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Toward an Intelligent Sea and Air Freight Logistics Information Services Platform: A Coordination Theory Perspective

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Abstract

International logistics were identified in 2009 by the Advisory Board for Finance and Economy Affairs, Office of the President, Taiwan, as one of the ten focus areas for future service industry development, as part of the action plans of the International Logistics Services Development Project (LSDP) launched in 2000. Under LSDP, the Intelligent Sea and Air Freight Logistics Information Services Planning Project aims to propose an intelligent logistics service platform for domestic and international logistics service providers to facilitate efficient logistic processes. This project intends to integrate cloud technology, GNSS, RFID, and wireless communication technologies, following and complying with the strategic initiatives of APEC, IATA, FIATA, IMO, and many other international organizations. The platform fosters a sequential dependency relationship among participating logistics service providers. Through the theoretical lens of the coordination theory, this paper investigates the impacts of the intelligent logistics service platform as a technology-enabled coordination. By deriving insights from relevant literature on coordination theory, this paper contributes to the body of knowledge related to coordination in the logistics industry. Future research directions are also proposed.

Keywords: Coordination theory, interdependence, sea and air freight, intelligent logistics information services platform

1. Introduction

Taiwan has long been highly dependent on foreign trade to support its economic development. On October 22, 2000, the Executive Yuan accepted the Action Plan of the International Logistic Services Development Project 2010-2013 (Executive Yuan, 2010). The Council for Economic Planning and Development also founded the Service Industry Promotion Office, Executive Yuan (Council for Economic Planning and Development, 2010). This office provides a platform for the communication and integration of inter-ministerial issues. It invites the Ministry of Economic Affairs, the Ministry of Finance, the Ministry of Transportation and Communications, and the Council of Labor Affairs to propose specific plans for improving the competitiveness of Taiwan's international logistic services. International logistics were further identified in the 16th Meeting of the Advisory Board for Finance and Economic Affairs, Office of the President, held on October 15, 2009, as one of the ten focus areas for service industry development, aiming to establish Taiwan as a leader in adding value

to logistics and integrating supply chain resources. After efforts are made to implement the proposals, the hope is that the result will be an overall enhancement of efficiency, attracting international businesses.

The Intelligent Sea and Air Freight Logistics Information Services Planning Project (Institute of Transportation, 2012) aims to propose an intelligent logistics service platform for domestic and international logistics service providers that will facilitate an improvement in the efficiency of logistic processes. This project intends to increase logistics safety and efficiency through the integration of cloud technology, Global Navigation Satellite Systems (GNSS), radio frequency identification (RFID), and wireless communication technologies. It will also comply with the strategic initiatives of the Asia-Pacific Economic Cooperation (APEC), the Air Transport Association (IATA), the International Federation of Freight Forwarders Associations (FIATA), the International Maritime Organization (IMO), and many other international organizations.

From Scott's (1981) system perspective, logistics operations can be seen as composed of many nodes that depend on each other. Due to practical concerns, when it comes to the logistics industry chain, scholars have always emphasized the ability to coordinate and communicate between the nodes as this dictates the smoothness and efficiency of the entire logistical operation. In general, the supply chain in the logistics industry involves integration, coordination, and cooperation issues that are related to planning and control, information access and dissemination, and physical delivery. Prior research has indicated the use of information technology as an important instrument within the supply chain that facilitates coordination mechanisms. For example, targeting US manufacturing facilities, Craighead and Laforge (2003) investigated the adoption of IT in supply chains and explored the issues and benefits reported by the adopting firms. Craighead et al. (2006) and Hill and Scudder (2002) examined the use of EDI in supply chains with respect to inter-firm coordination activities involving suppliers and customers. Through an analysis of the structural relationships and the methods in which information systems are utilized for supply chain integration and supply chain management performance, Kim and Narasimhan (2002) argued that there might be a recommended sequence when using information systems for supply chain integration. Subramani's (2004) study supported Bakos and Brynjyolfsson's (1993) vendors-to-partners thesis, which stated that IT deployments in supply chains lead to closer buyer-supplier relationships.

While prior studies have identified the role of IT in supply chain coordination, little attention has been paid to how it can be applied to common information platforms in the logistic services industry. This research thus draws on the coordination theory perspective to investigate the planning of an intelligent sea and air freight logistics information services platform by investigating the fit between interdependence and coordination strategies.

2. Literature Review

2.1 Coordination Theory

2.1.1 Interdependence

Thompson (1967) proposed the concept of interdependence and suggested that it takes three forms, namely pooled, sequential, and reciprocal. Pooled interdependence is the weakest form of the three because it represents a situation where each node has its own unique function which are gathered together to support the entire operation. Under this condition, all nodes are loosely coupled (Astley and Zajac, 1991). Since the nodes do not have any direct relationships, what pooled interdependence implies is actually closer to independence (van de Ven and Delbecq, 1976). In fact, Malone and Crowston (1994) defined pooled interdependence as a form where nodes share or produce common resources

during activities but are otherwise independent from each other. Even though the concept of interdependence was first applied to intraorganizational contexts, it has been extended into contexts that go beyond organization borders (Gulati and Singh, 1998).

The second form of interdependence is sequential interdependence, in which nodes are sequentially related, and where the output of a node will become the input of the next node (Thompson, 1967). The difference between sequential and pooled interdependence is that nodes in the former situation also share an ordered relationship other than having direct dependency. Malone and Crowston (1994) also proposed a similar idea and explored how node activities take place by defining sequential interdependence as a relationship, where the activity of a node can only be initiated after the completion of another node's activity.

Under sequential interdependence, time is a necessary factor when defining the relationship between nodes (Malone and Crowston, 1994; Thompson, 1967) as it reflects the order of triggering node activities. Also, when nodes share a sequential interdependence, not only do previous nodes affect whether a node's activity is set off or not, but the activity of the node itself will also decide whether the activities of later nodes will take place or not. The common buyer and seller relationship falls under this category (Borys and Jemison, 1989).

The third form, as proposed by Thompson (1967), is called reciprocal interdependence. Under this form, the output and input of each node are still related but reciprocal interdependence differs from sequential interdependence in that, here, the interdependence between the input and output is bidirectional (Malone and Crowston, 1994). Additionally, the characteristic of this form of interdependence is that there is constantly an input-output-input type of exchange between the nodes (Lemak and Reed, 2000). As a result, under this form of interdependence, network nodes share interdependence in their decisions and activities. Generally speaking, reciprocal interdependence may emerge in a product network of a strategic alliance (Gulati and Singh, 1998), among nodes that have common culture, identification or standard (Dyer and Nobeoka, 2000), or in a service network such as carriers (Thompson, 1967).

2.1.2 Coordination Strategy

Malone and Crowston (1994) defined coordination strategy as "managing the interdependence among activities." A coordination strategy forms the connection between nodes in a way that can facilitate better communication. It also helps in gathering knowledge and develops the necessary language standards across nodes through the interaction between them (Daft and Weick, 1984; Galbraith, 1993). Consequently, under the three different forms of interdependence described earlier, one can expect the formation of a corresponding coordination strategy. Thompson (1967), based upon the work of March and Simon (1958), thus proposed three types of coordination strategy, namely coordination by standardization, by plan, and by mutual adjustment.

For pooled interdependence, there is coordination by standardization, which establishes the procedure or rule for node activities so as to ensure the consistency between the functioning of a node and the other nodes in a system or organization. A coordination strategy based on standardization allows each node to meet the needs and expectations of the entire system or organization by following a standardized operating procedure. In other words, under coordination by standardization, each node can minimize the need for communication between nodes by acting in accordance with a clear and consistent standard, maintaining their high independence and low interdependence (Thompson, 1967). Through coordination by standardization, nodes with pooled interdependence have a low need for knowledge sharing, and this

characteristic may even put knowledge sharing at a disadvantage (Rivkin, 2000). The progress (or response) of all node activities takes on the same mode under the established rules, which makes knowledge sharing and communication between nodes a lower priority.

The second type of coordination strategy is coordination by plan (Thompson, 1967). This kind of coordination strategy formulates a detailed schedule to manage each node's activity under sequential interdependence. Compared with coordination by standardization designed for pooled interdependence, coordination by plan is lower on routinization but allows greater flexibility to adapt to changes in the external environment (March and Simon, 1958). Under coordination by plan, there is usually a coordinator/manager/planning agent who is in charge of product or information circulation between nodes so as to ensure operational efficiency and the ability to respond to external changes. With the existence of a coordinator, each node, other than functioning independently, can also understand the factors involved before and after its activity. In fact, the introduction of coordination by plan also implies the formation of a shared goal among the nodes (Galbraith, 1977).

Because of the importance of time and order in sequential interdependence, coordination by plan has a stronger need for knowledge sharing and communication than coordination by standardization. Each node must share its basic knowledge of operating processes and negotiate a coordination plan. Under this condition, judgments and interventions by the management or executive level are usually considered necessary (Beamon, 1998). For example, the logistics industry is a typical system of coordination by plan. To arrange delivery, there is usually a need to have a planner (or system) that can schedule and plan, map out the routes, arrange modes of transportation, and manage the contracts in order to carry out the sequential procedures between consignors and consignees (Wada and Nickerson, 1998). Therefore, the idea of standardization is still part of coordination by plan. However, there is a need to define a clear and explicit schedule in advance and establish an agreement on the rule for the input and output activities between nodes. The common information platform that follows the industry standard is a typical example.

Coordination by mutual adjustment also takes into account the communication of information in node activities. It is usually used under high variability or uncertainty, such as reciprocal interdependence, because this kind of coordination strategy is necessary for nodes to share information regarding each other's activities through an interactive reciprocal mechanism (Thompson, 1967). The difference between coordination by mutual adjustment and coordination by plan is that the former emphasizes joint decision making while the latter focuses on the coordinator playing the role of a central planner. Because coordination by mutual adjustment involves complicated activities, reactions, communication, and knowledge sharing, nodes must make a decision on and evaluate the activities of the previous node, their responses to the activity of the previous node, as well as the potential consequence of these responses. The increasing need for knowledge sharing and communication for reciprocal communication among nodes has thus elevated this need to the basis for decision-making. The coordination for these activities and reactions is neither through discrete exchanges, as in coordination by standardization, nor by administrative control, as in coordination by plan, but through networks of individuals engaged in reciprocal, preferential, and mutually supportive actions (Powell, 1990).

3. Planning for the Intelligent Sea and Air Freight Logistics Information Services Platform

The core idea of the coordination theory is that the form of interdependence among nodes will decide the coordination

mechanism. Each of the three forms of interdependence among nodes corresponds to one of the three coordination strategies of standardization, plan, or mutual adjustment. Using coordination theory to plan an intelligent logistics information services platform that is suitable for Taiwan's sea and air freight logistics, one must first clarify the interdependence among the participating roles.

Generally speaking, the participating roles in the logistics industry consist of customs, customs broker, carrier, local trucking, forwarder, shipping agency, container yard and terminal warehouse, and warehouse or distribution center (Institute for Information Industry, 1999).

Activities concerned with the logistics value chain include cargo pick-up → customs declaration → forwarding → warehousing → customs clearance → sea/air transportation → warehousing → customs declaration → ground transportation → customs clearance → logistics VMI (Vendor Managed Inventory) → cargo delivery (Farn, 2003). One should note, however, that differences lie between the import and export processes and that some activities have to be repeated because they happen in a different place. In the import process, logistic companies need to first collect the goods from the foreign seller and apply for customs declaration, then send the goods to customs for declaration. This process may involve temporary storage at a small warehouse, distribution center, or terminal for large containers. It then proceeds with customs clearance after the air or sea carriers arrive. Finally, the freight is transported by air or sea to the customs area of the importing country. Once the freight enters the importing country, it will be stored temporarily at a customs office whilst waiting for the buyer to complete the customs declaration procedure. After that is done, the logistics company entrusted by the seller will continue with cargo pick-up, customs clearance, and the diversion of goods. The cargo will be temporarily stored at a distribution center or a small warehouse awaiting direct delivery, or after being slightly processed by a third party logistics VMI, to the storage of different buyers. If one starts from the view of exportation, then the activity flow is exactly the opposite of that described above.

Although the operation of the actual logistics is far more complicated than the description above, the processes mentioned can virtually reflect most of the functions involved in the logistics operation. In Taiwan, there is no large integrated logistics company. Each logistics company only takes part in a certain segment of the entire process. Even though companies, such as HCT Logistics, T.V.L. Group, and T.H.I. Group, have attempted to provide a comprehensive service through the instigation of a logistics alliance, they still need the strategic cooperation from their business partners in order to attain a one-stop shopping logistics service.

Because of such characteristics, there is a sequential relationship in the operating procedure and information transmission between logistic nodes when taking into account the interactions among logistics companies. While a cooperative relationship may exist between nodes, the execution of later node activities still depends on the completion of the previous node's activity, along with the transmission and exchange of relevant information that is used to initiate later activities.

If one thinks of each logistic node as a task in the logistics industry chain, then the subject of this research, namely the planning of an intelligent sea and air freight logistics information services platform, can be seen as a shared resource of interdependent tasks (see Crowston, 1994). In other words, the platform is a resource shared by the multiple interdependent tasks (logistic activities) so as to carry out their collective goal, i.e., a comprehensive logistics service. Two particular characteristics must be considered at the planning phase: shareability and reusability.

Shareability refers to whether multiple tasks can use the resource simultaneously.

According to Crowston (1994), most production resources, such as raw materials needed for production, are not shareable due to the fact that they go through a transformation process during the production process. In contrast, since "information" can be transmitted and shared between different tasks, it is a shareable resource. Reusability denotes whether multiple tasks can use the resource time and again (von Martial, 1989). Raw materials used for production are not reusable in this sense but, because the information can be accessed repeatedly, reusability is shown.

Crowston (1994) also highlighted the fact that one can decide the order of access by setting priorities in order to avoid possible conflicts due to concurrent access to the resource. Regarding the information sharing issue investigated in the current study, one can resolve this issue by defining the roles in the industry value chain and constructing a common information services platform. To effectively integrate the roles of domestic customs affairs, value-added collaboration between the logistics companies, freight tracking at each node, and the utilization of intelligent technology, the planning of an intelligent sea and air freight logistics information services platform must satisfy the following needs in order to optimize the coordination efficiency and outcome among logistics nodes:

- *Strengthen the integration of B2B processes between suppliers and buyers in the logistics value chain:* The CMT Single Window that our customs currently work on focuses on operational integration, covering G2G (Government to Government) between government subunits, B2G (Business to Government) between business companies and customs units, and N2N (National to National) between countries, suggesting the need for B2B service integration between business companies. If the B2B processes between suppliers and buyers in the logistics value chain can be integrated, other than the benefit of minimizing repetitive data entry and increasing data accuracy, it can also attain the efficiency created by collaborative operations. For example, when a forwarder changes the information on a ship schedule, the platform should be able to notify the customs broker in time. If the customs declaration procedure is yet to be completed, the platform should automatically update any information regarding ship name, voyage number, and master and house B/L numbers. If the customs declaration has already been done, then the platform must make corrections and go through the declaration process again.
- *Be in line with current international standards:* Other than the B2B process integration among domestic companies, the platform must also be compatible with international standards. The benefit of complying with international standards not only includes an incentive for domestic companies to participate in the operation of international logistics, but also improves the global freight management and service of Taiwanese companies by reaching the critical mass.
- *Promote the integration between logistics services and the supply chain:* The current standard for operating efficiency, whether it be Just-in-Time or Delivery-on-Line, requires tight integration between logistics information and client-end supply chain management so as to stay on top of the status of each invoice (for instance, whether the status of the goods is at the production line, in transit, or in the warehouse). This integration brings the benefit of combining logistics companies with client-end supply chain systems as well as strengthening the irreplaceability of the logistics companies by increasing the efficiency of the client-end supply chain management.
- *Boost the application of intelligent and mobile technologies:* In order to improve the efficiency of the logistics management and operations, the plat-

form should effectively utilize physical devices, such as smart phones, electronic tags, and mobile readers, by linking them with the Internet and cloud services. This enables one to have access to logistics information services at any location.

- *Provide comprehensive information on freight status:* Due to the strong demand from clients, freight status information has become the most crucial issue in the entire service process for many logistics companies. Therefore, the platform should be able to serve the consignors' and logistics companies' need to provide real-time tracking for freight status information. Before the introduction of the platform, many companies could only provide the freight status of the physical logistics. If companies can have effective control over logistic information regarding the sea and air freight status, visibility throughout the service process can be significantly enhanced, helping the companies to move from providing port-to-port freight status to supporting door-to-door freight status inquiries.
- *Improve the interconnection between current applications and offer value-added services:* The operation of an intelligent sea and air freight logistics information services platform should also combine current information systems or applications between governments and companies through the interconnection capabilities of the intelligent platform. For example, the value-added service of providing all the forms required during the process can overcome the shortcoming of present information services operations where most services carry out customization themselves based on their individual needs, which suggests the lack of an integrated system among participating parties.

4. Intelligent Sea and Air Freight Logistics Information Services

4.1 Data Collection

To assist with the planning of the Intelligent Logistics Information Services Platform, in-depth interviews were conducted between May and December, 2011. The interviews focused on issues of the current bottleneck, information requirements, policy suggestions, and platform operations. The interviewees covered the major roles in the logistics industry. The companies interviewed are shown below:

- Importers/exporters: ASUSTeK Computer Inc. and Advantech Co., Ltd.
- Forwarders/customs brokers: Speedmark Transportation Inc. and Leader Mutual Freight System Inc.
- Container yards: Farglory Free Trade Zone
- Carriers/shipping agencies: Evergreen Marine Corp. (Taiwan) Ltd. and Realco Shipping Agency Ltd.
- Government agencies: Port of Keelung and Department of Navigation and Aviation, Ministry of Transportation and Communications

4.2 Proposals for the Framework of the Intelligent Logistics Information Services Platform

Key points in the planning of the framework and functions of the common information services platform include user characteristics, user needs, source of raw data, standards, and operating procedures. One should consider the environment of international business, the integration with backend supply chain management, and a coordinated service that eliminates horizontal competition. The area surrounded by the dotted line in Figure 1 of the intelligent logistics information services platform indicates the planned functions.

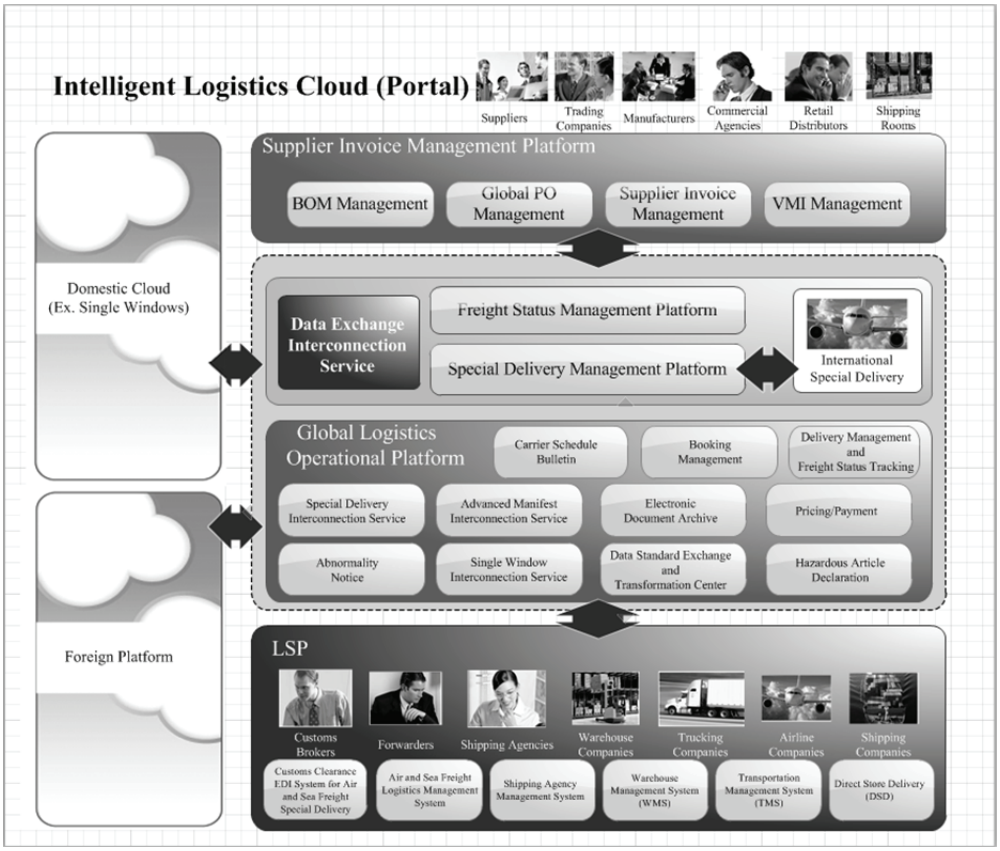

Figure 1: Framework of the Intelligent Logistics Information Services Platform

- *Carrier Schedule*: This service allows inquiries regarding recent carrier schedules so that one can confirm the flight number, ship name, and voyage number in advance.
- *Booking Management*: Based on the inquired carrier information, importers and exporters can enter the expected delivery information for forwarders or shipping companies to have access to. The booking information entered by the importers, exporters, or the forwarders can also be sent to the shipping or airline companies and used as information for advanced shipping notices. It can also be imported into internal ERP systems to prepare for bills of lading (B/L).
- *Delivery Management and Freight Status Tracking*: This module allows one to access and track the freight status online after booking. Freight status can be obtained through B2B and Web input, as well as GPRS and RFID.
- *Special Delivery Interconnection Service*: For speed deliveries, one can directly exchange information regarding taxation, B/L, invoice, and freight status with the four major international special delivery companies.
- *Advance Manifest Interconnection Service*: This function serves to convert the delivery data into manifest information for the carriers, and for them to use as foreign advanced manifests.
- *Electronic Document Archive*: This function responds to online inquiries regarding customs clearance documents, such as accompanying/customs declaration documents, taxation forms, B/L, booking notes, and warehouse receipts.

- *Pricing/Payment*: Logistics companies can enter pricing and payment information here. The system will automatically examine whether there is a match between payment and pricing, whether the freight is delivered, and whether there was a duplicated payment.
- *Abnormality Notice*: The platform will define an estimated time of arrival to the next logistics node according to the freight status of previous nodes. If there is a delay, it will send out an abnormality notice, both online and through text messaging, so that people out of the office or at a meeting can also be kept up-to-date.
- *Single Window Interconnection Service*: The official version of single window interconnection available offers a transformation mechanism that allows customs brokers to engage in customs clearance as well as obtain information concerning advance manifests of future imports.
- *Data Standard Exchange and Transformation Center*: It is expected that, through the platform importer and exporter, freight information can be transferred directly to customs brokers and be used for customs clearance documentation. The platform also delivers the ability to supply information exchange with foreign customs and carriers.
- *Hazardous Article Declaration*: Once the companies input the delivery information, they or their forwarders can then declare hazardous articles in the shipment. Such declaration information can be given to trucking companies who need to take note of hazardous articles. The information can also be transferred to MTNet for hazardous article declaration.

Under this planning model, the intelligent logistics information services platform also comes with a cloud portal and backend management module, as indicated in the following figure. Other than offering flexibility and malleability to the management and operation of backend infrastructure, through IaaS companies, a cloud framework also allows interconnection with other single windows once they are made available to other countries or other government units.

5. Conclusion and Suggestion

The planning of an intelligent air and sea freight logistics information services platform is a continual effort in the development of international logistics, one of the ten focus service industries identified by the Taiwanese government. In response to the rapid development of the domestic and foreign logistics industry, the goal of the intelligent logistics platform is to assist domestic logistics operations to connect with international businesses. More specifically, the current trends in global logistics operations have made logistics security and efficiency key factors in determining the competitiveness of Taiwanese logistics operations. Also, the ability to comply with international standards and regulations has also being aggressively promoted internationally in recent years.

From the perspective of information flow, the nature of the nodes in the logistics industry chain suggests that information must flow sequentially between the nodes in order to efficiently complete the entire logistics operation. As suggested by the coordination theory, coordination by plan can integrate standardization (international logistics standards and regulations) and the input and output principles between nodes (standard information operation platform), which would benefit the process of logistics operations, as well as Taiwanese companies, and enable them to become part of the international logistics system. Guided by this understanding, this research has proposed a plan for an intelligent sea and air freight logistics information services platform based on the coordination theory. Both the planning framework and application were discussed in the hope of taking the Taiwanese logistics industry a step fur-

ther, beyond the achievements of the Customs Clearance System of the Ministry of Finance, the MTNet of the Ministry of Transportation and Communications, and the FTNet of the Ministry of Economic Affairs.

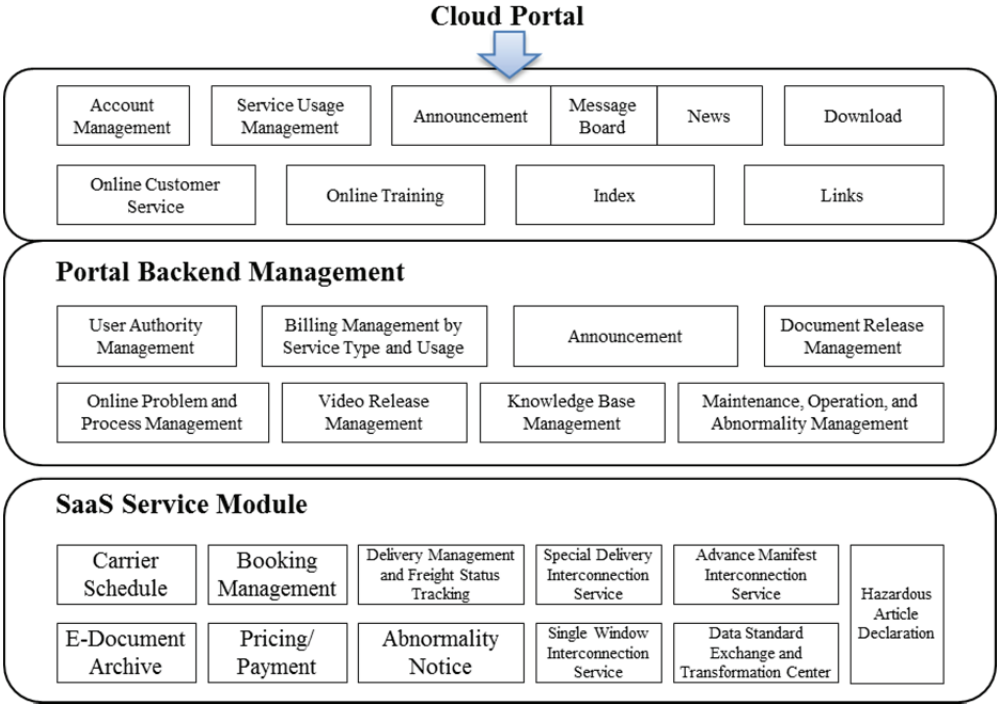

Figure 2: Service Module of the Intelligent Logistics Information Services Platform

This platform plan offers several issues for further research. First of all, at the industry level, there is the possibility of exploring the influence of international logistics development trends on local logistics industries and companies. Secondly, other than looking at the industry level, the organization level also suggests potential research issues. Examples of the research issues include factors that influence the adoption and continuance of the platform, the transformation of logistics companies' business models, from the viewpoint of cost or competition, and case studies on the internalization of logistics companies (e.g., strategic alliances).

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The Intellectual Property Rights of the Insurance Industry

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Abstract

E-commerce has developed rapidly in recent years. It has changed the way that businesses compete, created new rules for business and a new type of economics. Therefore, technologies are no longer a tool considered after the formation of business strategies, but a powerful motivation and main reason for formulating new business strategies. "Business Methods" are the key weapon in this campaign. The purpose of this paper is to explore the intellectual property of the insurance industry. This paper has focused its discussion on subclass 4 of USPC 705. Moreover, it also discusses the possible impacts and strategies that companies should take after the implementation of intellectual property rights (IPR). In conclusion, several suggestions are made to companies in response to this industrial restructure due to the implementation of IPR.

Keywords: Business method, insurance, intellectual property rights

1. Introduction

Incited by the innovation of internet technology, e-commerce has developed rapidly in recent years. It has not only changed the way that businesses compete, but has also created new rules for business and a new type of economics (Kalakota and Robinson, 2002; Kshetri, 2007; Odagiri et al., 2010; Yaghoubi and Tajmohammadi, 2011). The adoption and application of e-commerce in the insurance business is an important issue for the development of the insurance industry (Yaghoubi and Tajmohammadi, 2011). To enhance the efficiency and lower the overall costs of an insurance company, many insurance companies have established new business models to incorporate e-commerce technologies, such as B2B and B2C (Taylor et al., 2002; Durvasula et al., 2004; Yaghoubi and Tajmohammadi, 2011). Hence, technologies are no longer tools to be considered after the formation of business strategies, but a powerful motivation and the main reason for formulating new business strategies (Grossman et al., 2004). "Business Methods" just happen to be the key weapon in this campaign (Jackson, 2003).

A financial product is a type of service in nature. Therefore, in the past, a financial service was not protected by intellectual property rights (IPR) due to its characteristics (Odagiri et al., 2010). In addition, the insurance industry has traditionally been included as part of the finance sector and positioned as a service provider. However, protection of the intellectual property of insurance companies was an issue (Hall et al., 2009). Theoretically, the services and products of an insurance company should be included in the "Trade Secrets Act," which is part of IPR. This law prohibits the companies' trade secrets being illegally copied or delivered to others by either their employees or customers. However, this is not the case in reality. Since an insurance company has been defined as a service provider, how can clients and agents be prevented from knowing the contents of a

company's products, such as an insurance policy, the rationale of the product design, and so on. There is no secret that can be kept. In short, it is fair to say that an insurance company has no exclusive rights to protect the IPR of their products; even the name and content of the products are legally authorized from relative governing authorities. In fact, the business world, including the insurance business, is no different. New product development requires protection to ensure that product development efforts, such as the investment of manpower and capital, go as far and as long as possible to maximizing the return on investment. Why is it not the case for the insurance industry?

A "Business Method" is typically a new service method or new service system often developed by the Internet or other electronic technologies according to its description. Due to the "business methods exception" made by the United States Patent and Trademark Office (USPTO), process patents had, historically, met with difficulty in attaining the status of patentable subject matter. Therefore, all patented business methods were mostly computer software or other Internet-related technologies (Hunt, 2008; Lerner, 2006). Nevertheless, insurance companies were adopting new technologies in their application of marketing, calculation methods, or risk selection methods. Companies were also actively integrating new technology into new product designs or updates of existing products. Although the prime goal of a business method is to maximize the companies' profit when operating a new method, insurance products and methods were designed to improve service and operational quality and these innovations failed to be patented (Hall and Manfred, 2007; Wagner, 2008; Hall et al., 2009).

In fact, from the aspect of "Statutory Subject Matter," insurance business methods should not have been excluded from the protection of patent laws. However, this issue has long been argued in the fields of law, academia, and business. Rules or methods related to intellectual activities of insurance have conventionally failed to be patented. However, the U.S. Court of Appeals for the Federal Circuit (CAFC) changed this convention by sentencing the patentability of business methods in two cases. One was the case of State Street Bank & Trust Co. v. Signature Financial Group, 149 F.3d 1368 (Fed. Cir. Jul. 23, 1998). In this case, the court announced that, whatever the product, if they are useful, concrete and tangible, they are able to be patented. The CAFC also held that business methods are no longer an exception to statutory subject matter. Instead, business methods are subject to the same legal requirements for patentability as applied to any other process or method. Second was the case of AT&T Corp. v. Excel Communications Inc., 172 F.3d 1352 (Fed. Cir. 1999), in which the CAFC reassured the patentability of subjects that produce practical usage. The importance of these two cases is that business methods were now considered as patentable subject matter, and everyone could be an inventor. Practically anyone can come up with a process or improve an idea that in some way facilitates the methods of business. From then, innovative business methods become patentable, and, therefore, insurance business methods were protected by intellectual property rights (Bakos and Nowotarski, 2003).

Nowadays, patented insurance products are mostly related to so-called business methods, in which the competition has been intensive (Chang et al., 2009). Traditionally, IPR did not protect the products and innovative service design of the insurance industry and the competition between insurance companies was mainly focused on the speed of copying and emulation. However, the inclusion of the insurance industry into IPR has restructured the insurance industry's ecology. IPR for insurance will become a key issue for insurance companies in the near future. Therefore, in this paper, the following issues are discussed: what is the impact on insurance

companies? How can companies manage and integrate company strategies and business methods with the addition of IPR concepts at the same time?

This paper is a brief introduction to intellectual property for insurance, from the perspective of how patents may be applied to insurance products. This paper mainly focuses its discussion on U.S. patent classification 705 (USPC705) and its subclass 4, and explores the discussion on the developing technological trajectories of insurance business methods. The authors try to provide some business strategies that may help companies integrate business methods, IPR and management. The structure of this paper is organized as follows: First, there is an introduction to the patent law for business methods. Second is a literature review of intellectual property rights and insurance business methods. The third section is a discussion on the patent of insurance business methods. The fourth section is an analysis of insurance business method patents. Finally there is a conclusion and discussion.

2. Intellectual Property Rights for Insurance

Financial and insurance products were firstly excluded from IPR due to limitations in the economical and legal environment and capital circulation. This was because innovative products of an insurance company, such as new product ideas or better business processes, were freely shared among firms. Creating a concept for product development in the insurance industry was very simple; a firm sold its newly designed product in the market and other insurance companies quickly emulated that new product. Legitimacy was not a consideration at that time since the IPR had no protection. Thus, the innovative product often became a general product, which was freely copied by different companies in the market within a short period of time. However, this is no longer the case. A dramatic change came in 1998. The US CAFC announced the patentability of insurance business methods in the case of the State Street Bank. Hence, IPR now formally protects the business methods of the insurance industry. The result of this case was not only significant to the insurance industry, but also changed the competition pattern and ecology of the insurance industry (Bakos and Nowotarski, 2003).

2.1 Insurance Business Method

A business method may be defined as "a method of operating any aspect of an economic enterprise" (Advisory Council on Intellectual Property, 2003, p6). In 1997, the USPTO created the patent classification class 705 (USPC705), entitled "Data Processing: Financial, Business Practice, Management or Cost/Price Determination" in response to the trends in e-commerce. It is a business method patent class. Business method patents are a class of patents which disclose and claim new methods of doing business. This includes new types of e-commerce, insurance, banking, tax compliance, etc.

Later, in 2000, the USPTO published a White Paper entitled "Automated Financial or Management Data Processing Methods - Business Methods" (USPTO, 1999). According to the white paper, the focus of Class 705 is on "Finance" or "Management." Therefore, whatever the methods are that deal with financial or managerial issues, they all belong to Class 705. Additionally, Subclass 4 of USPC 705 was specifically created for insurance (e.g., computer implemented systems or methods of writing insurance policy, processing insurance claims, etc.). Subclass 4 clearly defines that insurance business methods can include the process of issuing insurance policies and claims, marketing methods, packaging methods, insurance product designs, and even insurance products that are designed for specialist needs. Hence, insurance business methods have become important assets for both independent inventors and major insurance companies.

The definition of subclass 4 of USPC 705 as "insurance business methods" highlights all the characteristics of insurance

products or business processes that can help lower costs or risks. Unfortunately, many insurance companies are currently not aware of the new changes instigated by the emergence of patent law. Some companies are even still coping with their competitors' product designs as they traditionally did before. However, it is important to note that most successful patents do not spring from entirely new ideas (Stuart and Podolny, 1996; Ruttan, 1997; Redding, 2002; Rycroft and Kash, 2002); they can be the improvement of existing ideas. However, as soon as one of the competitors obtains a patent from the improvement of an existing insurance product, which can be the existing sales product of other companies, how can the other companies survive in this game? Will they need to stop selling that product?

"Lincoln National Life Insurance Co. v. Transamerica Life Insurance Co. (Fed. Cir. 2010)" is a good example. Lincoln pursued Transamerica and others for infringement of its patents covering their method of administering a variable annuity plan with a guaranteed minimum payment[1]. A jury found the claims valid and infringed and awarded $13 million in damages. Therefore, if insurance companies are still not aware of this serious issue, they may pay for it in the near future due to the loss of competition in the market.

2.2 Patent of Insurance Business Methods

Subclass 4 of USPC705 also describes "computer implemented systems or methods." Most newly patented business methods for insurance are related to computer systems or Internet technology, which involves various types of data processing procedures and the application of information systems. In other words, insurance business methods basically transform conventional financial activities into the virtual Internet world, and create new Internet economics.

Patenting in this area has increased significantly in the last two decades (Hall et al., 2009). Innovations, such as new marketing technologies, the promotion of new skills, and improvements in risk-selection methods are all able to apply IPR for protection in the insurance industry. As Table 1 shows, before 1998, the U.S. had only granted 47 patents regarding insurance. During that time, the "inventions" of insurance companies, such as new product designs and new business methods when calculating insurance payments, were treated as "public property" and could be shared for free. Patents protect the ideas themselves, not just their expression. Now, there are more than 1300 licensed patents for insurance business methods.

2.3 Implication

The implication of this change is twofold. First, insurance companies have started to integrate their unique business methods into their customer services, product designs or marketing techniques at the same time. Second, any innovation in insurance is no longer public property. Although the numbers of patented insurance business methods are still small in the USPTO, companies, especially those that generate profits mainly from the sale of insurance products, should specifically pay attention to this change. More and more companies are hoping to produce products with innovative new methods, and will register these products into IPR systems in order to protect their innovations from emulation. Therefore, companies will start to form their own teams for product development and design and leave less space to allow competitors to copy their work. In practice, insurance companies have begun to pay attention to the value of IPR. For example, in the past, insurance companies

[1] **US Patent No: 7089201**
Title: Method and apparatus for providing retirement income benefits
Abstract: Computerized methods for administering variable annuity plans are disclosed. In certain embodiments, minimum payment features and mechanisms for adjusting current payments in response to cumulative payment totals are provided. Other embodiments provide withdrawal features under which certain guarantees are provided if withdrawals do not exceed predetermined withdrawal rates.

usually applied a trade mark to protect the value, reputation and prestige of the company and its products' "brand names." Unlike the electrical industry or other scientific industries, the insurance industry did not value the merit brought by their innovations. However, in the near future, if an insurance company aims to succeed and generate profits, it must know how to utilize the value created by innovation and the protection of IPR. In summary, licensing patents for insurance business methods can offer a legal and effective protection to financial and insurance products and services, and these can also safeguard the considerable amount of capital that insurance companies invest in product development and innovation. This protection will encourage companies to invest in innovation and may restructure the market based on a firm's institutional mechanisms, which is the company's capability to develop and innovate. Next, this study will present an analysis of the insurance business method patent and possible implications for management.

Table 1: Patents of Insurance Business Methods

Year	Application	Issue	Year	Application	Issue	Year	Application	Issue
1982	1	0	1993	8	8	2003	91	21
1984	1	0	1994	14	3	2004	71	25
1985	2	1	1995	18	3	2005	68	31
1986	3	0	1996	24	7	2006	99	46
1987	5	1	1997	38	9	2007	139	45
1988	1	4	1998	35	21	2008	125	90
1989	4	4	1999	43	36	2009	55	80
1990	5	3	2000	96	31	2010	81	276
1991	4	3	2001	118	19	2011	40	275
1992	3	1	2002	108	15	2012	3	245
Total								1303

Data source: http://www.USPTO.com

3. Analysis

Patents were searched from the USPTO by the patent analysis tool called "PatentGuider." The retrieval keyword was the current US Classification 705/4 for the period from 1980/1/1 to 2012/8/30. 1303 patents were extracted in total from the USPTO as per the analysis basis. Below is the data analysis exploration and content analysis.

3.1 The Trend of Insurance Business Method Patents

Insurance business method patents mostly apply to computer information systems or internet-related technologies. The technological life cycle (TLC) can be analyzed and described with statistical changes in the patent data, such as the number of patents licensed or under process.

Currently, there are few patented insurance business methods registered by the USPTO and only about 1300 patents have been issued. It can, therefore, be said that the technology of insurance business methods is now positioned at the introduction stage of TLC. However, it can also be seen that numbers of applying cases and applicants have tended to increase. In Figure 1, the red line represents the issued patents and the blue line represents the applications for a patent. Table 2 lists the top 10 assignees. 644 firms in the United States have, in total, obtained 1180 patents. This result met the expectations of this study. Because the classification of business methods was created by the USPTO, firms in the US would be more aware of this new trend than firms in other countries.

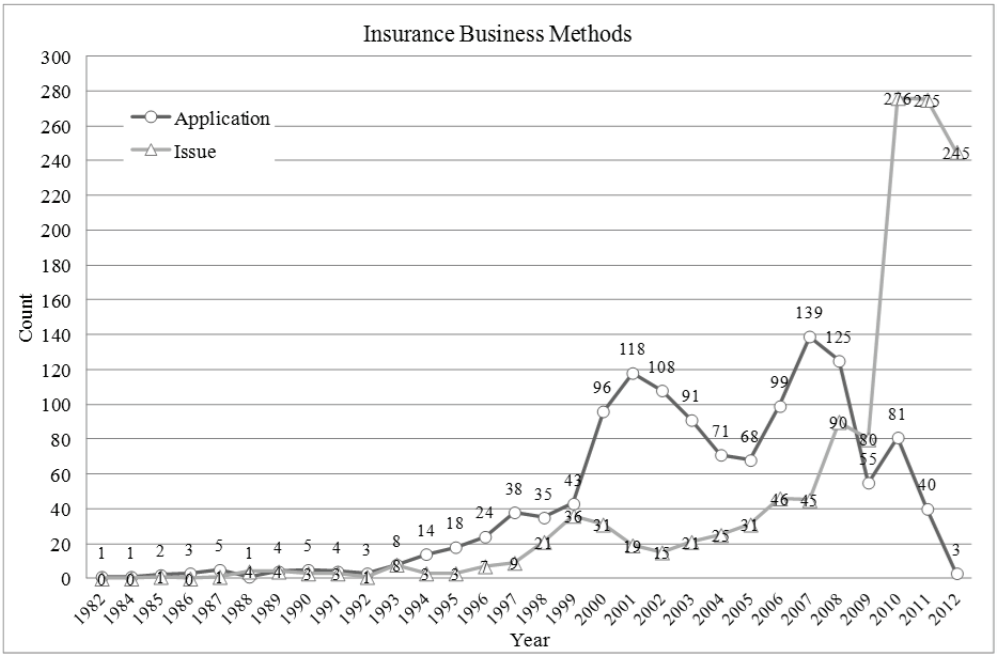

Figure 1：Number of Patents by Year (from 1982 to 2012)

Table 2: Distribution of Assignees

Nation	Patent count	Assignee
America	1180	644
Japan	31	19
Switzerland	15	6
Germany	15	6
South Africa	8	4
Australia	7	5
Bermuda	7	4
Canada	6	6
Ireland	6	1
Holland	5	3

3.2 Citation Analysis

Why are these patents important to the insurance sector? Patents highly cited by other patents are presented as significant patents to that relative field. Table 3 lists the citation frequency of the 1303 patents ranked within 20's. The patents with a high frequency of citation are crucial to the development of the insurance service. For example, patent 04831526, titled as "Computerized insurance premium quote request and policy issuance system," was cited by 97 firms 177 times, and can be described as a base patent or key patent.

3.3 Technological Trajectories of Insurance Business Methods

Graff (2003) suggested observation of technological trajectories and to study the emergence and growth of a new technology by analyzing the relative patent database with international patent classification (IPC). Following Graff's approach, this study identified the current technological trajectories of insurance business methods by IPC, and the result is summarized as Figure 2.

Table 3: Top 20 Patents of Insurance Business Methods

Patent No.	# of total Citation	Title of patent (Technology)	Assignee (Issued corporation)	# of self citation	# of other citation	# of cited corporation
04831526	177	Computerized insurance premium quote request and policy issuance system	The Chubb Corporation(US)	0	177	97
05523942	141	Design grid for inputting insurance and investment product information in a computer system	New England Mutual Life Insurance Company(US)	0	141	61
05191522	117	Integrated group insurance information processing and reporting system based upon an enterprise-wide data structure	ITT Corporation(US)	0	117	47
05873066	110	System for electronically managing and documenting the underwriting of an excess casualty insurance policy	Insurance Company of North America(US)	0	110	35
06208973	104	Point of service third party financial management vehicle for the healthcare industry	Onehealthbank.com(US)	0	104	55
04975840	105	Method and apparatus for evaluating a potentially insurable risk	Lincoln National Risk Management, Inc.(US)	0	105	55
05950169	101	System and method for managing insurance claim processing	CCC Information Services, Inc.(US)	1	100	39
05797134	97	Motor vehicle monitoring system for determining a cost of insurance	Progressive Casualty Insurance Company(US)	5	92	24
06163770	97	Computer apparatus and method for generating documentation using a computed value for a claims cost affected by at least one concurrent, different insurance policy for the same insured	Financial Growth Resources, Inc.(US)	0	97	25
05655085	96	Computer system for automated comparing of universal life insurance policies based on selectable criteria	The Ryan Evalulife Systems, Inc.(US)	0	96	46
05301105	92	All care health management system	Cummings; Desmond D.	0	92	62
05930759	178	Method and system for processing health care electronic data transactions	Symbol Technologies, Inc.(US)	0	178	28
06343271	77	Electronic creation, submission, adjudication, and payment of health insurance claims	P5 e.Health Services, Inc.(US)	0	77	41
04491725	76	Medical insurance verification and processing system	Guard Insurance Group(US)	0	76	56
05956691	71	Dynamic policy illustration system	Second Opinion Financial Systems, Inc.(US)	0	71	33
05809478	69	Method for accessing and evaluating information for processing an application for insurance	Allstate Insurance Company(US)	0	69	34
06119093	65	System for syndication of insurance	Walker Asset Management Limited Partnership(US)	0	65	24
04837693	65	Method and apparatus for facilitating operation of an insurance plan	The Chubb Corporation(US)	0	65	31
05504674	62	Insurance claims estimate, text, and graphics network and method	CCC Information Services, Inc.(US)	2	60	15
06341265	62	Provider claim editing and settlement system	P5 e.Health Services, Inc.(US)	0	62	31

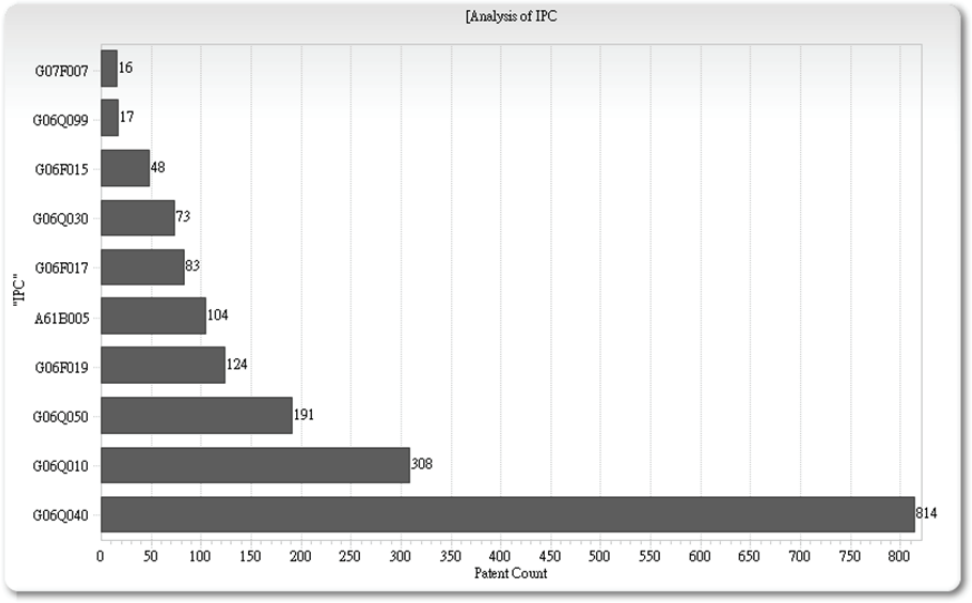

Figure 2: Identification of Technological Trajectories by IPC.

From Figure 2 above, it can be understood that the current technological trajectories of insurance business methods center on electronic digital data processing in IPC G06G, especially G06Q040 and G06Q010. The main technological items are computers in which a part of the computation is affected hydraulically or pneumatically; self-contained input or output peripheral equipment; computer systems based on specific computational models and impedance networks using digital techniques.

3.4 Relative R&D Capability

Which firms have obtained financial patents? What are their characteristics in terms of competitiveness? The indicator for the relative R&D capabilities of a firm includes the following criteria: the number of patents, number of other citation, number of self citation, average patent age and active year. This study selected the relative R&D capability over 50% for demonstration. In total, 15 firms met the criteria, as per Table 4. The results showed that Progressive Casualty Insurance Company was the most competitive, with The Chubb Corporation located in second place, etc.

4. Technological Field of Patents

The business processes of the insurance industry are highly related to information technology. For the companies that intensively utilize knowledge and information, business methods have become their main source when planning business activities. The innovations regarding the new ways of doing business are all able to apply IPR and to be protected in the insurance industry. According to the definition of subclass 4 of USPC705, current available insurance business methods are mostly related to Internet technology. For example, in the case of E-insurance, Yaghoubi and Tajmohammadi (2011) stated: “E-insurance can be broadly defined as the application of Internet and related information technologies (IT) to the production and distribution of insurance services” p. 252). In other words, it can be defined as the provision of insurance cover whereby an insurance policy is solicited, offered, negotiated and contracted online. In addition, the services of payment, policy delivery and claims processing may all be done online as well.

Table 4: Relative R&D Capability

Assignee	Patent	Other citation	Self citation	Inventor	Ave. patent age	Active year	Relative R&D capability
Progressive Casualty Insurance Company	8	191	8	30	10	8	100%
The Chubb Corporation	2	178	0	11	20	2	91%
CCC Information Services, Inc.	3	160	3	18	15	3	82%
Computer Sciences Corporation	45	35	176	31	10	8	78%
ITT Corporation	2	145	0	24	23	2	74%
Insurance Company of North America	2	143	0	10	16	2	73%
New England Mutual Life Insurance Company	1	141	0	5	18	1	72%
P5 e.Health Services, Inc.	2	139	0	4	14	1	71%
The Ryan Evalulife Systems, Inc.	2	132	0	3	17	2	67%
International Business Machines Corporation	32	124	5	88	9	13	65%
Financial Growth Resources, Inc.	2	118	1	2	15	2	60%
The Pharmacy Fund, Inc.	2	115	0	8	18	2	58%
Lincoln National Risk Management, Inc.	1	105	0	3	24	1	53%
Onehealthbank.com	1	104	0	2	14	1	53%
Walker Asset Management Limited Partnership	2	104	0	3	16	2	53%

From the perspectives of management and the practice of insurance, insurance business methods involve the methods of collection of financial information, administrative management, product design, service and selling activities, and so on. On the other hand, from the perspective of patent management using the application of patents, these activities can be categorized into five fields: (1) product design, (2) claim process, (3) marketing, (4) payment handling, and (5) information system. Since insurance companies are handling most of their business electronically, these five fields are closely related to each other, and each field also relates to the information system. Figure 3 is the conceptual model explaining the relations between the five patent fields for insurance business methods.

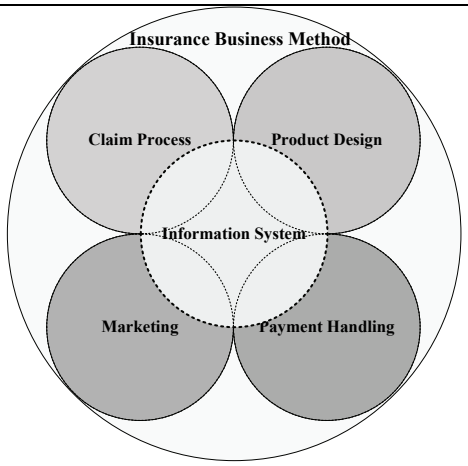

Figure 3: Conceptual Model of the Patent Field

4.1 Product Design Field

This involves new product design, risk management, underwriting technology and management, premium calculation and formula, novel policy forms, the identification of new insurance risks, and ways of utilizing information systems to assist these processes. Samples of relative granted patents are listed below in Table 5.

Table 5: Granted Patents in the Product Design Field

Patent No.	Issue date	Patent Title
07016871	2006/03/21	System for and method of variable annuity contract administration
06611808	2003/08/26	Method and apparatus for determining additional benefits and costs for an annuity contract
06343272	2002/01/29	System for analyzing and managing equity participation life insurance and annuity contracts
06134536	2000/10/17	Methods and apparatus relating to the formulation and trading of risk management contracts
05970479	1999/10/19	Methods and apparatus relating to the formulation and trading of risk management contracts

4.2 Claim Process Field

This involves the identification and estimation of claim cases, fraudulent settlement, claim submission, and ways of utilizing information systems to assist these processes. Samples of relative granted patents are listed below in Table 6.

Table 6: Granted Patents in the Claim Process Field

Patent No.	Issue date	Patent Title
07555439	2009/06/30	Computerized medical underwriting of group life insurance using medical claims data
07438218	2008/10/21	Systems and methods for pharmacy reimbursement claim resubmission
07406427	2008/07/29	Capture highly refined claim evaluation information across multiple web interfaces
07392201	2008/06/24	Insurance claim forecasting system
07376573	2008/05/20	Claims data analysis toolkit

4.3 Payment Handling Field

This involves account management, payment handing, etc. The payment handling field is strongly linked to the Internet and information systems for handling payment transmission, notification, and combination. Unlike traditional payment handling methods, which are seldom covered by IPR, new payment handling systems and methods mostly combine with Internet and information systems and have become the key fields in insurance business methods. Samples of relative granted patents are listed below in Table 7.

Table 7: Granted Patents in the Payment Handling Field

Patent No.	Issue date	Patent Title
07533047	2009/05/12	Method and system for securing card payment transactions using a mobile communication device
07536349	2009/05/19	Method and apparatus for processing a charge applied to a financial account
07260548	2007/08/21	Long term disability overpayment recovery service with post award service and savings program and financial assistance
07072842	2006/07/04	Payment of health care insurance claims using short-term loans
06343271	2002/01/29	Electronic creation, submission, adjudication, and payment of health insurance claims

4.4 Marketing Field

This involves selling technology or methods, marketing methods or technology, distribution technology, risk evaluation of channels, and the utilization of information system to assist these processes. Traditional, personal selling is very different from the new Internet or telephone selling. The new focus is to create convenience and efficiency in selling channels through Internet or telecommunication technologies. In the e-commerce age, the utilization of electronic marketing technology is very im-

portant. Samples of relative granted patents are listed below in Table 8.

Table 8: Granted Patents in the Marketing Field

Patent No.	Issue date	Patent Title
07533031	2009/05/12	Method and system for providing insurance services
07505916	2009/03/17	System and method for allocating home health services
07383197	2008/06/03	Method and apparatus for matching consumer of health care services to health care service provider
07124088	2006/10/17	Apparatus for internet on-line insurance policy service
07610257	2009/10/27	Computer-implemented risk evaluation systems and methods

4.5 Information System Field

Subclass 4 of USPC 705 is described as "computer-implemented systems or methods." This implies the inseparability of new insurance business methods from the information system. Completeness, speed, and comprehensiveness are the basic requirements for an information system in the insurance industry, and includes the technologies of filing, saving, retrieving, selection, confirmation, information transmission, and presentation of policy records and customers' personal data. Transforming traditional business activities into a computer's virtual world just fits into the characteristics of a patentable business method. Samples of relative granted patents are listed below in Table 9.

Table 9: Granted Patents in the Information System Field

Patent No.	Issue date	Patent Title
07555439	2009/06/30	Computerized medical underwriting of group life insurance using medical claims data
07519540	2009/04/14	Computerized prescription system for gathering and presenting information relating to pharmaceuticals
07451097	2008/11/11	Method, data storage medium, and computer system for generating a modular multi-coverage insurance product
07340383	2008/03/04	Control device, method and computer program product for browsing data
07328183	2008/02/05	Computer program and method for determining the economic impact of long-term care

5. Conclusion and Discussion

5.1 Implementation of IPR into the Insurance Industry

The insurance industry plays a key role in the contest for the patenting of business methods. This is because insurance business methods involve the activities of collection and processing of insurance data, and the management of insurance business activities, such as marketing and innovation. The scope is bigger than just an insurance industry; the banking and security industries are also related.

Insurance businesses methods help to solve the problem in that there had previously been no protection for the intellectual property of the insurance and financial industries. In the past, competitors could quickly duplicate the new service methods or newly designed products of their competitors. Now, this defect has been solved by the emergence of patent law for business methods. It enables insurance companies to protect their innovations and inventions using IPR. However, compared with other patent classes, not many patents relating to insurance business methods have been approved. Only approximately 1300 cases are licensed. However, these 1300 have started to exert an influence. In particular, these insurance business methods are systematic and general in their characteristics and have less obviousness. Their impacts are high and deep. Therefore, insurance companies should pay more attention to this issue. For example, Citibank have started their patent managing activities in their e-business network so as to prohibit emulation by their competitors. At the same time, from the approved patents

of Citibank, it can be seen that this company holds many key financial technologies. The Electronic-Monetary System (EMS, US Patent No: 05453601) is one of the most famous technologies. The EMS applied for patenting in 1991 and was approved in 1995. This patent has since been cited by another 200 patents. Obviously, the EMS is one of the key fundamental patents of the finance industry.

The impact of patent law on business methods in the financial industry is high. Financial activity is one key reason for the application of a new business method. Applying for a new business method could become a future trend, and the companies owning patents will be protected by IPR globally. For instance, Citibank routinely requires its global branches to apply similar patents in different countries, simultaneously, in order to protect its patent rights globally (Luo, 2000).

5.2 Strategy Formulation

Since the impact of IPR on the insurance industry is enormous, the following are suggested strategies for responses, combined with an analysis of future trends.

(1) Changes in the modes of product development: Companies will either need to invent or pay to use other companies' ideas.

Since the changes in the modes of product development will become the trend, companies will either need to invent or pay to use other companies' ideas. The innovation and new design of products prevents the free sharing of information, as does the modes of product development. Fast followers will no longer be able to compete with other companies using their existing strategy of "copying from others." More and more companies will join the inventions and try to utilize patent law to protect their own ideas from competition.

(2) Organizational restructuring: new organizational structures need to facilitate innovation and patent management.

Since organizational restructuring may be necessary, a new organizational structure will need to facilitate innovation and patent management. The insurance industry values innovation, but few companies ever appear to compete on innovative activities. That is because most companies only have product development centers instead of research and development centers. Following the implementation of IPR and changes in the modes of product development, organizational restructure will become a must.

(3) Establishment of a reward system: companies will start to setup reward systems to encourage people to invent new methods etc.

Since innovation will become a significant activity in the insurance industry, companies will start to setup a reward system to encourage their employees to invent new methods.

There is no limit to the sources of innovation. A great idea can come from a company's product designers finding an improvement to existing products, a salesperson finding a great idea when trading with customers, underwriters finding better rules for underwriting or risk selection, or other people who do not even work for an insurance company. In the past, because innovation is not protected, companies have not created a culture of innovation. However, in the future, the organizational culture of a company will need to be transformed; innovation should become part of the core values. Companies will start to setup reward systems, encouraging people to invent and share profits with them. For instance, employees will be allowed to become inventors of their own ideas.

(4) Patent watch and analysis: the organization needs mechanisms, such as creating positions of CTO and CKO within the company to handle patent matters.

Patent watching and analysis will become a significant activity inside a company. Consequently, the organization will need certain mechanisms, such as creating the positions of CTO (Chief Technology Officer) and CKO (Chief Knowledge Officer) within the company to handle patent

matters. Patent infringement often happens in the electronic industry. Although the approved patents for insurance business methods are currently few, it does not mean this type of problem will not occur in the future. Protection is a focus, as is violation. Companies need to pay extra attention to the possible infringement of their existing patents. Also, utilizing patents to create competitive advantages is still not popular in the industry. Therefore, organization should handle, such as those below.

(A) Patent analysis before investment to reduce the risk to secure the return of investment.

(B) Patent analysis before and after product development to prevent infringement from existing patents and to innovate based on existing patented technologies.

(C) To analyze competitors' patents for planning the company's future market segmentation, patent portfolios and responsive strategies, once possible infringement has happened.

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Reducing Energy Consumption as a Social Responsibility: Towards a Sustainable Energy Supply

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Abstract

The awareness of social responsibility has, in the past, focused primarily on business. However, the idea has grown that social responsibility is relevant to all organizations, not just those in the business world; even local government organizations have a corporate governance strategy that recognizes their responsibilities toward contributing to sustainable development. This paper is focused on the social responsibility principle of accountability where local government organizations and industries should be accountable for their impacts on society, in particular, how they could reduce energy consumption that has an effect on both the economy and the environment.

This paper also proposes the idea of social responsibility in which everybody from the organization is participating, enabling both internal and external stakeholders to benefit. Reducing energy consumption, as part of their social responsibility to care for the environment, will need collaborative efforts from within an organization. This paper explores the social responsibility of local government and industry in reducing their energy consumption. Improving energy efficiency and spending less on utility bills can help to release resources. This will enable local government organizations to more effectively provide the public services that their constituents expect while still operating efficiently themselves. For industry this could contribute to the sustainability of their operations and the sustainability of energy supplies for the next generation. It is important that local government should realize that they are in a unique position and, as part of their social responsibility, they can educate their constituents about the benefits of energy efficiency. Local governments can lead by example and also leverage their relationships with private sector organizations so as to motivate these groups to make energy efficiency improvements.

This paper also explored the possibility of technology collaboration as a social responsibility of foreign investors in a developing country, such as the Philippines. Through technology collaboration, local industries and government could afford to invest in appropriate technology that can reduce their energy consumption.

Keywords: Social responsibility, reduced energy consumption, sustainable energy supply, technology collaboration, appropriate technology

1. Introduction

One of the agendas of the millennium goal is about ensuring environment sustainability through integrating the principles of sustainable development into national policies and programs; the reverse loss of environmental resources by 2015. Part of environment sustainability is about sustaining the energy supply. Tester et al. (2005) emphasized that sustainable energy is the living harmony between the equitable availability of energy services to all people, and the preservation of the earth for future generations. The "twin pillars" of sustainable energy are Energy Efficiency (EE) and

Renewable Energy (RE), which exhibit synergy by bringing complementary benefits to electricity systems (Prindle et al., 2007).

In response to the millennium goal regarding sustaining the environment, the Aquino administration has crafted the Energy Reform Agenda (ERA). This focuses on "Energy Access for More", wherein one of the six-year agendas is concerned with the process of making energy efficiency a way of life for the Filipinos (Ayson, 2012). It also recognizes the relationship between sustainable energy and sustainable economic development as it embarks on attaining long-term sustainability in alternative energy supplies, such as the implementation of R.A. 9367 or the Biofuels Act of 2006.[1]

Electricity consumption throughout the Philippines has posted a remarkable increase over the past ten years, albeit over and above government efforts to reduce the consumption of electricity and petroleum products. A study conducted in 2010 by International Energy Consultants, an independent think-tank, revealed that the Philippines has the most expensive electricity in Asia, with an average retail rate of electricity costing 18.1 US cents per KWh, easing out Japan at the top. In spite of this, the Philippines still ranks 42nd out of 132 countries in terms of electricity consumption (using 2009 estimates). The survey conducted by the Central Intelligence Agency (CIA) World Factbook, revealed that the Philippines consistently occupied the 42nd to 45th positions from 2003-2010.

The main consumers of electricity can be clustered into three groups: residential, commercial and industrial users. Among these three economic sectors, the residential sector consumed the biggest amount of electricity. According to the Energy Statistics Database of the United Nations Statistics Division, the electric consumption of residential Filipino households ranks 38th among 196 countries, with a total electric consumption of 16.031 billion KWh, based on 2005 estimates. However, data from the Department of Energy Philippines revealed that there was a continuous increase in the electric consumption of the industry sector. Additionally, in 2010, the registered electric consumption of the industry sector was 18576 GWh, while the residential sector was 18833 GWh.

McGrory et al. (2002) concluded that government facilities and services are often the largest energy users and the major purchasers of energy-using equipment within a country. Government expenditures typically account for at least one-fifth of the GDP of industrialized countries, and are close to that level in developing countries. McGrory et al. (2002) also states the important opportunities to improve energy efficiency in government facilities, operations, and public infrastructure and services. The benefits include lower government energy bills, reduced greenhouse gas emissions, less demand on electric utility systems, and reduced dependence on imported oil. Another equally important fact is that the government sector buying power, and active, visible leadership, offers a powerful non-regulatory means to stimulate demand for energy-efficient products and services. Furthermore, the government's own energy efficiency advocate can influence the actions of both buyers and suppliers throughout the economy, likewise helping public agencies themselves to save money and energy, and avoid pollution.

A review of various case studies and best practices, provided evidence on the effective provision of energy efficient technology that consumes a minimal quantity of energy. Previous studies have underscored the importance of energy efficient technologies in reducing energy consumption, which in effect can contribute to the internal social responsibility of the stakeholder. The Big Ben clock, which is the great bell of the clock at the north end of the Palace of Westminster in London, was able to make an overall saving of an estimated 60 per cent (Boomer, 2008). Old

[1] http://www.senate.gov.ph/republic_acts/ra%209367.pdf

lighting technology was replaced by Philips QL's induction lighting system. His system is now illuminated by the means of 112 55-watt bulbs (28 per clock face) enabling a reduction in maintenance and energy costs. The Hyatt Regency hotel in Perth, which is a five-star hotel with 367 units, had savings of more than 175 000 kWh of energy a year. This was done by implementing two key initiatives to reduce gas usage: water heaters replaced standard shower roses in guest rooms with more efficient models; and the water temperature was reduced from 75˚C to 60˚C (Australian Hotel Association, 2001).

The foregoing researches have shown the best practices toward responsible energy utilization in hotels and public places. There is a wide array of stakeholders who play a vital role in reducing energy consumption, thereby increasing sustainability. Their mutual relationships and commitments are valuable in ensuring a sustainable energy supply for the next generation. In this study, the concerned stakeholders are the Philippine local government organizations, industries and foreign investors. The Philippine government is divided into four units: regions, provinces, municipalities and cities, and barangays. All divisions below the regional level are called local government units (LGUs). The 2009 Philippine Standard Industrial Classification (PSIC)[2] is a detailed classification of industries in the Philippines according to the kind of productive activities undertaken by those establishments. The list, which is based on the UN International Standard Industrial Classification (ISIC), includes 21 industry sections. Foreign investors in the Philippines are covered by the Republic Act No. 7042 (As amended by RA 8179), otherwise known as the Foreign Investments Act of 1991 (NEDA). This study focused on the three stakeholders as they are involved in the foreign direct investment (FDI) of new and appropriate technology that can contribute to the sustainable energy supply for the country.

With the increasing demand for energy consumption from the local government and industries, and the fact that renewing a source of energy would take a long period of time to replenish, sustainability of the energy supply for the next generation is a crucial issue. These critical issues have challenged local government units and industries in the Philippines to be proactive in reducing their energy consumption through their social responsibility. This paper is focused on the social responsibility of local government organizations and industries and how they could reduce energy consumption that has an effect on the economy and the environment. Furthermore, this paper also explored the possibility of technology collaboration through foreign direct investment as the social responsibility of foreign investors toward a developing country, such as the Philippines.

2. The Analysis of Stakeholders' Social Responsibility towards Sustainable Energy Supplies

In the technological age where electronic devices have become indispensable, an increase in the demand for energy is inevitable. From a wider perspective, worldwide energy efficiency policy measures that can generate energy savings have progressed in the last few decades. Grass root efforts from various economic sectors will contribute to a substantial decrease in energy consumption by adhering to their social responsibility toward efficient and responsible energy use for a sustainable energy supply. Responsible energy utilization encompasses aspiration, desire and concrete action to reduce energy use from the economic sectors down to individuals in each sectors. The use of appropriate technology at the policy level can be considered as an alternative approach to governance of bottom-up community action for sustainable development. A test-bed and showcase of appropriate tech-

[2] http://www.nscb.gov.ph/csd/psic1.asp

nologies was presented as "grassroots innovations," which demonstrates community-led initiatives for sustainable development (Seyfang, 2010).

In support of achieving a sustainable energy supply, the 3rd Philippine Energy Efficiency Forum (PEEF) was conducted last July 2012. Its aims were to address the challenges of energy security and climate change via energy savings and the de-carbonization of electricity supplies. Nevertheless, the Philippine government should also consider other strategies, such as reduction of energy consumption and investment in appropriate technology that will significantly minimize the utilization of energy. According to Willoughby (1990), appropriate technology attempts to discriminate between different technologies based on their relative suitability for specific purposes or situations. The infusion of new developed technology from industrialized countries to developing countries can extend the benefits of advanced technology. With the paradigm shift from technology transfer to technology collaboration, appropriate technology should not only address socioeconomic problems but also promote environmental sustainability. In the context of this paper, the appropriateness of technology does not only means utilizing renewable energy resources, and efficiency in the use of scarce natural resources, but also the promotion of significant decreases in energy consumption.

From the two pillars of a sustainable energy supply, which are energy efficiency and renewable energy, this paper has focused on the aspect of energy efficiency which is vital to the process of slowing down the growth of energy demands. Decreasing the demand for energy supplies will provide time for renewable sources of energy to be replenished. Practicing responsible energy consumption promotes energy efficiency and eventually leads to reduced energy consumption. It also helps reduce the fast depletion of natural resources and minimizes environmental impacts.

Central to this study is the proposed "two-way social responsibility" model (Figure 1). The solid lines in Figure 1 pertain to the social responsibility of the Philippine local government units and industries toward a sustainable energy supply through reduced energy consumption. Meanwhile, the broken lines refer to the social responsibility of foreign investors from developed countries toward developing countries through technology collaboration. This is considered a two-way social responsibility because it can start internally where everybody from the local government units and industries participate to reduce the energy consumption of the organization. This would have the effect of lowering their operational costs that contributes to the sustainability of the operation of both the local government units and industries. This is the internal benefit of the social responsibility of reducing energy consumption, and of the macro effect, which is the external benefit of contributing to the sustainability of the energy supplies for the country. Having both internal and external benefits to the stakeholder is what two-way social responsibility means. However, as the local government units and industries strive for energy efficiency by determining the appropriate technology that would rapidly reduce their energy consumption, they should also look to technology collaboration with foreign investors. Likewise, the two-way social responsibility proposed in this paper would have both internal and external benefits for the foreign investors too. The internal benefit for the foreign investor is that it will create business opportunities, while the external benefits are technology collaboration and a contribution to the sustainability of energy supplies.

In achieving sustainable energy sup-plies, foreign investors have an indirect involvement because their participation comes from supplying the appropriate technology that local government units and industries can use to reduce their energy consumption. Through technology collab-

oration, local industries and government units could then afford to invest in appropriate technology. This process helps to promote cost effective investments, which encompasses the following significant points: installing energy-efficient lighting systems and controls that improve light quality and reduce heat gain; they can upgrade and maintain heating and cooling equipment; they can use a performance contract to guarantee energy savings from the upgrades made; they can work with an energy services provider to help manage and improve energy performance; and lastly, they can install window film and add insulation or reflective roof coatings to reduce energy consumption (Energy Star).

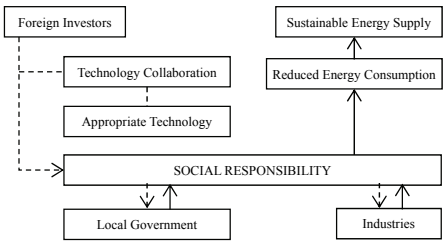

Figure 1. Model of the Two-Way Social Responsibility

Among the seven general principles of social responsibility identified by ISO 26000, this paper mainly focused on the principle of accountability where an organization should be accountable for its impact on society, the economy and the environment. Reducing energy consumption will need a collaborative effort from within the organization. Industries and local government units should start implementing internal policies to reduce their energy consumption, not only because it could lower their utilities expenses but, looking at the macro effect, it could contribute to the sustainability of energy supplies for the next generation, and this could be their initial effort. Since technology collaboration would take long negotiations, the urgent concern for a sustainable energy supply is inevitable.

Local government units and industries can find energy savings through multiple efforts. They could consider low cost measures or cost effective investments. The low cost measures include measuring and tracking their energy performance, turning off lights when not in use or when natural daylight can be used, setting back the thermostat in the evenings and other times when a building is unoccupied, performing monthly maintenance of heating and cooling equipment to guarantee efficient operation throughout the year, and educating staff about how their behavior can affect energy use.

Industries can reduce their energy consumption by following the four steps suggested by Selko (2012). First, they should establish a document about their energy usage for facility, production and, eventually, product levels. Without seeing and assessing facility energy-usage data, these firms are unlikely to reduce costs via improved energy consumption, and even less likely to take the more analytical and beneficial steps of examining the energy usage of their equipment, lines, and work areas. Second, they should monitor and assess facility-level energy consumption to know their facility's energy demands and environmental impact over a period of time, and how that demand (and costs associated with it) varies by what's occurring on the plant. Third, they can make incremental and proactive behavioral, control, and equipment improvements (e.g., devices to transmit energy data in real time). Lastly, few facilities operate "lights out" (i.e., running without any human intervention), but thousands of plants rely heavily on automated equipment and processes. Automation assumes a new critical role in improving operations, influencing not only safety but energy consumption as well.

3. Literature Review

3.1 Social Responsibility

As early as the 1970's, the term "social responsibility" was already common to organizations and governments and they were involved in several of its aspects. However, interest in social responsibility

has, in the past, focused primarily on business. An early concept of social responsibility was centered on philanthropic activities, such as giving to charity. Other aspects, such as labor and fair operating practices, human rights, the environment, consumer protection and countering fraud and corruption, were added over time, as social responsibility received greater attention. The International Organization for Standardization (ISO 26000) defines social responsibility where businesses and organizations do not operate in a vacuum. It is the relationship of a business to the society and environment in which they operate and is a critical factor in their ability to continue to operate effectively. ISO 26000 also provides guidance on how businesses and organizations can operate in a socially responsible way. This means acting in an ethical and transparent way that contributes to the health and welfare of society. ISO 26000, (Social Responsibility).

Social responsibility is the commitment of an organization to integrate social and environmental concerns into its decisions, and the obligation to assume its impact. The obligation is primarily applied to the organization's critical area, their specialty of influence. So, social responsibility has an individual meaning for organizations operating in different countries and industries where society, the level of economic development and the natural environment have unique characteristics of their own.

Nowadays, there is a high level of awareness of the need for and benefits of socially responsible behavior and this awareness is now becoming increasingly common among organizations globally and their stakeholders. The goal of social responsibility is to contribute to sustainable development (UNESCO, 2009).

3.1.1 Social Responsibility in the Setting of the Philippines.

In the Philippines, the level of awareness toward social responsibility is still in its early stages. Most of the research is connected with corporate governance, such as the studies carried out by the ADB (Asian Development Bank), and there are few researches about social responsibility in the Philippines. However, some of the corporations are practicing social responsibility or carrying out practical projects, either within the workplace or among the community. However, most of the social responsibility in the Philippines focuses on philanthropic giving (Sheil, 2003), and from the review of literature on social responsibility in the Philippines, these are separate from the operations of the corporation. However, looking at the definition of social responsibility, how should businesses integrate these into their business operations, and the social and environmental concerns into their decisions, and obligation to assume its impact? The challenge is how the corporation integrates social responsibility into their business operations that would have an impact on society and the environment. There is nothing wrong with their current social responsibility practices but they are called to a deeper involvement. Where their social responsibilities are integrated into their business operations, everybody from the corporation can participate and benefit. Concern for the environment and education are common social responsibility practices of corporations.

3.1.2 Social Responsibility of Local Government Units in Sustaining Energy Sup-plies.

Local government agencies spend more and more of their budgets every year on energy to provide public services and meet their constituents' needs. Local governments grab the opportunity in lessening their budgets, but nearly one-third of the energy used to run typical government buildings goes to waste. Every local government unit is now looking at how they can reduce their energy consumption within their jurisdiction (Energy Star).

The practice of corporate governance in local government includes leading by example and, at the present time, they are being challenged to improve their energy

efficiency. What the local governments can do to improve their community is ensure superior energy performance to protect the sustainability of energy supplies. Local government should realize that they have a unique position to educate their constituents about the benefits of energy efficiency. Local governments can also leverage their relationships with private sector organizations to motivate these groups to make energy efficiency improvements (Energy Star).

3.1.3 Social Responsibility of Local Industries in Sustaining Energy Supplies.

Worldwide industrial energy consumption is expected to increase by approximately 50% from 191 quadrillion Btu in 2008 to 288 quadrillion Btu in 2035, and manufacturers need to develop an energy-management culture (Selko, 2012). Local industries must monitor their energy usage and assess their readiness to take action to reduce their energy consumption.

Energy awareness, facility monitoring, energy efficiency and controlling production can lead to energy optimization for industry (Selko, 2012). Energy awareness lays the cornerstone for ISO-50001 compliance, the framework for industrial plants, commercial facilities, and entire organizations to manage energy. The standard was published in June 2011, and ISO estimates it will have a positive impact on as much as 60% of the world's energy use.

Selko (2012), emphasizes that energy management truly becomes proactive when companies model, simulate, and analyze energy as an economic variable in coordination with energy-compliance criteria and production requirements. There are growing energy demands, diverse energy sources, and diverse user needs that pose challenges for industrial companies, including increased regulatory and legislative activity intended to minimize environmental impact from energy-use, and energy-pricing increases in reaction to supply volatility.

Steps to reduce energy consumption should be considered by local industries as part of their social responsibility. This could be an integration of their social responsibility internally by reducing the cost of their utility expenses and, externally, by contributing to the sustainability of energy supplies. Although social responsibility is a proactive initiative of industry, it is a challenge for them to comply with ISO-50001 that aims to reduce the energy consumption of industries to ensure sustainability of energy supplies.

3.1.4 Social Responsibility of Foreign Investor.

When companies do business in less developed or poor countries, and when they work there "with imagination, passion, courage, humanity, and also hope for some luck" (Prahalad, 2004), they can contribute to change, both through their own activities and through the combined effects which their activities provoke in civil societies. Reviewing the literature that addresses the question of which foreign investor strategies may lead to social benefits in the emerging host countries, the answers point to social responsibility and business ethics (Pratt, 1991; Hart and London, 2005; Pies et al., 2009). One reason may be that the issues are not solely business problems but also social concerns. While it cannot be fruitful to oppose responsible behavior and ethics against the market economy, the terms "social responsibility" and "business ethics" are often seen as oxymoron's (Bardy et al., 2012).

3.2 Foreign Direct Investment.

Through foreign direct investment, foreign investors can not only penetrates a host country's market, but may also gain access to resources, economies of scale and scope in production, logistics, and marketing processes. Whether a foreign investor chooses FDI, rather than serving foreign markets through exporting, licensing, alliances/collaboration or other means, is determined by three factors (Dunning and Lundan, 2008). These include: a transferable competitive advantage in the home-market; specific characteristics of the

foreign market which allow the foreign investor to exploit its competitive position in that market, and the foreign investor's ability to increase its competitive position by taking advantage of what the host country has to offer for controlling the entire value-chain (Bardy et al., 2012). All three conditions must be present or FDI may not take place (Dunning and Lundan, 2008). The firm-specific advantages which constitute the spillover effects of FDI (proliferation of technology, secondary employment, and enhancement of skills) are often what less-developed countries need for their growth and development (Bardy et al., 2012).

A large body of literature emphasizes the positive impacts of FDI (e.g. Kowalewski and Weresa, 2008) and this usually includes FDI increasing growth by introducing new technologies, such as new production processes and techniques, managerial skills, ideas, and new varieties of capital goods. For this, the host country must meet certain conditions in order to maximize the technology spillovers from FDI ("absorption capacity") (Bardy et al., 2012). This paper looks at the technology spillovers from FDI through technology collaboration that can help reduce the energy consumption of local government and industry.

3.3 Technology Collaboration and Appropriate Technology.

IPCC (as cited in Philibert, 2004) defined "technology transfer" as "a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change". Although; it does not reflect a clear-cut distinction between technology collaboration and technology transfer, this paper has delineated the differences between the two terms. In the context of the current discussion, technology collaboration refers to the mutual cooperation between organizations from developing and developed countries for the purpose of further enhancement of the technology to be economically viable and compatible within the recipient local cultural and social environments. Like all forms of collaboration, the two organizations are working together to realize shared goals. Instead of government policy, technology collaboration is protected by an agreement wherein the guidelines and provisions are established by both parties. However, the legality of technology collaboration should determine whether or not it is covered by a technology transfer policy. In the Philippines, the Republic Act 10055,[3] otherwise known as the Philippine Technology Transfer Act of 2009, aims to facilitate the transfer, dissemination, effective use, management, and commercialization of intellectual property, technology and knowledge resulting from R&D funded by the government for the benefit of the national economy and taxpayers.

Technology collaboration will serve as a means to develop the appropriate technology to reduce energy consumption. Appropriate technology does not only refer to identifiable technical devices, but is also an approach to community development consisting of a body of knowledge, techniques, and an underlying philosophy (Akubue, 2000). It is a complete systems approach to development that is both self-adaptive and dynamic (Dunn, 1978). The question of whether the technology is "appropriate" for the recipient country is one of the problems of technology transfer. Ideally, appropriate technology should provide sustainable solutions which are considered beneficial and have a positive effect on the local community. The appropriateness of technology is about being affordable, easy to maintain, compatible with the existing infrastructure, efficient in the use of scarce natural resources, environmentally benign, and partial to small-scale (Akubue, 2000). Over and above these characteristics is the ability of the appropriate technology to be a contributory factor in reducing environmental pollution by reducing the demand for energy.

[3] http://www.lawphil.net/statutes/repacts/ra2010/ra_10055_2010.html

4. Implication

Local government units and industries have an important role in ensuring the sustainability of the energy supply by reducing their energy consumption. It is a challenge for them to integrate the social responsibility of reducing energy consumption in their day to day operations and activities. If the local government units can take the lead in reducing their energy consumption, then they could share their initiative and experiences with their constituents (local residence) as part of their social responsibility and advocate the promotion of energy efficiency and conservation. Local government units have a unique position in educating their constituents (local residents) to increase their awareness on how they can help promote the sustainability of the energy supply. If the residential sector is educated and informed by the local government units as to how they can reduce their energy consumption, then they will participate. Industries can also motivate their employees to be part of this social responsibility by reducing their energy consumption. Once the residential sectors see the effect of energy efficiency in the local government units and industries then they will have the initiative to also reduce their energy consumption. This will also mean less electricity costs for the residential sector and, at the same time, help with the sustainability of the energy supply.

This paper has introduced a model of social responsibility for local government units and industries which is a "two-way social responsibility." It helps them to reduce their operational costs (utility expenses) and at the same time to be accountable for their impacts on society, particularly to the environment. Furthermore, the new framework can encourage foreign investors, local government units, and industries to collaborate in determining the appropriate technology that will reduce energy consumption and lead to a sustainable energy supply.

5. Conclusion

Reducing energy consumption is one way to achieve a sustainable energy supply but this will need a collaborative effort from local government units, industry and foreign investors. The local government units act as leaders in advocating the promotion of energy efficiency and conservation by utilizing social responsibility as their means. This proposed two-way-social responsibility has both internal and external benefits. The internal benefit of this social responsibility is that it lowers operational costs, particularly utility expenses for the local government units and industries, and helps them to invest in the appropriate technology to reduce their energy consumption. The money they save in lowering their operational costs can be used for this investment. Meanwhile, the external benefit of social responsibility is that they helps in sustaining the energy supply for the next generation. It is called two-way social responsibility because it has internal and external benefits.

Adopting the proposed two-way social responsibility is a great help with the sustainability of the local government units and the industries' day-to-day operations whilst, at the same time, contributing toward the sustainability of the energy supply. Both the local government units and industries can start reducing their energy consumption using low cost measures and, eventually, with cost effective investments through collaboration with foreign investors.

Furthermore, foreign investors play an important role in helping the local government units and industries in determining the appropriate technology to use when reducing energy consumption and making it more affordable.

6. Recommendation

In response to local government units and industries achieving the millennium goal for ensuring environmental sustainability, it is recommended that they integrate and implement social responsibility by

reducing their energy consumption. The initiative for reducing energy consumption as social responsibility should start internally where everyone is called upon to participate/contribute. Furthermore, they could also engage in external initiatives by collaborating with foreign investors over the appropriate technology to help them reduce their energy consumption and contribute to the sustainability of the energy supply.

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