) and Shin et al., (2001) stated that in the case of lower rank, the financial condition is deeply related to the post-retirement adaptation. In the case of economically stable middle rank or high rank, the influence of economic condition on post-retirement adaptation is very low. The

feature of current retirees is the insufficient preparation for old age. The problem of adaptation can be found in retirees without a stable source of income and are at this point in time hiding in the blind spots of public social security system or old age social security system. This can be severe.

For retirees, the income activity of the family member becomes an important resource that conserves the loss of income after retirement, as this can become a positive influence on post-retirement adaptation (Sung et al., 2010). However, in case the spouse continues to work, it can lead to the recognition of loss of work and can cause the conflict due to the division of labor (Sung et al., 2010). Moreover, there are a lot of opportunities to spend leisure time with the spouse after retirement, but these activities are difficult to the situation of the working spouse. Thus, when the spouse is working, the retiree hopes for the relationship with the spouse because these activities are difficult.

Similarly, post-retirement adaptation of male retirees is influenced not only by a single factor but instead, various factors are applied to that affect the characteristic and environment of the individual in a complex manner.

III. Methods

1. Participants and Procedure

The subjects of the investigation of this research were 307 male retirees, age of at least 55, residing at S and Y City located at the Eastern part of Jeollanam-do, who have retired at most five years ago and have no current job. The reason for restricting the time period of retirement to less than five years is because that period is considered to

have the most adaptation problems caused by retirement.

The investigation period was from June 14 to August 24, 2013 and the investigators of the research were comprised of undergraduate and graduate students, including the researcher. The gathering of survey material was conducted in a way that the retirees answer the questionnaire after the pre-trained investigators fully explain the objective of the research and contents of the questionnaire to the male retirees. After, the questionnaires were collected. A total of 400 questionnaires were distributed but the collected questionnaires were only 356 pieces, showing the collection rate of 89%. A total of 307 questionnaires were used as the analysis material, excluding the 49 questionnaires that considered to have dishonest answers or considered to be inappropriate as the material.

2. Measurement

This research aims to look into the factors influencing post-retirement adaptation of male retirees. It was conducted with a questionnaire that was composed of 2 parts. The specific questions of the questionnaires were composed of 10 questions on getting to know the social demographic characteristics, and 11 questions to look into post-retirement adaptation.

1) The Social demographic characteristics

The Social demographic characteristics was age, education, career, religion, spouse, living state, health state, monthly living expenses, economic state, and family income.

2) Post-retirement adaptation

The criteria for post-retirement adaptation is composed of a total of 11 questions, amended and revised according to the ob-

jective and situation of the study centering on the 'Criteria for Post-retirement Adaption' of Sung (1999).

The criteria for post-retirement adaptation are the criteria measuring their subjective awareness on the degree of post-retirement adaptation, including questions like 'I sometimes think I am incompetent', 'I started a new life because of retirement', etc. A five-point Likerts scale was used and the answers to negative questions (Numbers 1, 2, 7 and 9) are analyzed by reverse checking. The higher the sum of the score means higher the post-retirement adaptation is. The reliability of the criteria of post-retirement adaption used in the research showed to be high with Cronbach's $\alpha = 0.85$.

3. Data Analysis

The statistics process of the research was done using the SAS package program and specific analyzing method is as follows. First, the frequency and percentile were investigated on the social demographic characteristics of the subjects of the investigation. Second, the mean and standard deviation were acquired to investigate into the post-retirement adaptation of male retirees in Korea, and Cronbach's α -coefficient was calculated for the reliability of the criteria. Third, the one-way ANOVA was conducted to look into the post-retirement adaptation according to the social demographic characteristics of the subjects. Fourth, the stepwise multiful regression analysis is performed for the relative influence of the social demographical characteristics of the subjects.

IV. Results

1. Social Demographic Characteristics

The Social demographic characteristics of the sample were presented in Table 1.

score of post-retirement adaptation of male retirees was lower than the median, and such result does not coincide with the re-

Table 1. Characteristics of the sample

(N=307)

Variable	Category	N	%	Variable	Category	N	%	
Age	55-59	172	56.0	Religion	Yes	205	66.8	
	≥ 60	135	44.0		No	102	33.2	
Education	≤ Middl school	54	17.6	Spouse	Yes	69	7.6	
	Hgh school	146	47.6		No	38	12.4	
	≥ College	107	34.9	Living state	Alone	33	10.7	
Agriculture, fishing business & cattle farming		25	8.1		With spouse	138	45.0	
					With children	136	44.3	
Career	Professional skill production	54	17.6	Health state	Poor	49	16.0	
	Management office work	52	16.9		Moderately	136	44.3	
	Sales	34	11.1		Good	122	39.7	
	Own business		78	25.4	Monthly living expenses	< 1,500,000	111	36.2
						1,500,000-2,500,000	118	38.4
	Public servant	40	13.0	> 2,500,000		78	25.4	
Etc.		24	7.8	Economic state	Poor	135	44.0	
					Moderately	133	44.3	
					Good	39	12.7	
Family income		200	65.1	Family income	Yes	200	65.1	
					No	107	34.9	

2. The Level of Post-Retirement Adjustment by Male Retirees of Korea

The post-retirement adaptations perceived by the male retirees who are the subjects of the investigation are found in Table 2.

As shown in the table, the post-retirement adaptation of male retirees who are the subjects of the investigation showed a low score, the average of 30.81, compared to the median, which is 33 points (minimum score: 11, maximum score: 55). Specifically, the average score for the question, 'I have a goal of life to pursue' was 3.12, measured as highest whereas the question, 'I feel like my status within my family has weakened after retirement' showed the lowest score of 2.14.

As shown in the research, the average

search result of Kim et al. (2005) in which the degree of post-retirement adaptation exceeded the median. The result is lower than the research result of Sung (1999), which showed a low score that is nearest to the median, describing that male retirees are regarded to experience difficulty in adapting to post-retirement life. Considering the characteristic that current male retirees have high expectation on the quality of life, they seem to have evaluated as unsatisfied due to the negative experiences in reality, unless they have considered retirement as the new beginning of life and had prepared for it that such awareness does not only have negative influences on the post-retirement adaptation, but implies that it can further lead to the conflict within the family, causing changes in

Table 2. The Level of Post-retirement Adjustment (n=307)

	Items	M	SD	Range (Median)
Post- retirement adjustment	1. I am dealing with boredom nowadays.	3.10	1.18	1-5 (3)
	2. I occasionally feel like being a loser.	2.66	1.12	1-5 (3)
	3. I have a goal to achieve.	3.12	0.99	1-5 (3)
	4. I am satisfied with my accomplishments in my life.	2.71	0.99	1-5 (3)
	5. In comparison to some of my friends, I managed to be a success.	2.53	1.01	1-5 (3)
	6. With regard to my ability and my endeavor, I believe what I have is fair.	2.69	0.95	1-5 (3)
	7. I feel the level of respect has waned within the family since retirement.	2.14	0.78	1-5 (3)
	8. I feel happy and satisfied from my mundane activities.	2.92	0.90	1-5 (3)
	9. My health has been worse since retirement.	3.05	1.02	1-5 (3)
	10. I have started a new life from the point of retirement.	2.85	0.99	1-5 (3)
	11. I have been pursuing leisure and new interests since retirement.	3.04	1.00	1-5 (3)
	Total	30.81	0.53	11-55 (33)

the quality of family relation. On the other hand, in terms of spending time through a leisurely life, it is evaluated positively to a certain point because male retirees consider the time after retirement as the opportunity to pursue new goals, interests and activities, rendering them consistently active. The question of how to spend their leisure time after retirement is the core factor in determining the quality of general life after retirement. Thus, a measure to help leisure life for male retirees should be prepared in order to manage a more productive and meaningful life by leading the leisure time more positively.

3. Post-Retirement Adaptation According to the Social Demographic Characteristics

ANOVA was conducted to look into the post-retirement adaptation according to the social demographic characteristics of male

retirees, and the results are as shown in the Table 3. below.

As shown in the table, post-retirement adaptation according to the social demographic characteristics of male retirees, the economic condition ($F=56.83$), the health condition ($F=42.73$), the level of education ($F=19.13$), the presence of religion ($F=10.77$), the presence of the spouse ($F=10.68$), the type of residence ($F=8.07$), and the monthly average cost of living ($F=6.36$) showed significant differences within the group at $p<.001$, while the income activity of the family member ($F=10.68$) at $p<.01$. However, age ($F=2.67$) and career prior to retirement

($F=1.82$) did not show significant differences in statistics within the group. In other words, the group with the economic margin showed a higher post-retirement adaptation than the group without, the group with good health condition than the group without, the

Table 3. Post-retirement Adaptation by Variables

(N=307)

Variable	Category	N	M	SD	t/F	Dun.
Age	55~59	172	32.04	5.78	2.67	A
	≥60	135	30.61	6.14		A
Education	≤Middle school	54	28.98	5.46	19.13***	B
	High school	146	30.40	5.76		B
	≥college	107	34.09	5.78		A
Career	Agriculture, fishing business & cattle Farming	25	29.80	5.33	1.82	B
	Professional skill, production	54	32.28	6.14		AB
	Management, office Work	52	31.12	5.56		AB
	Sales	34	30.50	5.49		B
	Own business	78	31.06	6.15		AB
	Public servant	40	33.75	6.37		A
	Etc.	24	30.67	6.72		B
Religion	Yes	205	32.22	6.06	10.77***	A
	No	102	29.87	5.72		B
Spouse	Yes	269	31.84	5.99	10.68***	A
	No	38	28.55	5.68		B
Living State	Alone	33	27.88	5.30	8.07***	B
	With Spouse	138	31.34	6.29		A
	With Children	136	32.40	5.64		A
Health State	Poor	49	27.76	5.95	42.73***	C
	Moderate	136	30.24	4.97		B
	Good	122	34.25	5.97		A
Monthly Living Expenses	< 1,500,000	111	30.27	6.47	6.36***	B
	1,500,000~2,500,000	118	31.76	5.81		A
	> 2,500,000	78	32.62	5.51		A
Economic State	Poor	135	30.21	5.97	56.83***	B
	Moderate	133	32.10	5.99		A
	Good	39	36.28	6.41		A
family member's income activity state	Yes	200	32.10	5.99	6.99**	A
	No	107	30.21	5.97		B

* p<.05, ** p<.01, *** p<.001

group with education background above college graduate than the group without, the group with religion than the group without, the group with spouse than the group without, the group living with spouse or children than the group without, the group with monthly average cost of living above 1.5

million won than the group with a lower cost of living, the group with high degree of accepting the retirement than the group at middle or low, and the groups with income activity of the family member showed higher post-retirement adaptation than the group without.

As shown in the research result, economic condition is the problem most commonly visible among the retirees in Korea, such that retirement without enough preparation adds difficulty in post-retirement adaptation. Such result coincides with previous research (Son 2010) that the male retirees with better economic conditions perceive the quality of life in accordance with the retirement adaptation higher than those who do not. Moreover, the research result that the post-retirement adaptation varies depending on the health condition and level of education as well coincides with the result of previous research (Shin, 2007; Son, 2010). Similarly, health condition is expected to greatly affect the quality of life in accordance with the post-retirement adaptation, while the high level of education is considered to increase post-retirement adaptation because of its high possibility of having many economic and social resources that can be utilized after retirement, helping the retirees to have aggressive and active life.

In terms of the presence of religion and the spouse, there were significant differences within the group and such result as well shows that the religion is a factor that effectively supports the adaptation of the retiree. Sung (1999) also revealed a research result describing that the male retirees having religious life through leisure time showed a positive attitude towards the retirement experience, and family, which positively affects adaptation. If the couple establishes the companion relationship after the retirement of husband, the sense of belongingness and mutual dependence between the couple increase and they share perspectives and leisure activities. These are positive influences to the process of adapting to retirement, making the existence of the spouse an important factor to the post-retirement adapta-

tion of males. The result of the research matches with most of the previous researches as well (Han, 2002; Lee, 2011; Shin, 2007). Thus, the type of residence of the family has a close relationship with post-retirement adaptation that the acceptance of retirement of the family members is high while living with the spouse or children brings about positive effects to post-retirement adaptation.

4. The Influences of the Factors According to the Post-Retirement Adaptation of Male Retirees in Korea

A stepwise multiple regression analysis was conducted to look into the relative influence of the factors of the post-retirement adaptation of male retirees who are the subjects of the investigation.

Prior to conducting the stepwise multiple regression analysis, the Durbin - Watson coefficient was calculated through the residual analysis, and the process of regression analysis result showed that all Durbin-Watson coefficients were near 2, saying that there is no autocorrelation found among residuals. Furthermore, the correlation between the independent variables is $0.0004 < r < -0.7698$, confirming that there were no linear relationship, and when VIF is over 10 within the range of $1.56 < VIF < 1.92$, the problem of multicollinearity was found. Hence, the regression analysis was conducted. Aside from the variables that underwent the correlation analysis, some nominal variables were converted to dummy variables and were used as the variables for the regression analysis.

As shown in the Table 4. the influences of the variables on the post-retirement adaptation of the subjects of investigation showed to have the explanation power of 35%. Among these, the economic condition ($\beta=0.34$) showed the highest influence with

21%, followed by health condition ($\beta=0.25$), level of education ($\beta=0.15$), and religion ($\beta=0.10$) in order. However, the age, career prior to retirement, presence of spouse, type

maintaining the life after retirement, these seem to have very close relationship with adaptation. The biggest reason behind the negative view of retirement in Korean soci-

Table 4. Variables Influencing on Post-retirement Adaptation (n=307)

Variables	Category	post-retirement adaptations	
		B	β (Rank)
Age		-0.07	-0.01
Education		1.26	0.15** (3)
Career ^{a)}		0.40	0.02
Religion ^{a)}		1.16	0.09* (4)
Spouse ^{a)}		0.45	0.03
Living State ^{a)}		0.97	0.08
Health State		2.09	0.25*** (2)
Monthly Living Expenses		-0.31	-0.04
Economic State		2.90	0.34*** (1)
family member's income activity state ^{a)}		0.24	0.02
상수			15.66
R ²			0.35
F 값			15.63***
Durbin-Watson			1.87

* p<.05, ** p<.01, *** p<.001

^{a)} The following variables is treated as a dummy variable.

Career: Public Servant(1), Etc.(0)

Religion: Yes(1), No(0)

Spouse: Yes(1), No(0)

Living State: With Unmarried Children(1), Etc.(0)

Family Member's Income Activity State : Yes(1), No(0)

of residence, monthly average cost of living, and the income activity of the family member slightly affected post-retirement adaptation, and its values were statistically not significant that these are eliminated from the influential variables. In other words, better economic condition and health condition, high level of education and having religion result to higher level of post-retirement adaptation.

As shown in the research result, the reason why the economic and health condition affects post-retirement adaptation of the male retirees the most is that as much as these are the most fundamental factors in

ety is that as the economy weakens and activities decrease due to retirement, health worsens. If the retiree has a good enough economic condition, is stable in terms of materials, and manages to maintain the good health, the retirement perhaps was not recognized as the incident bringing about stress. Thus, the present economic power and health condition are considered as the most crucial factors affecting post-retirement adaptation, and this research result coincides with the result of previous researches (Kim et al., 2011; Jeong et al., 2010). The level of education also affects post-retirement adaptation

that such result also coincides with the research results of previous researches (Kim et al., 2011; Shin, 2007; Sung, 1999), which shows that the higher the level of education, the higher the perception towards the quality of life after retirement. It is because the higher the level of education, there is higher possibility to have many economic or social resources that can be utilized after retirement. These may result to a broad range of interests and activities after retirement, and therefore becoming more aggressive in the search for a new interest and activity that can substitute the work.

V. Summary and Conclusions

Male retirees experience changes in diverse aspects of daily life through retirement, and the difference between the variation in adaptation to such changes works as the important factor in determining the quality of life of male retirees. Thus, this research aimed to look into post-retirement adaptation, focusing on male retirees facing transitional life caused by retirement. In addition, by examining the factors affecting the post-retirement adaptation, this research aimed to provide basic information to increase the quality of life along with the understanding of the post-retirement adaptation alone.

For this, the data was collected against 307 male retirees at the age of at least 55, residing in S and Y Cities situated at the Eastern part of Jeollanam-do who have retired less than five years. The gathered data were statistically analyzed through reliability, frequency, percentile, average, standard deviation, t-test, ANOVA, correlation analysis and stepwise multiple regression analysis.

The research results found through the research are summarized as below:

First, the score for post-retirement adaptation of male retirees was found to be relatively low with the average of 30.81, which is lower than the median at 33. Second, post-retirement adaptation according to the social demographic characteristics of male retirees, the economic condition, health condition, level of education, presence of religion, presence of spouse, type of residence, and monthly average cost of living showed significant differences within the group at $p < .001$, while the income activity of the family member at $p < .01$. In other words, the group with economic condition above average showed better post-retirement adaptation than the group without, the group with good health condition than the group without, the group with education background above college graduate than the group without, the group with religion than the group without, the group with spouse than the group without, the group living with spouse or children than the group without, the group with monthly average cost of living above 1.5 million won than the group with lower cost of living, the group with high degree of accepting the retirement than the group at middle or low, and the groups with income activity of the family member showed higher post-retirement adaptation than the group without. Third, the relative influences of the factors of the post-retirement adaptation of male retirees (social demographic factors) 35% explanation power. Among these factors, economic condition showed the highest influence with 21%, followed by the order of influence of health condition, level of education and religion. In other words, a better economic condition and health condition, a high level of education, and having religion re-

sulted in a higher level of post-retirement adaptation.

The conclusions derived using the research results are as follows:

First, the level of post-retirement adaptation of male retirees who are the subjects of the investigation shows to be lower than the median, and thus they are considered to experiencing difficulties in adapting to retired life. Such results show that in case of male retirees who lost work and economic roles despite having conditions to work, they are not satisfied with themselves due to negative experiences such as psychological shrinkage caused by the weakening of self-value and the fall of self-esteem, unless they have considered retirement as the opportunity of new started and have prepared for it. Thus, the difficulties caused by such negative experience from the reality eventually result to a negative influence on post-retirement adaptation that positively accepting the changed reality and self after retirement is necessary. On the other hand, from the aspect of life goals, health, and use of time through leisure, retirement is evaluated as very positive because it shows the potential of the free, productive old age of the male retirees. Thus, reinforcing the realistic support system to help the adaptation for male retiree is needed to achieve balance of life and to have meaning and goal as an opportunity for new life rather than as a negative time by spending the retirement period through productive activities. As the measure for this, the preparation and education regarding retirement, such as possessing adaptability and maintaining the physical and economic power, need to be executed in a specified and systematic way from the start of the career life. Moreover, there is a need for continuous development on the support system and program on how to utilize the

leisure time, how to manage the leisure time and how to create a new role in order to substitute or develop the sense of accomplishment, meaning and joy, which the retirees were able to feel while working through other roles along with the pursuit of productivity through the meaning of life and leisure of the retirees. Because most of their generations have high expectations on life during old age accompanied with health, leisure, hobby and self-development, participating in the voluntary work, healthy sports and leisure is also considered to bring about the effect of increasing productive aging in a social and psychological sense that the provision of opportunities for various leisure activities and the gentrification of the programs that can satisfy their desire will be needed. In addition, the male retirees of current generation will attempt to re-enter the labor market that there should be a continuous measure for the utilization of leisure and creation of jobs from the social and political dimension such as expansion and supply of works appropriate for old aged people, development of work education training, and establishment of lifelong education system should be established, and effective institutional support that can create a social environment that is positive and supportive of the old aged people is needed as well.

Second, the successful adaptation to retirement, which is the essential assignment of male retiree, and post-retirement adaptation, which determines the quality of his life, vary depending on the health and economic condition. Between the two, health is the fundamental condition for social relationship and activity that it is important in maintaining independent life and positive self-image, causing psychological influences to the retiree. Hence, adaptation to retirement and quality of life after retirement are intimately

related. Therefore, there is a need to deviate from the welfare service focused on the physical health of the existing group of old people, but the diverse level of health services, which also considers psychological and mental health is needed for the retirees, with wide range of retirement age and different characteristics, to manage the health retirement life. Particularly, in the case of early retirees below the age of 65 or middle-aged people, if health worsens, it can further accompany economic difficulty aside from the consistency of health problem. An active measure that can resolve the blind spots of medical security should be prepared. Moreover, as much as economic condition is the most fundamental condition in maintaining life after retirement along with the health, a specific implement for a stable economic life is demanded from the initial stage of adulthood, and the stability of employment in the national level should be secured through economic stability and poverty prevention, as well as the execution of realistic social security system, the active support for the vitalization of employment for middle-old aged group and the solving the blind spots of national pensions through the regulation of increasing the retirement age, salary peak system, etc. to avoid the gap between income between the retirement period and public annuity supply period. On the other hand, in their generation, the desire for work during old age does not simply lie on the economic reason such as preservation of income, but is a considerable part that would be contributed from non-economic aspect such as the good use of leisure, connection to the society, self-realization, etc. due to the improvement of level of education compared to the previous generation. Thus, new work for the elderly should develop qualitatively favorable jobs for them to ag-

gressively utilize their profession aside from low-wage simple labor. Reflecting the diversity of the generation should be a priority. In addition, in order to strengthen the plan for life in later years and in preparation for the old age for male retirees, the foundation for plans for the elderly, including the consistent development of plan of old aged people, the construction of infrastructure for the support and activation of planning services for old aged people should be constructed.

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Myanmar Marine Resources and Scuba Diving Environment

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Abstract

In this study, we examine the changes in tourism industry of Myanmar. In particular, because Myanmar is known to have rich marine resources, the current status of the ocean-related tourism sector was of our focus of the study. Furthermore, prospects of scuba diving sector were investigated in more detail. There are several factors that increased number of overseas travelers in Myanmar over the recent years. More frequent number of flights to and from Myanmar has been scheduled from the airlines in service and some airlines newly started to operate their flights to Myanmar. It is possible to experience the oriental Buddhist culture and the unique untouched nature. The total area of the fishing grounds of Myanmar is 230 000 km². 3000km total length of coastline, fisheries production reached 3.9 million tons in 2010. However, entry into port is a problem. Because Yangon harbor is a river port, large container ships cannot dock at the port. Myanmar has a lot of beautiful beaches, and future growth in tourism in the marine sector is expected. The country is blessed with an environment for scuba diving, but social infrastructure such as road is insufficiently developed that accessibility to the coastal area is still very poor. There is a huge development potential for scuba diving, but illegal fishing is prevalent in some areas. Noticeable signs of destruction of the aquatic environment are spotted. For future of the Myanmar's marine tourism industry, these factors hindering the development should be identified and resolved.

Key words: Myanmar, marine resources, scuba diving

I. Introduction

Myanmar was a country that is among the countries that have been closed together with North Korea(David I. Steinberg, 2011). But reform since President Thein Sein, the

tourism industry has increased about 62% compared to before opening(Ueueuin, 2012). According to the 2011 tourism statistics of the Ministry of Tourism of Hotel Myanmar Radio Free Asia (RFA), income earned by Myanmar government through investors and foreign tourists was 300 million one thousand nine one million U.S. dollars(2012.2). Since Myanmar took the open reform measures in 2010, number of foreign tourists visiting

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Myanmar has been increasing. Foreign investors show interest in hotel accommodation industry in Myanmar eyeing this has increased (Ueueuin, 2012).

In this study, we examine the changes in tourism industry of Myanmar. In particular, because Myanmar is known to have rich marine resources, the current status of the ocean-related tourism sector was of our focus of the study. Furthermore, prospects of scuba diving sector were investigated in more detail.

II. Myanmar's Tourism Industry Trends

Tourism revenue in Myanmar increased 36% in the 254 million dollars in 2010 in the first year of the open in 2009 before being released (Ueueuin, 2012). And, increased 26% in 2011 of the following year. Since its opening, an increase of a total of 62% in two years. The number of tourists who visited Myanmar was 760,000 people in 2009. 790 000 people in 2010, 82 million people in 2011, it is on the increase gradually. In terms of country-by-country tourists, Chinese most often with 60,000 people. The next was in the order Thailand, Malaysia, South Korea, the Japanese. France, United Kingdom, Germany, USA tourists was 60,000 people about four major countries of Western Europe (Ueueuin, 2012). It have increased the number to 1 flight daily Mandalay flights - Bangkok Air Asia had been operating four flights a week from January 2013. It is to digest the tourists increase. It became to increase flights to 3 months after the start of the October 2012 flight. Bangkok Air also Bangkok from September 2013 - began the flight of Mandalay. Myanmar tourism is expected to grow by Thais. Tends to

increase even Korean tourists. At 12,400 people in 2008, 22,500 people visited Myanmar only one year of 2011. September 13, 2012, Air direct flights between Incheon Yangon was established. Is expected to increase even more Korean tourists (Kim, 2014). Under these circumstances, the results of the investigations travel agency association in the United States recently conducted, Myanmar has been ranked number one emerging tourist spots which are the most attractive among foreign travelers, January 30 Hanoi Times 2013 reported. In Association was founded in 1972 USTOA, a major tourist service provider and travel agencies all over the world are participating as a member, and was analyzed by visible achievements of the reform policy full-fledged government of Myanmar. However, tourism infrastructure to accommodate foreign tourists surging were analyzed as missing. Foreign tourists increases so, interest of foreign investors in the accommodation also increased. According to the place where it has been officially announced, it is under construction in the accommodations provide scale a total of 6000 investors in six countries, Singapore, Thailand, Japan, Hong Kong, and the United Kingdom over about \$ 1.1 billion (Kim, 2014). Myanmar government recently, the proliferation of tourists, is facing a situation of shortage of accommodation has published recruitment bidders Hotel Investment Services Korea Trade-Investment Promotion Agency (KOTRA). Marriott International and Resort, Reuters, which revealed the plans to invest in the hotel industry of Myanmar reported the Starwood Hotels is a hotel company in the world in the Davos conference in January 2012, was held in Switzerland. Even compared to other countries in the Asia-Pacific Ocean region, is

showing a growth rate of overseas travel Myanmar (2012.8). Looking at the changes in the January–April 2012, following the 164% Japan, became the second place in the 34% Myanmar. Except for that it is a special situation travelers that Japan was plunged in the nuclear accident and tsunami is recovering gradually, it is also possible to see the first place is Myanmar substantially. According to the documentation (Pacific Asia Travel Association, PATA) has announced the Asia Pacific Ocean Tourism Association, it was found that 900 million people, travelers who visited Asia during this period rose 7% year-on-year (Wewe Win, 2012). This is in contrast to the Mexico and North America decreased. It is analyzed the reduction in North America, down flights aviation policy of the United States airlines has been acting in particular. The reason the world prefer the Asian region, is as follows. It suspect that the point that by the downturn in the economy, relatively few costly acts appealing. In addition, these areas, there is also an advantage that they can enjoy at the same time for recreation and tourism and wonderful natural landscape. Adding new flying the airlines of each country, to increase flights in particular, I want to mention Oriental Buddhist culture unique and unspoiled nature, overseas tourists has increased acts as an increase factor Myanmar. By country of travelers, it is in the order of Japan, South Korea, China, Taiwan, and the United States. It became clear increase in travelers from Japan, China, Taiwan Cal in the eyes especially (Kim, 2014). To beat the expected travel demand to the economic crisis in Europe is reduced, the travel industry showed strong. Is in the process that will be recognized on the road Asia Pacific Ocean region have spread worldwide, and out in front the benefits that

can be enjoyed at reasonable prices for recreation and tourism, Matin J Craigs PATA Chairman, travel market worldwide it said it plans to announce on.

Korea also is moving quickly into the open policy of Myanmar. First, Korean Air began regular flights direct flights to Yangon (Rangoon), Myanmar from September 13, 2012. For one round trip daily flights, 18:05, Incheon airport to arrive at 21:40 in Yangon. Departure 23:20 from Yangon, return trips to arrive at 7:40 of the next business day to the Incheon International Airport. Through a third country such as Thailand, it was probably 10 hours or more in the past, but the travel time has been significantly reduced in direct flights operated. Currently, it's about success in boarding rate reaches 95% (Wewe Win, 2012). Travel agency also is taking out by rushing the related products. It is assembled in the schedule, such as meeting ruins Porsche Dagon, of Hansawadi dynasty, Bago, shadow Pagoda, huge Valle Pagoda (internal backroom published), with students of Yangon University Department of Korean. On the other hand, in September 2012 SK Telecom signed a commercialization of services and Myanmar communication work, I started roaming service (Kim, 2014).

III. Myanmar's Marine Environmental Conditions

The total Fishing grounds area of Myanmar is 230,000km², length of coastline of 3000km, the total fishery production volume to reach 3.9 million t standard in 2010 (Kim, 2008, Ocean Monthly Korea, 2014). Foreign investment is total of 25 companies, it is a 324 million dollars. Total exports was 380million dollars. In particular,

there are many more shrimp(Ocean Monthly Korea, 2014).



Fig 1. The diving points that are known up to now in Myanmar

Korea, 2014).

One of Asia Logistics artery, from Bangkok to Ho Chi Minh City in southern Vietnam economic route. The Thai government, has the idea of making the distribution centers of the Andaman side multi-way section of Myanmar to extend. However, Arrival current problem is large. It is not possible large container ships to harbor with a Yangon harbor currently. Yangon Port in the river port, you must transshipment in a small boat at Singapole cargo etc... Thira port currently in development, near in Yangon and a certain level of infrastructure international port, such as road was equipped already. Up to the Andaman Sea, the harbor of Thira is a river port located in the 16km north from the mouth of the Yangon river. The total length is 1,000 meters, but water depth of about 10 meters, large container ships can not harbor that said deep-sea harbor. The flow rate is fast, Arrivals and Departures are possible only at high tide estuary(Ocean Monthly

Representative beaches of Myanmar were listed below. It is known that the main beaches of the west coast and is a relatively safe from tsunami(Ministry of Foreign Affairs, 2009).

(1) Nagapail beach

It is a coastal resort of certain first 7km, the Rakhine coast in Thandwe. It is an hour away by plane from Yangon. A 3km white sand beaches, clear seawater beautiful cobalt light. Sunset is also a superb ride seemed.

(2) Ngwesaung beach

Located at the bottom of Charungtta. The new resorts of the west coast of Myanmar. Clear water such as a crystal and white sand is beautiful. The lift-equipped bungalows and hotels on the beach. It is about \$ 150-200 per night.

The length of the beach reached 16km, 7 hours take as long as a high-speed bus from Yangon.

(3) Chaungthar beach

Located in Patheingyi west 40km. 240km from Yangon. It takes about 7 hours by bus from Yangon (foreign \$ 30 roundtrip). There are some small islands that you can go around.

(4) Kan Thaya beach

The Rakhine coast, it takes 8 hours about 290km, by bus from Yangon.

IV. Marine Resources Scuba Diving Environment of Myanmar

Diving tour is a discipline of undeveloped still directly in Myanmar. The area is known as Myeik islands andaman sea diving available in Myanmar. October to May, the dry season is a season of scuba diving. It is sometimes done in conjunction diving in Thailand and Myanmar than the local current. It is believed that a diving point of several places has been identified for this region, and that attention in the future(Lee, 2012).

The Andaman Sea is located southeast of the Bay of Bengal. Yet south of Myanmar, it hit the western Thailand and Malaysia. North to south is 1200km, east and west 650km, the width 797,700km², 870m average depth, maximum depth will 3,777m about. South is connected to the Pacific Ocean in the Malacca Strait between Sumatra and the Malay Peninsula island(Lee, 2012). It is also the crash sites in 1987 KAL machine, is aerial bombing in terrorism in North Korea. First, there is a way to go Andaman airplane (round-trip airfare \$ 195) from Yangon. Secondly, there is a method to enter Myanmar through the sea aboard the boat from Phuket, Thailand.

Divers use a lot of the second method mainly. They boarded in tammurabu wharf normal Phuket Thailand. Report it to depart from Thailand's northernmost town Ranong. Receive an entry visa to the port city of Myanmar reported in kotong or Kawthaung. Come and go in immigration procedures guide the boat down while the ship moored instead. After the dive, and depart again in kaung daung report undertakes a re-entry procedures in Ranong, Thailand. The procedure will take some time. Sometimes, in some cases doubling the immigration officials and the country came together to carry passport and boarding tourism staff(Lee, 2012). The diving points that are known up to now, there is something like the following.

(1) High Lock

It is an island of rock in the middle of the sea. The one standing trees on the island. There is a sand floor and spread soft corals underwater reef. The big fish and small organisms, such as the hippocampus and Nudi Branch, can be seen. However, there are many sea urchins threatened ecology of biological fixation.

(2) Rocky Island

Many sea anemone communities be seen. There is also a place where bleaching occurs.

(3) Shark Cave

Height 4m, width 1.5m, length of 18 meters cave is there. Can be seen, such as the Grey Reef Shark, Ray, Whip Corais, Anemones, Crabs, Shrimps, Lobster

(4) Black Lock

It is an island of rock standing one trees. Bottom can see the sand, Sting Ray, Manta, and reef sharks.

(5) North Twin Pinnacle

Water depth comes out to 65m east especially in the water slope. Can be seen, including zebra sharks, stingrays blue dot, the bull shark. Be careful in a strong tide.

(6) Sea Fan Forest

It forms a community fan coral.

(7) Western Rocky

The best beauty boasts Myanmar. The long, narrow cave is there. It consists of two parts of the island and peaks with a coral garden. The state of nature has not been compromised, and can find different kinds of sharks.

Overall, it is far more difficult to access for divers as well preserved natural aquatic environment. Been designated as a national park fishing is prohibited. However, in some areas are being illegal fishing. How much more are using dynamite fishing activities. Noticeable signs of destruction throughout the aquatic environment resulting.

V. Conclusions

After Myanmar in 2010 took the open reform measures, foreign tourists to visit Myanmar is increasing. Foreign investors eyeing this, an interest in hotel accommodation industry in Myanmar has increased. Myanmar tourism revenue has also increased. Myanmar has emerged as an emerging tourist destination attractive between foreign travelers. However, tourism infrastructure to accommodate foreign tourists surging were analyzed as missing. Even compared to other countries in the

Asia-Pacific Ocean region, Myanmar is showing a growth rate of overseas travel. World are favored as overseas travel destination in Asia. It is an important factor that travel cost is relatively small. In addition, these areas are also an advantage that they can enjoy at the same time for recreation and tourism and wonderful natural landscape. Adding new flying the airlines of each country, to increase flights in particular, I want to mention Oriental Buddhist culture unique and unspoiled nature, overseas tourists has increased acts as an increase factor Myanmar.

Factors in other overseas travelers Myanmar has increased are as follows. One, increase flights and new airlines flying of one country. Two, it is possible to touch the oriental Buddhist culture and the unique nature of untouched.

The total area of the fishing grounds of Myanmar is 230 000 km². 3000km total length of coastline, fisheries production to reach 3.9 million t standard in 2010. However, entry into port is a problem. It is not possible large container ships to harbor with a Yangon harbor currently. Because it is a river port. Therefore, a small cargo ship is needed for transshipment. It is made mainly from Singapore. Thira harbor is also the same. Thira harbor is near the Thira industrial park. Yangon is also close but with a depth of only 10 meters. In addition, the difference between the morning and evening tides violently, Arrival is possible only at high tide.

Myanmar has a lot of beautiful beaches. Future growth of the tourism industry of marine-related is expected. Beach typical, is as follows. Nagapail, Ngwesaung, Chaungthar, Kan Thaya

Blessed are equipped to scuba dive the sea environment. But, if you are participating

in diving directly in Myanmar still, it is slight. Social infrastructure such as traffic away still, accessibility is reduced. Rather, it is often used as a way to enter Myanmar through Thailand by boat. There is inconvenience that guide or disembark by proxy, in charge of station staff must be on board immigration declaration. Areas that can be diving in Myanmar are as follows. The Myeik of Andaman sea ect. Diving in collaboration with Phuket of Thailand,, rather than directly from Myanmar have been carried out occasionally. Diving point typical known until now is as follows. High Lock, Rocky Island, Shark Cave, Black Lock, North Twin Pinnacle, Sea Fan Forest, Western Rocky ect. They will be a popular diving spot in the future. While overall, underwater environment has been well preserved remains of the natural difficulties of access diver ever. Been designated as a national park fishing is prohibited. However, in some areas are being illegal fishing. How much more are using dynamite fishing activities. Noticeable signs of destruction throughout the aquatic environment resulting.

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Strategic Integration of Real Economy and Finance with Banking Infrastructure

- Focusing on the Development Direction for Myanmar's Financial Market -

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Abstract

Financial development is significantly correlated with long-term economic growth, but there are conflicting views on which takes precedence over the other. However, the salient basic banking infrastructure, which connects real economy with finance regardless of such causal relation, is a certainly necessary factor for development of finance and economy. For the development of the economy of Myanmar, the link between finance and real economy is inevitable, and this requires the construction of basic banking infrastructure centered on credible banks. This thesis examines the basic infrastructure of a banking system that Korea constructed at the initial stage of its economic development, and further suggests the necessity of banking infrastructure and the development direction for the growth of the financial market of Myanmar.

Key words: banking infrastructure, Myanmar's financial market, capital market transaction, payment and settlement system, knowledge sharing program

I. Introduction

Schumpeter (1912) stated that the services provided by the financial intermediary are the essential elements for economic growth and technology innovation, and that the development of the financial intermediary promotes economic growth through the quantitative and qualitative improvement of credit supply. In other words, he emphasized that a good banking

system distributes resources effectively and alleviates or eliminates risk, increasing the efficiency of the entire economy by assessing the investment plan of an enterprise and directing the management ability of an entrepreneur in the decision-making process of loan. This explains why the financial market constitutes a significant part in the modern economy, as it strongly affects real economic activity and not merely reflects the scope and direction of real economic activity.

Whether the development of real economy or the construction of an effective banking system leads economic development would

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vary depending on the situation of each country. However, there is a close relationship between the two, and for developing countries who still have long way to go, it would be appropriate for both the real economy and the financial economy to grow complementarily, exhibiting a synergy effect by possessing a banking infrastructure that is basically needed rather than setting a priority among policies focusing on the causal relationship.

Meanwhile, the development case of Korea would be a good example for developing countries in South East Asia. Korea achieved rapid growth after the Korean War and experienced a severe financial crisis, receiving a bailout from the International Monetary Fund (IMF) due to the callowness of financial transactions by the financial institutions and corporations that were not properly developed in accordance with the rapid growth of real economy. However, as Korea experienced the financial crisis, the financial transaction competence of Korean corporations and financial institutions was greatly enhanced. Such case of Korea would provide a good benchmark for developing countries that might be able to follow a similar path in future. The market experience of Korea, who had surmounted the economic development and financial crisis in relatively short period of time, seems to provide a good implication for developing countries in South East Asia.

Myanmar has many similarities with the economic development process of Korea. The country started with nothing, and there were industrious citizens who decided to endure and live well for their descendents. Besides, Myanmar has resources that Korea in the past didn't have, as well as an optimal population size that leads the domestic market. If Myanmar consistently carries

forward an appropriate real economic and financial policy, it will be able to achieve economic development faster than Korea.

Thus, this thesis first looks into the role of essential financial institutions (bank, security company, among others) that are needed in connecting the savings within the country to investment. From the aspect that financial institutions connect the two axes of economic activity, household (supply of fund) and enterprise (demand of capital), the basic role of financial institution should be established. Second, it examines the core functions (currency multiplier effect, foreign currency loan reduction effect) contributed by the basic infrastructure of financial institution. Third, it examines the method to connect the foreign international financial market by domestic banking infrastructure and sectors that need infrastructure to be constructed. Fourth, it examines the development plan of financial market of their own country by utilizing their own financial institutions and constructed basic infrastructure. Lastly, this thesis looks into a way to support the construction of banking infrastructure of developing countries by utilizing the developing country supporting program of Korea who recently experienced financial reform.

II. Review of Related Literature

As Schumpeter (1912) asserted, finance and real economy are intimately correlated. However, the causal relationship whether the development of finance causes economic growth or finance develops according to economic growth is vague. This is also well reflected in the results of different preceding researches that conflict with one another.

Levine, Loayza and Beck (2000) asserted

that financial intermediaries and economic growth show significant correlation and that a developed banking system leads to economic growth. Levine (1997, 2005) argued that it affects savings and investments and ultimately changes economic growth with its five functions: 1) it distributes the capital by examining and providing the preliminary information on potential investment; 2) it exerts the corporate management rights after inspecting investments and providing finance; 3) it enables the transaction, diversification and management of risks; 4) it concentrates and mobilizes savings; and 5) it makes the exchange of goods and services easy. He looks at the role of finance to be growing step by step in its scope depending on the changes in the banking system. He asserted that as the economy develops, financial development should change its role where the center of gravity shifts as shown in Table 1 (Yoon, 2012).

the development of finance market helps the economic growth. It is because in order to develop the overall finance market, information capital and human capital should be accumulated, organizational capital similar to the efficient distribution market should be formed, and the substructure of the finance market such as a transparent accounting standard and legal enforcement should be constructed.

Thus, other scholars considered that the financial system essentially developed according to the economic growth, emphasizing the financial demand (Robinson, 1952; Patrick, 1966). In other words, they viewed the improvement of income level and expansion of corporate production activity due to the development of real economy increase financial investment demand by the depositors and the demand of external funding by corporation (Park, 2003). Park and Lee (2005) used the data of three North East Asian countries (Korea, China and

Table 1. Economic Development and Role of Finance

5 Channels (Levine 2004)		
Encourage and raise Savings		Developing country at the initial stage of development
Facilitation of goods, services exchange		
Transaction, diversification and management of risks		Developed country at the maturity stage of development
Exertion of corporate monitoring and corporate control		
Production of information on investment opportunity and capital distribution		

Source: Quoted in Yoon Jong-yeon (2012)

However, it is nearly impossible for developing countries that possess the features of a mostly agricultural economy at the initial stage of economic development to construct a well-developed capital market within a short period of time just because

Japan) whose stages of economic development vary to investigate into the relationship between the financial development and economic growth. Materials dated from 1970-2003 for Korea, dated from 1990-2001 for China and dated from

1980–2002 for Japan are used to analyze the relationship between finance (including insurance) development and manufacturing development.

The result shows that in the cases of China and Korea, whose economic growths are relatively late, the development of manufacturing caused the development of finance and insurance. Furthermore, the increase of productivity per person in manufacturing led to the development of finance and insurance. In the case of Japan, whose economy had already been well developed, it is analyzed that the financial development caused the economic growth. As a result of closely observing the experiences of Japan, Korea and China, although there were gaps between the periods of rapid economic growth, the most noticeable period of achievement was at the financially suppressed environment (government taking the lead in managing policy of the strategic finance, the inflation rate, and the real loan interest rate) without any definite development in the functions of financial intermediary.

Again, the finance sector did not precede and develop in the economic development. Rather, the development of the finance system seems to have unfolded very slowly, lagging according to the economic growth. For instance, the financial environment of China is similar to that of Korea 10 years ago. In other words, the relationship between financial development and economic growth, namely the phenomenon that commonly appears in North East Asian countries which is the alleviation of financial suppression unfolded based on the growth of real economy or the qualitative improvement of financial sector, is worthy of notice.

Looking into the causal relationship between finance and economic development,

there is an intimate relationship between the two. However, the causal relationship is unclear. Many scholars had studies to establish a causal relationship between the two, but it is difficult to clearly establish that. In fact, in a way this problem could be an issue of which came first, chicken or egg. It is difficult to expect a financial development without capital accumulation according to the economic development, and even if there is accumulated capital, it is difficult to expect the steady economic development if the capital is not efficiently distributed to where it can steadily create added value because of absence or inefficiency of banking system.

However, considering Korea and China in the past, the limited financial resources are allotted to the strategic industry at the initial stage of development under the lead of government. In other words, they had chosen to lead the development of real economy with the capital distribution to the strategic industry under the leadership of the government and the finance industry supports it instead of distributing the market-oriented financial resources by promoting the finance market.

In general: 1) the developing country has no efficient banking system that is well constructed like the advanced country, thus the effective distribution of financial resources according to the market based economy is impossible; 2) in a situation where financial capital has not accumulated through savings because the disposable income has increased due to the development of the industry within the country, the nation directly and indirectly should involve in the management of limited foreign capital and lead investment into the strategic industry to maximize the usefulness of capital; 3) generally, in the market-centered inter-

national finance market, as the uncertainty in recovery of capital investment is increasing, it leads to a rapid increase of capital financing cost. From the standard of international investors, most developing countries have relatively high uncertainty in the economic, political, policy consistency, and legal system sectors than the advanced countries.

Thus, it is because there is a difficulty that the securing necessary finance capital through the development of (international or local) market-based banking system is very restricted realistically.

III. Financial Institution Infrastructure and Economic Efficiency

1. Role of Financial Institution

1) Fund Intermediary between Households and Corporations

Corporations are profit-making entities pursuing financial gain, and it aims to become institutions that exist permanently. However, on the financial management side of corporations, the goals of maximization of profit and the stable, permanent corporation oppose each other. A corporation needs capitals (loans or bond issues) from outside investor adding to their own capital. If the corporation invests in the long-term asset (or project) raising the short-term capitals by minimizing the cost, it may temporarily reduce financial expenses. However, in a changing finance market (particularly in international finance market), the short-term capital cannot be continuously raised in a good condition that the liquidity risk eventually increases in the long term. Thus, the problem of a corporation that grew

steadily is how to adjust the goals of pursuing profit and maintaining the corporation, together with the continuous discovery of a good business model in the market, considering volatile financial market which a corporation cannot control (or should not control).

Households save surplus funds. The goal of saving requires different investments, and that means it is dependent on the purpose of saving.* In the short term, it would be educational expenses and purchasing a house, but in the long term, preparing living cost for retirement is large. The capital demand of corporations exceeds the capital supply of the household at the initial economic development. Afterwards, as the disposal income of the household increases while the corporations grow, the gap between the capital demand and supply make a balance.

Traditionally, the bank is an institution that symbolizes trust. The bank is an institution that requires trust from both corporations and individuals. The role of effectively managing the limited financial resource through financial institutions, the bank in particular, is very important for developing countries at the early development stage.

2) Diversification of Financing Methods and Expansion of Investment Demand

Corporate growth connects with the development of the national economy. Along with growth, a corporation needs to raise more outside capital (loan, bond and stock

* If the available assets for investment of households increase to a certain level, a portfolio management is required instead of set up investment purpose according to the purpose of the capital. Household will look for investment not only in domestic but expands to international market.

issues) and requires the diversification of financing. This is because the corporation develops more sophisticated business model as it grows, and each business model requires the raising of outside capital appropriate to the business model. Thus, the financing method of a corporation, which started with bank loans, expands to the issuance of bond or stock.

As the economic growth has increased, the demand to invest the disposal income more effectively increased even in the household sector. Thus, bank saving is insufficient, and that leads to start investing on bonds or stocks through security company considering the characteristics of one's own investment capital.

Therefore, as corporate growing the structure of outside capital financing also diversified, and it develops more. This is connected to the increase of investment demand for various financial instruments, thus it brings about the qualitative changes of financial institutions. Thus, the financial institutions should push for the diversified strategies with banks, stocks, insurance, among others, depending on the stage of economic development.

3) Expansion of Trade and Capital Market Transaction between Countries

The development of information and communication technology causes the development of international logistic business, thus corporations over a certain scale pursue management efficiency based on economies of scale by purchasing raw materials needed in global market and selling the manufactured products in the global market too. In case of products (or services) becoming less differentiated due to the standardization of manufacturing technology, economic integration may happen searching for

transaction efficiency. Examples are NAFTA of North America, single market in Europe and ASEAN (plus Korea, China, Japan) market.

Such an expansion of the trade and financial capital market transactions between countries is clearly explained in table at the Appendix 1. 「Comparison of Population Structure, Economic Activity and Scale of Exports and Imports By Country」. Table 1 compares the population structure, economic activity and energy consumption of developing countries, Korea, Taiwan and developed countries. Developing countries mostly have a young population structure and the economic development caused gradual urbanization, such that the investment of social overhead capital is needed. The corporate development or increase of household disposable income increases the energy demand and fosters high-quality human resource that corporations need. Thus, the investment expansion of educational expense is required. Corporate development brings the increase of exportation and importation, and this requires a role that is more aggressive than the banks of one's own country. Table 1 compares the changes by sector according to the developmental stage of the country in specific numerical values.

2. Payment and Settlement System

The general functions of currency are store of value, unit of account, and means of payment. Among these, the bank takes charge of means of payment. Payment and settlement refers to the act of clearing right and obligation of transferring the bond and stock occurring as the result of various economic activities, and the process of payment and settlement is included in most economic activities (Korea Institute of

Finance, 2005). As payment and settlement means the transfer of capital accompanying the general economic activities, like all goods or financial transactions, the payment and settlement between finance companies goes through the clearing process, which is the process of calculating money given and received in between the payment and settlement. Similarly, the system that institutionally completes the payment and settlement is called the payment and settlement system and in case of Korea, the payment and settlement system is comprised of clearing institution, settling institution and participating institution.

The payment and settlement system is a substructure of the banking system that enables the smooth payment and settlement occurring in financial transactions or economic activities of economic agents including the individual, corporations, and the government (Bank of Korea, 2009, 05). If the capital is like a blood of our body in terms of economic activity, the payment and settlement system is like a blood vessel that circulates the blood to every part of the body. As the vessels should be strong for the body to maintain its health, the payment and settlement system should be operated in a smooth manner for the stability and efficiency of economic activities. The payment and settlement system is a passage connected to the settlement of capital involved in all economic activities (Park Gu-yong, 2006). The payment and settlement system of Korea is classified into several kinds, depending on the characteristics of the capital as shown in Table 2.

1) Currency Multiplier Effect of Payment and Settlement System

The household sector, an axis of the economy, is related to the settlement system

for a small sum among the payment and settlement system. And because of the fact that it provides capital to corporations through savings, it is indirectly related to the settlement system for large sums, as well as the security settlement system. The payment and settlement of the household sector is mostly completed at one-off. Thus, the safety of the settlement is more important than the immediacy of the payment and settlement.

However, the significance of payment and settlement is slightly different for the corporate sector. Corporations require both safety and immediacy. They transact with diverse domestic and foreign parties, and the types of transaction require the payment and settlement of business trade transactions, of principal and interest of capital market transactions like loans and bonds, and of currency exchange and currency hedge transactions for overseas transactions. And such diverse transactions need to be settled simultaneously in real time. If the payment and settlement is slow, unstable and inefficient, corporations have to settle with their own capital in advance to guarantee the safe payment and settlement to the counter party of the transaction, and this shows the factor aggravating competitiveness because corporations need a lot of operating capital.

For instance, if the export company commonly receives the export payment in foreign currency, the company exchanges the received foreign currency into home currency at the bank. Then, the exchanged home country money is used to pay to the account purchasing the raw materials, or to the dealers, or it is used to repay the principal and interest of loans or issued bonds. Part of it is used to pay the salaries of the employees and to pay taxes to the government. Such flow of all capitals

Table 2. Payment and Settlement System of Korea

Settlement system		Clearing institution	Settlement institution	Participating institution
Settlement system for big sum(between financial institutions)		Bank of Korea	Bank of Korea	Bank, mutual savings bank, Security company, insurance company, investment trust company, etc.
Settlement system for small sum(between individuals)		Korea Financial Telecommunication and Clearing Institute	Bank of Korea	Bank, post office, mutual savings bank, credit cooperative, community credit cooperatives
Stock Settlement System	Securities and KOSDAQ	Security Futures Exchange	Bank of Korea, Korea Securities Depository	Bank, Security firm, insurance company, investment trust company, etc.
	Futures Exchange market		Bank of Korea, Security Futures Exchange	
	OTC market		Bank of Korea, Korea Securities Depository	
Continuous linked system(for currency settlement)		CLS bank	CLS Bank, (each settlement currency country, central bank)	Bank

Source: Bank of Korea, 2006

requires the payment and settlement system.

If the payment and settlement system is very efficient, Company A can settle the capital to Company B in real time and Company B can again settle the capital to Company C, D, E, F and G consecutively in real time. If the initial amount Company A settled is 10 million Kyat, as the 10 million Kyat had circulated 10 times, the capital amounting to 100 million Kyat had circulated entirely in the country. However, if it was settled only 3 times in a day due to the inefficiency of the payment and settlement system, the company additionally needs the operating capital amounting to 70 million Kyat when it is viewed from the entire country. In other words, if the payment and settlement system is efficient, the capital of

70 million Kyat was used in the investment activity of the company, creating added value to the country, but if it is inefficient, the 70 million Kyat was ineffectively used merely for the payment and settlement without any added value.

Thus, constructing an efficient payment and settlement system causes the effect of increasing the domestic investment capital by entire country and not merely for the immediacy and safety of payment and settlement. If Myanmar constructs an efficient real-time payment and settlement system like Korea, Myanmar is expected to have a positive effect expanding the domestic capital for the economic development.

2) Effect of Reducing Foreign Currency Borrowing

An efficient foreign currency payment and settlement system can reduce the demand of foreign capital borrowing of corporations. Commercial banks in Korea directly settle the demand of payment and settlement of foreign currency between corporations through the foreign currency payment and settlement system between banks in Korea (Table 3).

depository and foreign exchanges (spot exchange, forward exchange, future and derivative hedge transactions, among others) are connected with the payment and settlement system.

If a corporation develops, all these transactions will be continued repetitively. Thus, the construction of an efficient payment and settlement system will innovatively improve the efficiency of financial transactions from the national

Table 3. Foreign Currency Settlement System of Korea

Settlement System	Clearing Institution	Settlement Institution	Participating Institution
Foreign Currency Settlement System	Bank	Bank	Bank

This has a proper function to reduce the demand of foreign capital of corporations in the country by innovatively improving the circulation of foreign capital between corporations through settling not only in the home currency, but also in foreign currency in real time. Developing countries can expect the reduction effect of foreign capital financing of the corporation by constructing the foreign currency settlement system like Korea, thus it needs to be actively reviewed for introduction.

3) Enhancing Financial Efficiency by Mutually Connecting All Parties and Financial Products of Financial Transactions

The payment and settlement system centering on the bank as shown in Table 2 mutually links to all financial institutions within the country. Aside from payment and settlement between financial institutions like bank, security company, insurance company, investment trust company and savings bank, all parties of financial products from stock exchange in charge of transactions and settlement of bonds and stocks, securities

perspective that ultimately enables the efficient distribution of limited financial capital. It also provides a foundation to reinforce the competitiveness of a corporation.

The construction of payment and settlement system, in a passive sense, takes charge of the payment and settlement function between the parties. However, as examined above, in an active sense, the construction of an efficient payment and settlement system enhances the competitiveness of domestic corporations, enables diverse financial transactions, and creates an ecosystem organizationally connecting all participants of the economic activity. In other words, it is a very crucial matter preparing the foundation of domestic finance market.

3. Banking Infrastructure for international financial transaction

The demand of financial transactions of corporations depending on economic development is connected to the expansion

of transaction demand between foreign countries. It is because most economic activities of corporations are directly or indirectly related to the export and import activities with foreign countries. Thus, the payment and settlement system within the country needs to be constructed to enable the connection with the global settlement system.

The commercial bank can link the payment and settlement system with the bank in foreign country using the SWIFT standard system. Commonly, the security company cannot be the directly involved in the payment and settlement with foreign financial institutions. This is because the payment and settlement system between the countries is centralized on the bank, and also because the security company has lower credit rating than the bank. Thus, it is difficult to carry forward an independent financial transaction with foreign financial institution*. Therefore, even if all financial institutions can participate by constructing the payment and settlement system that includes all parties concerned in financial transactions within the country, transactions with foreign financial institutions should be centralized on the bank. If the credit rating of a commercial bank within the country is insufficient compared to the standard of international transactions, the bank that the government has invested in can execute the role of commercial bank**.

The foreign link of the payment and

settlement system of commercial banks should be constructed in consideration of the works of other financial institutions, namely security company, which may happen in the future. The capital transaction a security company takes charge of causes a lot of new business incidentals, unlike the receiving deposit and providing loan of a bank. For instance, the arrangement of issuance of security (bonds or stocks), the registration of issued stocks, and its storage, are involved in bond investors and stock-issuing corporations. Moreover, if the security is traded in the security transaction market before its maturity date, the security storage institution requires the procedure of transferring the name of the buyer of a new security. And, in the case of the stock that has been publicly issued, the role of delivering corporate information that is posted frequently to the investor is required for the protection of investor's right. All these procedures should be handled smoothly by constructing a system.

The bigger picture that includes all factors should be prepared in advance but not necessarily constructed at once. Considering the development stage of a market, essentials by priority should be prepared one at a time by stages.

IV. Development Direction of the Financial Market of Myanmar

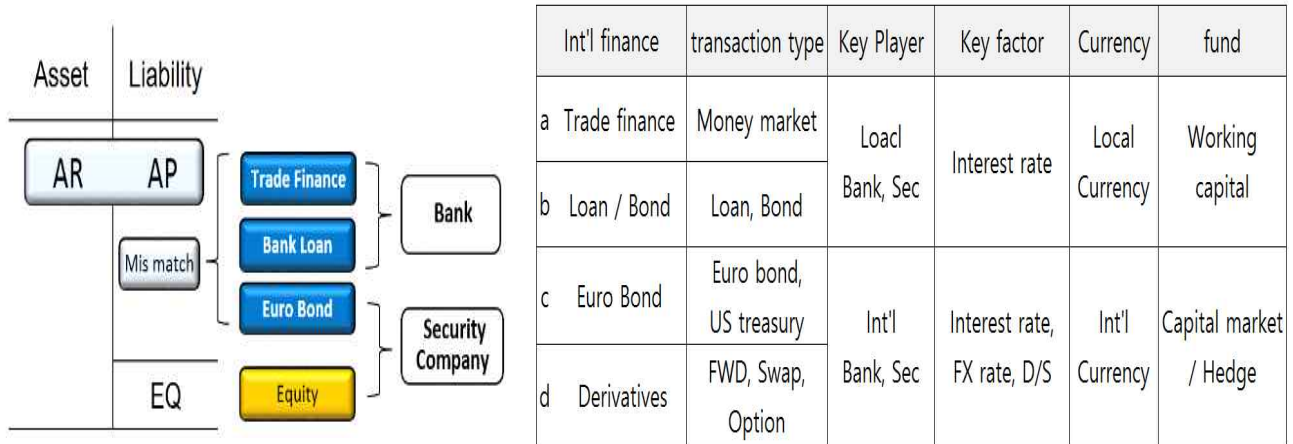
1. Connection of Real Economy and Finance

Table 4 briefly summarizes financial transactions of a company. All financial transactions are caused from the real economic activities of corporation. Corporations borrow the working capital from the financial institution and allocate it to the

* But, in the case of developed countries, if the financial market is well developed and if allowed by the related law, a global security company of considerable size can also take charge of the roles of payment and settlement similar to the bank.

** Prior to the development of commercial banks, the central bank or export-import bank funded by the government can deputize.

Table 4. Company economic activity and Financial Transaction



gap between the account payables and account receivables. In other words, the mismatched sectors left after netting the gap between the payables and receivables within the corporations are raised from outside.

Moreover, depending on the length of the mismatch period, a corporation get trade finance, loan from the bank and issue bond through security company. If the length is long, it also issue new equity capital. If the currency is matched and period is mismatched, the corporation can get a bank loan. If both currency and period are mismatched, it can get a bank loan and hedge the loan by derivative transactions at the same time. The bank can trade the foreign currency transaction position which occurred from the corporate transaction (including the transaction with security company and insurance companies) at the inter bank market. And in order to mutually trade the remaining and insufficient capitals by bank in the inter bank market, the efficient payment and settlement system mentioned above should be constructed first.

2. Construction of Banking Infrastructure

The financial institution of developing countries can take the lead in responding to

the demand of banking operations of individual and institutional investors, as well as the demand of procurement of domestic corporations that are already possessed. In other words, as summarized in Table 5, it handles the following: 1) payment and settlement of all types of transactions; 2) FX SPOT exchange transactions of domestic currency and foreign currency; 3) Hedge FWD transactions (or SWAP, Options); 4) primary and secondary market transactions of bond and equity; and 5) receiving deposit of domestic corporation and individual investors. If the payment and settlement system between the banks is operated, all transactions enumerated above can be practiced between domestic financial institutions. Thus, an opportunity for new financial transaction is provided to the domestic financial institutions.

Note) The transactions enumerated above are all interrelated and mutually influence and affect the market price of each transaction. Thus, the financial institution connecting both the individual (or institutional investors) who is the fund supplier and the corporation who is the fund demander should carry out the transactions enumerated above simultaneously in parallel.

Table 5. Illustration of Corporate Transactions

Classification	Transaction Type	Transacting Market	Key Player
1)	Fund transfer transaction	Clearing bank business	Corporation, bank, investor
2)	Spot exchange transaction	Foreign currency exchange	Corporation, bank, investor
3)	Hedge transactions (forward, swap etc)	Foreign currency derivative transaction (hedge purpose)	Corporation, bank, investor
4)	Funding activity transaction	Capital market transaction	Corporation, bank, investor security company
5)	Saving activity	Deposits market	Corporation, bank, investor

3. Utilization of Knowledge Sharing Program (KSP)

1) Background of the KSP

There will be many ways how to approach at establishing banking infrastructure for Myanmar. One of the recommendable ways is to utilize the Knowledge Sharing Program (KSP) of the Korean Government (Table 6).

In keeping with the global recognition of knowledge as a vehicle for effective development policy and also an effective tool to learn advanced systems for developing countries and emerging markets, Korea has actively advocated knowledge sharing in its development cooperation endeavors. Among many projects that have incorporated knowledge into ODA practice, the Knowledge Sharing Program (KSP), initiated by the Ministry of Strategy and Finance (MOSF), is recognized and appraised as Korea's representative knowledge sharing initiative all over the world. The economic miracle made out of the ashes of Korean War has aroused great interest in learning Korea's development experience, and against the backdrop the MOSF launched the Knowledge Sharing Program in 2004 which is gaining increasing global attention as a new paradigm of development cooperation.

In line with the core idea of the G20 Seoul Summit Multi Year Action Plan in Development and The Busan Partnership for Effective Development Co-operation, KSP pursues the vision of Knowledge-based development by sharing Korea's development experience with policy makers of partner countries. The 'sharing' principle aims for sustainable growth by creating base for high-ownership driven and self-reinforcing mid-and long-term economic growth. Through the KSP, the partner countries are provided with policy consultations tailored to the needs of the partner countries. KSP consultants, with years of experience and expertise on specific fields such as macro economy, financial market, infrastructure, an so on, work closely with policy makers and practitioners of the partner countries. This is carried out through a series of collaborative research, training, consultation and technical assistances held alternately in Korea and in partner countries.

KSP focuses on areas where Korea has successful experiences and strong expertise to be shared with partner countries. For example, there have been Socio-Economic Development Strategy, Economic Crisis Management, Financial Services, Human Resource Development, Export Promotion, Agriculture development, Knowledge-based Economy, E-Government & ICT development,

Table 6. Illustration of KSP Projects from 2004 to 2012

Areas	Number of Topics	%	Number of Countries
Total	462	100.0	39
(1) Innovating the Finance policy and Financial system	54	11.7	13
(2) Development Strategy for macro economy	64	13.9	21
(3) Industrial policy and fostering investment (including infrastructure)	62	13.4	22
(4) Science & IT foster and innovation	60	13.0	17
(5) Enhancing Trade and Export	53	11.5	13
(6) Fiscal Management and Operating public enterprises	46	10.0	17
(7) Sustainable development and territory development (Regional development, Energy development)	41	8.9	13
(8) Strategy to foster enterprise (SMEs)	23	5.0	12
(9) Innovating human capacity and education (Including labor and employment)	38	8.2	17
(10) Development for agriculture and fisheries	13	2.8	7
(11) Others (Law & Legislation, tourist industry)	8	1.7	6

Energy & Green Growth, Infrastructure development, and so on. KSP projects not limited to those aforementioned, it provides integrated policy research and consultation on a wide variety of socio-economic development areas of partner countries.

After the successful KSP consultations, it is possible to have a follow-up implementation works; that is, enacting laws or building infrastructures are possible through other ODA funds or private sectors. There have been concrete outcomes and achievements; establishment of the Vietnam Development Bank, Kuwait's 5 Year Economic Development Plan, establishment of SEZ in Uzbekistan, establishment of Saudi Arabia Development Institute (SDI) and Saudi Arabia's Educational Broadcasting System (EBS), establishment of the export-import

Bank of Dominican Republic, Deposit Insurance System of Mongolia, etc.

As Korea is the only country that has both a vivid experience of the initial stage of development of financial market and industry, which started from the ashes of the Korean War in 1950, and the current developed state that grew with global corporations such as Samsung. Korea is still growing with the developing countries. Therefore, Korea can strengthen the win-win cooperative relationship with Myanmar which will help both countries mutually. It is recommendable to apply the Knowledge Sharing Program (KPS) to help Myanmar to plan a tailored financial market based on the experience of Korea.

2) Future Policy Direction

As mentioned above, the Korean government provides follow-up support to implement policy recommendations with relevant measures including the Economic Growth Cooperation Fund (EDCF) and other ODA resources. The KSP provides package support including knowledge sharing, infrastructure, facility, equipment and technical cooperation, management too. As the Korean government is willing to work together for development of the world, it will be a good idea for Myanmar to find ways to work with Korea on ways to establish new financial system of Myanmar.

3) Economic cooperation with Myanmar

Korea and Myanmar has 40 years bond, friendship, and bilateral economic cooperation since diplomatic ties began in 1975. Both countries will be future key partners for mutual progress in the region, as shown through the following: first, the trade volume in expansion, and since the launch of new a government in 2011, it has reached \$800 million in 2012, and grows by 20 percent annually; second, the fourth largest investor, whose accumulative investment exceeds \$1 billion, with future investment volume expected to further increase; and third, similarity and a complementary nature, in which complementary industrial structures including agriculture, forestry, manufactures, ICT, among others, help make up for weaknesses.

There are challenging factors such as the following: no free lunch, education, control of excessive expectation levels of individuals, good governance (social development) and policy coherence. However, there are opportunities too: politically and geographically important hub (territory), many countries and IOs, including MDBs, have strong and keen interest, good size of young

population and plenty of natural resources, as well as a strong will to develop and progress.

As Myanmar is flooded with various ODAs, investments, businesses from many stakeholders, leadership with good judgment and efficient coordination will be the most important.

V. Conclusions

Real economy and financial sector are intimately correlated, and these cannot be separated. Considering the fact that the development of real economy is difficult to achieve without financial development through the construction of basic banking infrastructure, developing countries need the construction of basic banking infrastructure rather than the discussion over whether real economy leads the finance or vice versa. Constructing banking infrastructure needs to be recognized as an important matter that brings about the development of real economy and financial industry simultaneously by connecting the two.

In the case of developing countries, there should be efforts to allocate the financial resources to the strategic industry according to the long-term development plan of a state. And in order to efficiently distribute limited financial resources, the role of basic banking infrastructure is important. In this respect, the experience of Korea in both economic growth and overcoming the financial crisis within a short period of time would be a good example. We should also take note that at the background, the strengths of the financial sector and IT industries sector were properly fused.

We intended to propose the integrated development plan of real economy and

finance sector in more detail with bottom-up detail process and top-down strategic approach, but we could not and it leaves much to be desired.

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