

# **Making Sense of a Financial Inter-Organizational System: A Case Study of Taiwan Offshore Fund**

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## **Abstract**

The digitalization of globally integrated markets over the last decade has facilitated a significant growth in the trading volumes of cross-border financial transactions. To increase their operational efficiency and maintain competitiveness in the marketplace, market players are developing inter-organizational systems (IOS) to automate the trading and settlement process for both domestic and cross-border transactions. This paper applies the concept of technological frames analysis to investigate the diffusion of an IOS that connects organizations in the European investment fund industry with their distributing banks in Taiwan. The results of a case study provide insights into how different socio-economic contexts influence the assumptions and expectations of stakeholder groups with respect to the concept and benefits of an IOS. The case study also investigates the social and institutional intervention process required to reframe the incongruent technological frames of relevant social groups. A series of three theoretical propositions reflecting the dynamic nature of the adoption and assimilation of a global IOS are offered as key implications.

**Key words :** Information Technology Adoption, Financial IOS, Technological Frames Analysis, Globalization of IS, Qualitative Research Methods

# 跨組織金融資訊系統之科技意會— 以台灣境外基金產業為例

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## 摘要

國際金融交易在全球化與市場整合趨勢下，近十年來，呈現大幅成長。為提高營運效能並維持市場競爭力，許多業者相繼採用「跨組織資訊系統（Inter-organizational Systems, IOS）」以進行自動化交易。這項科技可以有效降低人為疏失，提高跨國金融業務往來之效率與效能。然而，跨國組織在資訊系統的採納過程中，卻有地域性的差異。本研究由「科技思維框架（technological frames analysis）」的觀點，以質性研究方法，探討歐洲基金投資機構與其在台灣分銷銀行間，於跨組織資訊系統的科技採納過程。主要研究發現有三。第一，科技採納的利益相關團體（stakeholder group）對資訊系統的預期效益，深受所處之社會經濟結構所影響。第二，社會或組織則透過「重塑（reframing）」科技框架過程，影響利益相關團體對科技的採納。第三，資訊科技的成功擴散，和組織型塑科技願景（organizing vision）影響產業成員思維，並進而採納有密切關聯。本研究，在理論與應用層次方面所提出的三個假設，期望能提供未來後續相關研究作為參考。

**關鍵字：**資訊科技採納、跨組織金融資訊系統、科技思維框架分析、全球化資訊系統、質性研究方法

# 1. INTRODUCTION

The forces of global competition and technological change have transformed the landscape of capital markets in the last decade, as shown by the demutualization and mergers of stock exchanges (Aggarwal 2002; Barrett and Scott 2004; Lucas et al. 2009), the transformation of financial markets (Barrett 1999; Barrett 1999; Wigand et al. 2005) and the streamlining of securities transaction processes (Hee et al. 2003; Huang et al. 2006; Toppen et al. 1998). Information communication technologies offer investors and financial institutions the benefit of interconnectivity and instantaneous transmission to access a diverse range of financial instruments and markets worldwide. As a result, the ‘geographical decentralization’ and emergence of a globally integrated capital market have increased cross-border trading volumes (Sassen 2005). According to the Bank of International Settlement (BIS), in the United States, the value of cross-border trading of bonds and equities as a percentage of GDP increased from 4% in 1975 to 230% in 1998. In the recent years, Asian markets have become key players in the global economy because they offer both investment opportunities and a source of capital for global firms. For instance, it was reported that 25% of the net income of Citigroup Private Bank and Wealth Advisors came from Asia in 2005 (Deloitte 2006); and the Asia-Pacific region is expected to surpass North America in terms of high net worth individuals (HNWIs) by 2013 (Merrill and Capgemini 2009). In light of global competition and growing opportunities in the Asia Pacific region, financial institutions in mature markets are deploying inter-organizational systems (IOS) to connect with their business partners in emerging markets. The major objectives are to streamline cross-border transactions, improve efficiency, and reduce operational risks.

In the IOS literature, several researchers have discussed the implications of socio-economic and institutional contexts on the adoption and implementation of IOS (Christiaanse and Huigen 1997; Damsgaard and Lyytinen 2001; Hsiao 2007; Kumar et al. 1998; Teo et al. 2003). However, although useful, most studies focus on a particular national context. As Robey et al.(2008) point out:

“These (economic and social) challenges are likely to multiply as IOS implementation expands and as organizations linked by IOS become more globally dispersed.” (p.498)

In this study, we investigate the perceptions of various financial services institutions in mature and emerging markets during the IOS diffusion process, and try to determine how such perceptions are transformed through social and inter-organizational interactions. We argue that the challenges that arise from successfully implementing a global IOS are highly relevant to the assumptions held by stakeholders in different financial markets. In the IS literature, users and managers’ perceptions and beliefs, i.e., technological frames, have proven relevant in understanding the implementation of information systems at the organizational level (Compeau

et al. 1999; Lin and Cornford 2000; Lin and Silva 2005; Orlikowski 1993; Orlikowski and Gash 1994). We extend the application of technological frames analysis to industry and multi-national contexts. To this end, we conducted a case study on the diffusion of a financial IOS in the mutual fund industry. The IOS connects mutual fund institutions in Europe with their distributing banks in Taiwan.

The remainder of this paper is organized as follows. In the next section, we review the literature related to the social and institutional influences on IOS adoption and implementation. In Section 3, we introduce technological frames analysis, which serves as the conceptual framework in this study. We discuss our research approach and the case study in Section 4. Section 5 provides an analysis and discussion of our findings. Then, in Section 6, we address the implications of the study.

## 2. LITERATURE REVIEW

The widespread use of inter-organizational systems in various industries has generated a great deal of interest among IS researchers and motivated the study of their adoption, governance and organizational consequences (Robey et al. 2008). However, as Robey et al. (2008) noted, most studies have focused on a particular technology, i.e., electronic data interchange (EDI). A number of scholars have researched different aspects of the adoption and use of EDI by organizations.(Chwelos et al. 2001; Hart and Saunders 1997; Iacovou et al. 1995; Kuan and Chau 2001; Kumar and van Dissel 1996; Premkumar et al. 1994; Premkumar et al. 1997). In these studies, variables, such as innovation characteristics, organizational readiness and environmental pressure, are seen as the most important factors that influence the adoption and impact of EDI in organizations. Besides EDI research, the diffusion process of RosettaNet, a non-profit consortium that shares business-to-business (B2B) information in the high-tech industry, has also attracted the attention of IOS researchers in recent years. For instance, Boh et al (2007) studied the diffusion strategies adopted by RosettaNet to ensure local adaptation in each country. Malhotra (2005) applied the lens of absorptive capacity to determine how different supply chain partnership configurations influence knowledge management in the context of the RosettaNet consortium's diffusion process. To overcome the shortcomings of single-dimension analysis of IOS standard assimilation, Bala and Venkatesh (2007) adopted three theoretical perspectives to provide an integrated view and empirically test the hypotheses in the context of the implementation of the RosettaNet PIP standard. Apart from the above areas, there is an increasing amount of research on applications of IOS in other industries, such as the US residential mortgage industry (Markus et al. 2006; Wigand et al. 2005) and the automotive industry (Howard, 2005) .

In reviewing the literature, we found two interesting developments in this research area: 1) a gradual shift in the research focus from the initial emphasis on organizational adoption and use to a broader discussion on the transformation and implications at the industry level; and 2) the application of institutional and socio-cultural perspectives in the analysis of the relationships between organizations' actions, industry structures and IOS implementation. Both developments are closely related and relevant to our study. With regard to the first development, we agree with the argument posited by Robey et al. (2008) that the nature of IOS artifacts has evolved from proprietary EDI systems to an Internet-based network. The openness of Internet-based IOS standards provides firms with greater interconnectivity and broader access to potential trading partners. This has motivated researchers to examine the development and institutionalization of IOS standards, and consider how these emerging technologies transform an industry's structure (Barrett and Scott 2004; Crowston and Myers 2004; Crowston et al. 2001; Steinfield et al. 2005) and how they are adapted to fit various local conditions (Boh et al. 2007).

Parallel to this development, we heed the call for alternative theoretical perspectives, such as social and cultural theories, in light of the changing nature of IOS artifacts. Robey et al. (2008) suggested that

“By focusing on the relative openness of standards, IOS research can accord IOS artifacts theoretical status beyond their role as nonspecific assets. Facilitating cooperation among competitors in trading networks may be due to collective benefits of ISO standards rather the operation of open “electronic markets,” as predicted by transaction cost theory ” (p.498)

Other scholars have echoed this viewpoint and proposed to focus on a deeper interpretation of the relationship between technological and industrial structures in the diffusion process (Chiasson and Davidson 2005; Crowston and Myers 2004; Crowston et al. 2001). For example, Boh et al. (2007) highlighted the strategic importance of contextual factors in managing the local adaptation of RosettaNet. Hsiao (2003) examined the difficulties faced by Singaporean firms in adopting the e-marketplace through the lens of valued-oriented and reliability-related distrust. Howard (2005) investigated how ICT has reshaped the structure of the automotive industry through a longitudinal case study. In this paper, we consider that our research focus and theoretical underpinnings align with the above two developments in IOS research. The context of our research is the application of global IOS systems to streamline cross-border transactions in the financial services industry. With respect to the theoretical lens, we respond to the call for a contextual perspective on the investigation of IOS phenomena. Focusing on the interpretive process, we apply the concept of technological frames analysis to assess 1) how a diverse set of stakeholders at the international level perceive and interpret the implementation of a global IOS; and 2) how social and institutional intervention addresses the issue of incongruence in understanding during the diffusion process.

### 3. THEROETICAL FRAMEWORK

The inclusion of contextual issues has been an interest to organizational researchers over the past few years. This school of research opposes the notion of “technological determinism” and suggests that users make a decision as how and what to interact with various properties embedded in a technology in accordance with the time, place and circumstance in which they are situated in. Thus deploying different theoretical perspectives subscribing to this worldview, many organizational researchers have made an attempt to address the emergent and situated relationship between technology and work practice. Interpretation perspective, which is also subscribed by this research, builds on social cognitive philosophy on information technology. Orlikowski and Gash (1994, p. 175) consider the importance of such understandings:

“... people’s interpretation of a technology is critical to understanding their interaction with it. To interact with technology, people have to make sense of it; and this sense-making process, they develop particular assumptions, expectations, and knowledge of the technology, which then serve to shape subsequent actions toward it. While these interpretations become taken-for-granted and are rarely brought the surface and reflected on, they nevertheless remain significant in influencing how actors in organizations think about and act toward technology.” The notion of technological frames analysis was developed by Orlikowski and Gash (1992 and 1994) to investigate the underlying assumptions, expectations, interpretations and knowledge that individuals hold towards technology. The concept of technological frame included not just the nature and role of technology itself, but the specific conditions, applications, and consequences of that technology in particular contexts” (Orlikowski and Gash, 1994 p. 178). While Orlikowski and Gash challenged IS researchers to take closer look at the way in which organizational members interpret technology in order to get a rich picture of their interactions with it, including systems development, implementation and use. The concept of technological frame helps researchers to address their interests in “how organizational members make sense of and assign meaning to their environment, organization and tasks” (Orlikowski and Gash, 1994, p. 176). A central assumption in Orlikowski and Gash’s (1994) definition is that social groups have shared frames and difference in their group’s frames can inhibit the effective deployment of a technology. Besides, the technological frames concept highlights the relevance of context in relation to the use of technology: “Technological frames are the understanding that members of a social group come to have of particular technological artifacts, and they included not only knowledge about the particular technology but also local understanding of specific uses in a given setting” (Orlikowski and Gash, 1994, p. 178).

From our perspective, we argue that technological frame analysis is helpful when unfolding the interpretation process of IT and organizational change, particularly to assist the identification

about the existence of frame incongruence. As IS scholars argue that early recognition of incongruence and interventions can lead to frame change ( i.e., frame alignment) and one can continue to observe whether the efforts to change frames can succeed or fail in achieving alignment of frames.(Flichy, 2007, p. 70).

Scholars have applied technological frames analysis in a diverse range of IS studies, such as technology implementation (Barrett 1999; Lin and Cornford 2000; Lin and Silva 2005; Orlikowski 1993; Orlikowski 2000), technology design and evaluation (Davidson 2002; Wilson and Howcroft 2005), and IS security management (Hsu 2009). The underlying philosophical premise of frames analysis aligns with the social-cognitive approach, which asserts that knowledge cannot construct meaning effectively in isolation, and reality is a personal interpretation dependent on an individual's experience and the surrounding environment. Furthermore, an action is subject to the interpretation of the individual in accordance with his worldview. In other words, a frame is a mechanism for an individual's sense-making in the context of a particular time and space, which in turn leads the individual to perform context-specific actions.

While frames are normally held individually, a group of individuals can develop and share similar assumptions about and understandings of certain organizational phenomena through the process of organizational discourse. Pinch & Bijker (1987) conceptualized such groups as "relevant social groups" (p.30); while Wilson and Howcroft (2005) explained the significance of relevant social groups in IT-related organizational change as follows:

"The notion of different 'relevant social groups' who will not only define a technological problem differently, but also disagree over definitions of what constitutes success and failure and how evaluations can be used in such constructions." (p.22)

In their widely cited paper on groupware implementation, Orlikowski and Gash (1994) posited that, within an organization, there are two relevant social groups: technologists and users; and three domains of technological frames: nature of technology, technology strategy, and technology in-use. The authors suggested that the two groups hold very different interpretations and perceptions of the three aspects, i.e., there is incongruence in their understanding of technological frames. Their findings indicate that if the significant incongruence between technologists and users is not resolved at an early stage of technology use, it might be problematic in the long run, since "the cognitive habits formed through initial exposure could prove difficult to change later" (p198). Although Orlikowski and Gash highlighted the negative consequences of incongruence of technological frames in organizations, they did not elaborate on how such incongruence could be resolved. To address this shortcoming, Lin and Cornford (2000) adopted the concept of social translation from actor network theory to explain how the process of social translation of technology at an early stage of project formation leads to shared technological frames among different relevant social groups in an organization. Davidson



(2002) also employed the reframing process through the tale of eight episodes during a system development project at a health insurance company. These studies emphasize the interpretive flexibility of frames and the implications of social and political intervention in the reframing process (Lin and Silva 2005; McLoughlin et al. 2000). Hence, in order to contribute to the knowledge of technological frame research, the aim of this paper is to disclose the development of technological frames and how these are shaped by the context in which a financial IOS is deployed. Next section details our qualitative case study of IOS diffusion in a Taiwan market during a 7 years period.

## 4. RESEARCH APPROACH

### 4.1 The research site

Our case study focuses on the diffusion of a financial IOS to streamline cross-border fund transactions between European mutual fund institutions and the distributing banks in Taiwan. This type of financial product is known as an offshore fund in Taiwan because it is offered by non-domestic organizations. According to statistics published by the Securities Investment Trust & Consulting Association (SITCA) in Taiwan, the size of the offshore fund industry stood at USD 31 billion in January 2009. The prosperity and potential growth of the industry in Taiwan represents a growing challenge for European mutual funds, since most Taiwanese banks use a manual, fax-based system to process fund transactions. However, because of the increasing size of the fund market and the volume of business, European firms are eager to standardize and automate cross-border transactions.

In 2000, offshore fund companies and financial technological solution providers began promoting the concept of ‘Straight-Through-Processing’ (STP) in the Asia-Pacific region. The objective of STP is to implement a standardized financial IOS system that connects fund companies and distributing banks without any manual intervention during the transaction lifecycle. To facilitate the implementation of STP worldwide, the International Organization for Standardization (ISO) has established ISO 20022 as the open standard for financial services messaging. However, in the Asia-Pacific region, the diffusion of STP has been a very slow process. The joint EFAMA-SWIFT survey<sup>1</sup> published in May 2009 reported that the automation rate in the region stood at only 36 % in the last quarter of 2008, compared to 63% in Europe, the Middle East and Africa.

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<sup>1</sup> EFAMA: European Fund and Asset Management Association/ SWIFT: Society for Worldwide Interbank Financial Telecommunication.



## 4.2 Data collection and analysis

Our data sources included interviews, documents, conference participation and observation notes for the period 2004–2010. The primary data source was face-to-face interviews with participants involved in STP initiatives in different parts of the fund transaction lifecycle, including fund houses, STP solution providers, and distributing banks. Some participants were interviewed more than once. Informal conversations were held and observation notes were taken while attending various industry conferences and workshops between 2006 and 2010. Documents included meeting minutes, PowerPoint presentations at forums, government and industry reports, and company press releases. A detailed interview information is provided in Table 1 and sources of our field work are shown in accordance.

To analyze the data, we applied the theoretical concept of technological frames analysis to organize and present our qualitative data. The combination of documents, observation notes and interview results allowed us to make an initial interpretation of the implementation of STP and identify major events associated with its diffusion in Taiwan. In the second step, we interpreted the data based on the theoretical framework, which led to the identification of the three relevant social groups (as summarized in Table 2) and frames in this domain context. Reading file notes and interview materials several times allowed us to refine the development of the frames domain and confirm the dialogical process between the data and the theory (Klein and Myers 1999). Case study is more importantly a research strategy that strengthened by the possibility of combining data collection methods which focus on understanding the dynamics present within a single setting (Eisenhard, 1989). This study is part of a larger research project that was carried out since year 2004; hence, we had considerable background knowledge to help validate our findings. During the data analysis, we returned to the interviewees for further information or clarification of the statements made in the initial interviews either by setting follow-up interviews or emails. The correspondents either confirmed or rejected our interpretations, thus providing this study with a scope of study for further elaboration. By conducting longitudinal study and retrospective data analysis, this study has been possible compare the actual use, with the intended use and by that trace changed technological frame of STP.

## 4.3 Case study

Next, we describe Taiwan's offshore fund industry, and then detail the major events that led to the initiation and implementation of the STP project in the local mutual fund market. We conclude this section with a summary of the diverse interpretations held by relevant social groups during the past seven years.

### 4.3.1 Taiwan's Offshore Fund Industry

Following strong economic growth in the 1980s, the government began a series of financial

reforms to facilitate the increasing demand for access to overseas investment opportunities. Examples of financial deregulation included an easing of foreign exchange controls and permission to invest in foreign equities and bonds. In 1983, the Securities and Exchange Act was amended to allow domestic banks, securities brokers and securities investment enterprises to establish domestic mutual funds. A subsequent policy change led to the sale of offshore funds, subject to certain conditions. Since the 1990s, several economic and political events have contributed to the emergence and growth of offshore funds in Taiwan. For instance, the 1995-1996 Taiwan Strait Crisis created a great deal of tension and uncertainty because China launched a series of missile tests in the East China Sea close to Taiwan; and the 1997 Asian financial crisis resulted in the loss of demand and confidence in the domestic equity market. Consequently, offshore funds appeared to be a safer investment than buying equities in the domestic stock market. The trend continued into the new millennium. In recent years, offshore funds have attracted investors because of the active promotion by banks and financial advisors. Moreover, the ubiquity of online banking services makes conducting fund transactions more convenient for customers, and the practice is becoming increasingly popular. For instance, one commercial bank reported that, in 2002, major fund sales accounted for approximately 47% of the online transactions made by its customers. As of January 2009, seventy-four offshore fund houses were authorized to sell 907 offshore funds in Taiwan; and the total fund size was USD 31 billion. However, the growth of the offshore fund industry has highlighted the limitations of existing manual-based fund processing procedures.

#### 4.3.2 Initiating STP to Automate Offshore Fund Transactions

Because of the growing volume of business and turnover rate, European fund houses are being pressured to automate transaction traffic; while in Taiwan, financial institutions are being encouraged to implement STP based on the European model. As a manager from one fund house told us:

“Most fund houses here (in Asia) have a strong European experience. In Europe, the majority of funds are based in Luxembourg and Dublin. In these two places, labor is expensive and in short supply. Therefore, STP is a good way to increase efficiency and reduce costs. For us, to implement STP in Asia costs nearly nothing technology-wise, since our European office already has the technological capability in place.” (Fund C)

In addition to the need to reduce costs, fund houses in Europe are facing regulatory pressures, such as the implementation of the Basel II. Accord which attempts to ensure a more transparent audit trail and better risk management. Since automation helps reduce operational risks, it enables fund houses to meet the regulatory requirements.

To initiate the STP project in Taiwan, the European fund houses began communicating with their distributing banks about automating the transaction process. A number of the fund houses also approached an STP solution provider to develop and promote an ISO 20022-based STP

solution with the local distributing banks. Meanwhile, another two European-based STP solution providers entered the Taiwan market. The regional manager of an STP solution provider recalled the positive assumption about STP adoption in early 2000:

“Eight years ago, when a fund house came to see us about automating the fund transaction process, we assumed that it would be easy. Banks were already our users, and we discussed two aspects of the process: purchasing and redemption. We felt this should be taken up immediately by the banks.” (Vendor A)

To identify potential early adopters among over 40 distributing banks in Taiwan, the solution providers started approaching banks with a large offshore fund trading volume. However, both fund houses and STP solution providers found that, contrary to expectations, their contacts at many of the banks had little understanding of the STP concept or the need to implement such a project. For instance, during the initial contact, the distributing banks often responded that they already had an automated fund transaction process in place, since they used fax machines to communicate with offshore fund houses. In other visits, clients appeared to have little or no knowledge about the nature of and need for STP and a financial messaging standard. One fund house manager observed that distributing banks did not understand the difficulties caused by using faxes:

“Another issue is the idea of using fax to process offshore fund orders. All orders for our funds are faxed to the processing centre, where the paper fax is converted into an image file. The trust department of the distributing bank in Taiwan will then call to confirm receipt of the fax, which creates a lot of problems for us. The bank thinks that it (confirmation) is simply a matter of looking through paper faxes. However, we have to open numerous image files, and that takes a lot of time. If the bank implemented STP, it would generate a confirmation of receipt message automatically.” (Fund H)

There are other concerns associated with cost of implementation. Although cost efficiency has been the main driver of the implementation of STP in Europe, the relatively low labour costs and cheap telecommunication costs of using fax machines provide very little incentive for banks to invest in new technologies in this business area. One manager at a distributing bank made the following comparison:

“It would cost us NTD5 million to install the [STP] system plus the messaging fees, but our fax system only cost NTD10, 000. We ask whether it is a worthwhile investment. For us, the front office is more important than the back office, since it is where the value and business come from.” (Bank 7)

A manager at another bank emphasized the efficiency of current staff:

“Our employees are very experienced and have been with the company a long time. They are extremely familiar with the fax process and can complete it within 30 minutes.” (Bank 5)

Furthermore, the managers expressed concern about possible employee lay-offs as a

consequence of STP implementation. Normally, it is difficult to ask for replacements or to recruit new staff for back-office departments. Managers also felt that the possibility of employee termination might impact on the staff's morale.

As a result, although some banks expressed interest initially, for the first few past few years since 2000 none have actually implemented an automated offshore fund transaction process since the STP project was established in Taiwan.

#### 4.3.3 Awareness Development and Adjustment for Local Adoption

Having realized the problems, the STP solution providers and fund houses adopted a number of strategies to educate the distributing banks about the nature and benefits of STP. Other than regular client visits, conferences and seminars on fund automation have been arranged since 2004; and the Asia Fund Automation Consortium (AFAC) was established in 2006.

Most events at the conferences and seminars were reported by local business newspapers and trade magazines. Between 2004 and 2005, presentations at the conferences focused on introducing the STP concept with speakers from solution providers and fund managers from Europe, where the level of awareness and the diffusion rate are high. In addition to explaining the benefits of increased efficiency and cost reductions from the European perspective, the STP solution providers and fund house managers highlighted the benefit of flexibility in the cut-off time for fund trades. It was pointed out that automation would give banks the flexibility to extend the cut-off time for end customers' trades by one to two hours during the trading day. This benefit is significant because of intense competition for fund sales among banks in Taiwan.

To further stimulate local interest, some conferences included presentations by a manager of the first distributing bank that registered for STP implementation. He recalled his participation in the events as follows:

"I was asked to share our experience at the conferences. It (STP solution provider) gave me the role of educator to inform other distributing banks about STP. In December 2004, I gave a presentation to explain the reasons for adopting STP, and in August 2005, I gave another presentation on the current status of our project. What I did is mainly about experience sharing."  
(Bank 1)

Another major development during this period was the formation of the Asia Fund Automation Consortium (AFAC) by seven large fund houses in September 2006. The fund houses signed a memorandum of understanding (MOU) to demonstrate their commitment. The objective of the consortium is to "provide distributors throughout the Asia Pacific with a consistent approach to automate across the majority of fund providers" and "agree on common formats, standards and routes for automation". The group meets regularly and shares information about STP development in Taiwan. Members of the group use AFAC as a single entity to promote STP in various sessions of conferences and client visits. One fund house

manager explained the rationale for joining with competitors to form AFAC as follows:

“We all know each other loosely and we know that, individually, we cannot achieve much. Each year we are all under pressure to cut costs and achieve STP rates. The distributors are telling us that they will only participate if other banks do the same. We realise that we have to act together to convince the distributors.” (Fund B)

In our interviews with distributing banks, three bank managers explained how they learned about the concept of STP through the visits of AFAC personnel. In addition to promotional efforts, the fund houses had to agree on a common messaging format using ISO 20022. To achieve this important goal, the AFAC and the first distributing bank that made a commitment to STP worked together to agree on a messaging format that would fit with local practices concerning fund purchases, redemption and switching. It took nearly a year to finalize the messaging standard for the Taiwan market and complete testing with the fund house involved. In late 2006, the above distributing bank went live began using ISO 20022 messages for fund transactions, and another bank followed in early 2007. The standardization of messages through testing and the integration of systems of the fund houses and the distributing banks yielded a consistent transaction process. The manager of the third distributing bank that adopted the STP solution (in late 2008) made the following comment about the ease of testing with various fund houses after the standard was established:

“At that time (2006), the solution was ready; however, the system was not mature, and it lacked stability and standards. Nevertheless, we saw that two banks had already done the testing, so we didn’t have to be a guinea pig.” (Bank 3)

#### 4.4.4 From Awareness to Implementation

In our interviews, managers from various distributing banks explained how they had acquired knowledge about STP from the industry seminars held since 2004. Interestingly, both solution providers and fund houses observed significant changes in the content of discussions since the education efforts started. In a recent interview, one salesperson from an STP solution provider described the changes in clients’ thinking as follows:

“The landscape has gone through a major change over the last three or four years. When we started the education process four years ago, we had to spend the first meeting explaining the concept of fund automation to our clients. However, distributing banks now understand the rationale for STP, so we can move straight to the discussion of our solution when talking to potential clients. Within 15 minutes, they are asking about our pricing model.” (Vendor B)

Having raised the level of awareness, in 2009 one solution provider decided that it was appropriate to stop running the annual fund automation conference. From the solution providers, attention has now shifted to improving the technological platform and the pricing model, as the distributing banks are demanding a more user-friendly product at an affordable cost. As one manager observed: “STP is not bad: it is the high cost that makes it bad.” The banks are

concerned about the up-front installation costs and messaging costs. In Europe, high labour and office-rental costs were the main drivers of STP implementation; however, those costs are significantly lower in Taiwan. One manager explained that, while understanding the advantages of automation in theory, it is difficult to develop a positive cost and benefit analysis for such investments. As a result, nearly all solution providers have reduced the messaging costs in the past two years to address the banks' concerns.

The AFAC continues to work on the standardization of fund messaging. In the early stages, the fund houses concentrated on developing a standard for fund purchases and redemption, the two functions used most frequently in fund transactions. Having agreed on a standard, the AFAC is trying to define the format for monthly statements to meet local reporting requirements. In addition, as the banks become more aware and make decisions about implementing STP, one of the major evaluation criteria for adoption is the number of fund houses that have adopted the ISO 20022 messaging standards for the Taiwan market. Given that 74 offshore fund houses now have approval to operate in the local market, the distributing banks feel that more fund houses should join the AFAC network and adopt the common formats already defined. In a recent survey, one bank stated that it would only consider adopting the STP solution if the automation rate of its daily processing volume climbs above 60 %. To meet this demand, the AFAC has expanded its membership to 10 fund houses. One fund house manager explained how the AFAC reached a decision about which additional fund houses to include in the consortium:

"We cannot include all fund houses in our consortium because it would be very difficult to manage and achieve agreement on messaging standards. Instead, during our visits to the distributing banks, we ask the banks which fund houses they would like to include in our consortium." (Fund F)

A senior manager of one early STP adopter reflected on the transformation in the role of distributing banks since the establishment of the STP project in the Taiwan market:

"I think the fund houses are ready and eager to have STP implemented, and they are all hoping there will be more demand from distributors. The fund houses would be happy if there was more pressure from the distributors!" (Bank 8)

These developments highlight the different perceptions of fund houses, solution providers and distributing banks over the years since STP was introduced to the Taiwan market. The solution providers' initial optimism about the market's acceptance of STP was short-lived, as only two banks adopted STP for the first seven years since introducing STP; one at the end of 2006 and the other early in 2007. Because of efforts made by fund houses and STP operators to understand the local requirements and educate distributing banks, three more banks implemented STP solutions in December 2008. It has been reported that more banks are currently in the testing phase.

## 5. ANALYSIS

In this section, we consider the different assumptions about STP adoption held by fund houses /STP solution providers headquartered in Europe on the one hand, and the distributing banks in Taiwan on the other. In particular, we identify three key frame domains (as illustrated in Table 3) where incongruence has occurred:

- *Nature of STP*- refers to the stakeholders' understanding of the concept of STP for fund transactions;
- *Business value of STP*- refers to the stakeholders' assumptions about the organizational benefits of STP implementation;
- *Implementation Requirement*- refers to the technical and business resources required for STP implementation

### 5.1 Frame Incongruence in the Early Phase of an STP Project

In the case study, we found that the fund houses and STP solution providers approached the Taiwan market based on their experiences in Europe and assumed that STP adoption would not present a major challenge. However, our findings indicate that the distributing banks did not have the same understanding about the nature of STP, its business value, and implementation requirements. Fund houses and STP solution providers consider that ISO 20022 messaging standards should be adopted to develop a transaction process that does not require manual intervention. With regard to the business value of STP, in the European context, the benefits are evident in terms of cost reduction, increased efficiency and meeting regulatory requirements. These experiences influenced European fund houses and STP solution providers in their discussions with distributing banks in Taiwan, as well as their interpretation and expectations of STP implementation. Initially, solution providers thought the implementation would be a straightforward extension of existing financial messaging standards; and fund houses assumed that their technological capability would be easily generalizable to the Asian context. Taken together, the assumptions of these two groups of stakeholders were optimistic at the outset of the STP adoption project.

However, the distributing banks interpreted the three frame domains differently. First of all, the banks had little knowledge about the nature of STP, and perceived that there is a general equivalence between the use of ISO 20022 messaging for STP and fax machines. When discussing the business value of STP, the banks felt that there would be no clear business advantage, since back-office processing tasks do not generate revenue for a fund. Moreover, because the banks could employ experienced staff at a comparatively low cost, managers found it difficult to identify clear business benefits. With regard to the implementation requirements, most managers expressed concern over the high up-front installation and messaging costs. They



also felt that with only seven fund houses committed to STP implementation and ISO 20022 messaging at the beginning of the project, the rate of automation was not sufficient to justify implementation. As Orlikowski and Gash (1994) pointed out, the existence of incongruent technological frames can lead to difficulties in system implementation and development. In our case study, we found that the different perceptions of technological frames between the fund house/STP solution providers on the one hand and the distributing banks on the other had a significant impact on the diffusion of STP in Taiwan market.

## 5.2 Intervention Strategies to Resolve Frames Incongruence

Since 2004, the fund houses and STP solution providers have employed various intervention strategies to influence and change the assumptions and perceptions of managers at the distributing banks in Taiwan. Some studies have suggested that if incongruent technological frames exist, effective communication, negotiation and education can be employed as driving mechanisms to achieve alignment of the frame domains among relevant social groups (Davidson 2002; Lin and Silva 2005; Ovaska 2005). We also observed the use of such mechanisms in our empirical investigation. Having realized that distributing banks did not share the same level of enthusiasm, fund houses and STP solution providers adopted several strategies to reframe the banks' perceptions and interpretations of the STP project.

First, to expand the knowledge of the banks' managers, the fund house and STP solution providers held a conference and a series of free workshops to explain the development of STP in Europe, the terminology of STP, and ISO 20022 messaging standards. Most of the speakers were affiliated with the European firms, but one local bank manager, who was enthusiastic about STP, participated in order to improve interest and awareness through local peer influence. Efforts to improve the knowledge of local banks were further supported by the dissemination of reports and press releases during and after the conference. In some talks, the speakers highlighted the benefits of extending the cut-off time, which would improve the quality of service the banks could provide to their end customers. This issue is particularly important for local banks as the competition between them is intense.

Second, when fund houses realized that acting individually was ineffective in persuading the banks to adopt STP, the AFAC was established to develop a collective approach to promoting the benefits and value of STP for Taiwan's offshore fund industry. The primary objective was to modify the banks' perceptions about the lack of common standards and the problem of integration. The consortium also engaged the banks in discussions about their concerns and requirements associated with the STP project, and invited some banks to participate in developing common standards. The rationale for such involvement was that it would help reduce the psychological distance between the fund houses and the distributing banks, and, at the same time, show that the consortium was committed to addressing the banks' concerns. Moreover,

the participation of the banks could help the fund houses identify the data fields that might be required for local fund market practices, and provide an early opportunity to test the system.

Third, to overcome the incongruence between the stakeholders' technological frames regarding the implementation requirements, the fund houses and STP solution providers tried to assuage the banks' concerns about economic constraints and the small number of participating fund houses. As shown by the case study, managers at the distributing banks could not see any advantages in adopting STP, since they perceived that the use of low-cost and experienced staff was sufficient to run the existing operation. To address these issues, the STP solution providers modified their pricing model and developed a more user-friendly and affordable system. The objective was to reframe the perceptions of the distributing banks regarding the economic burden and technological complexity of STP implementation.

At the end of the above reframing process, the fund houses and STP solution providers appeared to be developing a common approach that aligned with the expectations and assumptions of the distributing banks. The result further echoed Davidson's argument on "framing as a process- and context-dependent evolution within relevant social groups", and their progress from the understanding of what a technology might be used for to what it will be used for, and what it is used for, increasing their focus on certain features and applications (Davidson, 2006, pp 32). With regard to STP, reframing process is of certain interest. Because STP is basically a global initiative to create a unified trading process based on the ISO 20022 messaging standard, but is to be developed in the local settings where the technology is deployed. While the new networked and ubiquitous computing infrastructure holds a potential for radical service innovation, this potential has not been fulfilled. One of the major reasons accounting for the slow adoption of STP is that the global STP initiative was not well aligned to the local context and existing networks of Taiwanese distributing banks.

## 6. IMPLICATIONS

The previous analysis unfolds the perception and interpretation of different stakeholders on the nature and implementation process of STP. In this section, we derive our findings and analysis to develop three propositions. These propositions represent the implication and contributions to the existing knowledge (Lee and Baskerville, 2003).

***Proposition 1: The interpretation of global IOS diffusion is subject to both socio-organizational and economic context.***

Similar to other studies that have applied technological frames analysis, our findings indicate that different groups of stakeholders can have diverse interpretations and assumptions about the same technology (Barrett 1999; Orlikowski and Gash 1994). Furthermore, as Robey et al. (2008) pointed out, the economic and social context of IOS implementation is likely to

be more challenging and significant when IOS diffusion becomes more globally dispersed. Our data shows that early perceptions and assumptions about an STP project are shaped by the economic and social environments of the relevant social groups. For example, the difference in labour costs between Europe and Taiwan led to distinct interpretations of the business value of STP. The maturity of the financial markets in Europe and Taiwan also influenced the stakeholders' early understanding of the concept of STP. Our findings are in line with those of other scholars who have stressed the significance of the local context in studies of ISO adoption. (Boh et al. 2007; Hsiao 2007), and provide further empirical evidence to support Robey et al.'s (2008) position on the value of the socio-cultural perspective in post-EDI adoption research.

Our study also contributes to the literature on the interpretive process of IT and organizational actions. Specifically, the theoretical contribution lies in the use of the technological frames model as the analytical approach. Our work goes beyond traditional technological frames analysis within the organizational context and confirms the value of this theoretical framework at the inter-organizational and industry level (Davidson, 2006; Chiasson & Davidson, 2005). Specifically, this study looks outside the organizational "box" and include the institutional setting of the organizational environment that shapes organizational members interpretations and actions related to a financial IOS. In organizational studies, neo-institutional theorists consider the role of institutional isomorphism, such as coercive, mimetic and normative forces, in influencing an organizations' decision about the adoption and assimilation of new ideas (DiMaggio and Powell 1983). We found that the geo-economic environment can be used to separate firms into different institutional contexts, so that it is possible to establish clusters of relevant social groups despite the globalization of financial markets. European-based fund houses view STP as a means of meeting the Basel II regulatory requirements. On the other hand, the financial supervisory authority in Taiwan does not impose the bank to implement STP as part of requirements to reduce operational risk. The lack of mandatory requirements has a great impact of the motivation of the distributing banks in Taiwan to invest financial and technological resources in STP projects. This is an example of how coercive isomorphism shapes stakeholders' assumptions. However, such a force is not evident in the Taiwan market.

***Proposition 2: The internal organization structure can play a role in influencing the adoption of IOS diffusion***

A priori, it may not be evident that small firms should have more difficulties with IOS diffusion than do large organizations; in fact some authorities claim that they do not. But the types of problems faced by small firms are certainly different to those confronting large ones. The differences find their expression in resource availability and in the degree of formalization of organizational system. Our findings reveal that firm with better resources not necessary means that it is easier to achieve internal approval to implement IOS. The likelihood of success in adopting IOS, at the corporate level, is lower in decentralized than in centralized organizations.

The major problem is to ensure that the system built by different divisions can communicate with one another; if this is not done, the firm may find itself with a number of independent systems, which cannot be aggregated or compared. This would imply that the interaction of industry structure and IOS is clearly an area requiring further investigation. In our research, we see the STP projects will succeed to the extent that expectations are constrained from below by motivation and from above by reality. Local banks develop its own pride and “know-how” procedure with respect to fund trading. This attitude is set by the dominant view of MIS staffs held by older members of the investment fund industry. We find its expression in the expectations, preconceptions and attitudes prevalent in the sensemaking of STP concept during our interviews.

In our case findings, what might be more noteworthy is that “top management support and the power of IT department within the firm (local) and collection action (industry level) lead to the first adoption.” Proposition two is interesting given that it adds to the resource based view (Teece et al. 1997) in the sense of indicating that differential firm performance is fundamentally due to firm heterogeneity rather than industry structure, and focus on those resources that are housed within the firm. In fact, the advantages and disadvantages of the firm often link to relationship of industry network in which the firm is embedded. Therefore, a firm’s critical resources and capabilities may extend beyond the organization boundaries, or even extend to the inter-firm routines and processes (Dyer and Singh 1998). This proposition also brings a practical implication for inducing technological changes in industries. For example, vendors concerned to diffuse IOS innovation may show potentially friendlier and more advanced version of innovation to distributing banks so that the latter may start demanding a technological shift. Yet, IS department staffs from distributing banks will thus concentrate on aspects of the systems that may be attractive to the trust department staffs. In our case finding, this implies that, indirectly at least, the size of the organization affects its prospects for success with IOS diffusion. Given the top management support, the power of IT department within the firm, and lack of consensus for a collective action, this implies that the likelihood of success in diffusing IOS, at the industry level, is requiring a certain collection action within and across firm boundaries. In our case, this was achieved by frequent industry forums and conferences which engaging the current and potential user groups in discussions about the benefits and criticisms of IOS diffusion.

***Proposition 3: The success of IOS diffusion is subject to the development of organizing vision among industry members***

Organizing visions are ideas about organizational application of information technologies. New IT can be an important driver in the production of organizing visions (Swanson and Ramiller 1997, p. 467). By creating, participating, and being influenced by the STP discourse, distributing banks do not operate in a vacuum when they consider whether to adopt and implement STP. From previous IS literature, IT innovations are predominantly studied from

an economic-rationalistic model (Attewell, 1992; Fichman, 2004). Alternatively, based on an extensive literature study on IT innovations, Fichman (2004) proposes several qualitative perspectives that can be taken, including management fashions (i.e. Abrahamson, 1991) and mindful innovating (i.e. Swanson and Ramiller, 2004). In this sense, our case findings not only confirms those early propositions but also to suggests that frame congruence (organizing vision) can be achieved as the result of purposeful (collective) actions from those competing in the industry.

Furthermore, our findings show that the process of framing and reframing provides the empirical evidence on how members of a community develop and utilize organizing vision. We argue that understanding and managing the interpretive process can facilitate effective deployment of a globally dispersed IOS. In particular, if incongruent technological frames exist, the dominant relevant social groups can determine the intervention strategies used to reframe the expectations and assumptions of other stakeholder groups. In this case study, the dominant relevant social groups are the fund houses and STP solution providers, given their assertiveness in pushing for the diffusion of STP in Taiwan's offshore fund industry. Initially, these groups worked together to cultivate the idea of STP as an 'organizing vision' (Swanson and Ramiller, 1997) in order to facilitate communication and discussion during the reframing process. Through conferences, reports and newspaper articles, the dominant relevant social groups attempted to create favourable and positive interpretations of the organizational implications of STP implementation. For instance, inviting the manager of one bank to speak at a conference enhanced the salience of STP and reframed the assumptions of potential adopters about the business value of STP. We extend our support to the scholarly studies of organizing vision that is "interpretive and rhetorical construction" shaped by institutional, economic and societal perspectives simultaneously.

With respect to its practical contribution, this empirical investigation calls for increased organizational-level awareness of how different interpretations and expectations can have a strong impact on IOS implementation, especially when the diffusion involves organizations from different institutional contexts. By adopting an interpretive process, different stakeholder groups can discover incongruent technological frames that may affect IOS adoption and assimilation, and identify specific areas of disagreement. It is then possible to formulate appropriate social and institutional actions to address incongruence in the assumptions of the relevant social groups. In addition, frames analysis allows organizations to trace changing interpretations, and assess the effectiveness of intervention strategies over time. We consider that early identification and determination of key areas of incongruence among different stakeholder groups would lead to smoother and better management of the diffusion of a globally dispersed IOS.

## **7. CONCLUSION**

The motivation for this study is to deepen the understanding of IOS diffusion beyond organizational and national boundaries. The empirical investigation focuses on three groups of stakeholders in Taiwan's offshore fund industry. Specifically, we apply technological frames analysis to examine the expectations, perceptions and knowledge of different stakeholders in Europe and Taiwan about the nature and value of STP implementation. The concept of technological frame is applied to enhance the knowledge of the outcome of fund industry members' interactions and sense making of STP. The findings demonstrate that the relevant social groups in different institutional contexts hold diverse views about the introduction of STP to the Taiwan market. Such differences create incongruent technological frames, which hinder the assimilation process. Collectively, the theoretical and practical implications of this study add to the processual understanding of STP innovation from global initiatives to its subsequent local diffusions. Our progress echoed Davidson (2006)'s call on more dynamic perspective on frame change as an ongoing interpretive process, triggered by a variety of organizational circumstances, could help to move technological frame research beyond the well established tenets, compared to earlier studies mainly based on snap-shots in time. We also find that relevant social groups gradually achieve frames congruence through communication, education and negotiation at the inter-organizational level. Therefore, we hope that the rich insights provided by this empirical investigation will stimulate further research on the social and contextual issues that affect the adoption and assimilation of a global IOS in other industries.

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Table 1 : Interview / Conference and Workshop Information

Date	Type of Organizations	Interviewees
October, 2008	Local IT vendor	Senior Manager
November, 2008	Fund house	Senior Manager
November, 2008	International bank	Vice President
November, 2008	Local bank	Assistant Manager and Senior Vice President of IT department
November, 2008	International bank	Senior Vice President, institutional fund services
December, 2008	Local bank	Senior Assistant Vice President, Trade Finance Application Department
December, 2008	Global STP provider	Vice President, investment fund services
December, 2008	Global STP provider	Head of Operation
December, 2008	Global STP provider	Senior Vice President
January, 2009	Local bank	Senior Vice President, IT Department
February, 2009	Local bank	Assistant Manager, Trust Department
February, 2009	Local bank	Senior Vice President, Trust Department
March, 2009	Local bank	Senior Manager, Trust Department
March, 2009	Local bank	Manager, Trust Department
March, 2009	Local bank	Senior Manager, Trust Department
March, 2009	Local bank	Senior Vice President, Consumer Banking
March, 2009	Local bank	Manager, Trust Department
March, 2009	Local bank	Assistant Vice President, Trust Department
April, 2009	Local bank	Assistant Vice President & Section Chief
April, 2009	Local bank	Vice President, Trust Department
April, 2009	Local bank	Vice President and Division Chief
May, 2009	Global STP provider	Manager, Securities
December, 2009	Local bank	Senior Vice President, Trust Department
December, 2009	Local IT vendor	Team Manager, Financial Solution
December, 2009	Local bank	Assistant Vice President, Trust Department
January, 2010	Local Bank	First Vice President, Application System Department

Date	Conference/Workshop
December, 2004	Fund Automation and Solution Workshop
August, 2005	Fund Masterclass
November, 2006	Fund Masterclass
November, 2007	Fund Distribution and Automation Conference
July, 2008	Fund Automation Forum
November, 2008	Fund Distribution and Operation Conference
March, 2009	AFAC Meeting
May, 2009	Taiwan Fund and Securities Automation Summit
July, 2009	AFAC Meeting
January, 2010	AFAC Meeting

Table 2 : Summary of the three relevant social groups

Group	Element / Composition
European Fund House	<ul style="list-style-type: none"> <li>- share common assumptions about STP value added business solutions</li> <li>- 10 fund houses based in Europe</li> </ul>
Global STP Solution Provider	<ul style="list-style-type: none"> <li>- share a common belief in the application of STP and its functionality</li> <li>- 3 STP Solution Providers</li> </ul>
Local Distributing Bank	<ul style="list-style-type: none"> <li>- share a common geographic location and socio-economic status</li> <li>- 15 distributing banks that have active offshore funds in Taiwan</li> <li>- There are a total of 15 financial holdings companies and 37 domestic banks in Taiwan.</li> </ul>

Table 3 : Summary of the frame domains and their content

Frame Domain	Fund House/ STP Solution Provider from Europe	Distributing Banks in Taiwan
Nature of STP	<ul style="list-style-type: none"> <li>- Use ISO 20022 messaging standard</li> <li>- An established practice in Europe</li> </ul>	<ul style="list-style-type: none"> <li>- Use fax machines</li> <li>- Do not have knowledge about the STP concept</li> </ul>
Business value of STP	<ul style="list-style-type: none"> <li>- Complies with regulatory requirements</li> <li>- Reduces labour cost</li> <li>- Increases operational efficiency</li> </ul>	<ul style="list-style-type: none"> <li>- No significant business benefit;</li> <li>- No clear benefit in replacing experienced and low cost staff</li> </ul>
Implementation Requirement	<ul style="list-style-type: none"> <li>- Easy implementation because the banks use SWIFT messaging for other services</li> <li>- Low implementation costs</li> </ul>	<ul style="list-style-type: none"> <li>- High up-front implementation and messaging costs</li> <li>- Difficulties in testing</li> <li>- Not all fund houses have adopted the ISO 2002 messaging standard</li> </ul>

