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ADOPTED GLOBALLY BUT UNUSABLE LOCALLY: WHAT WORKAROUNDS REVEAL ABOUT ADOPTION, RESISTANCE, COMPLIANCE AND NONCOMPLIANCE

Research Paper

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Abstract

We undertake an exploratory case study to investigate how warehouse employees work around an Enterprise Resource Planning software that cannot be used as designed due to work practices required by local conditions. Our research illustrates how long-standing approaches to studying IS innovation, adoption and diffusion in relation to fixed IT artefacts say little or nothing about important phenomena and practical issues. We draw on theories of work systems and IT innovation, adoption and adaptation to explain both why workarounds are required and how they are enacted. Our context involves the local Hong Kong operations of a global retailer of home textiles. Our 29 interviews at the site reveal many perspectives about how an inadequate information system failed to support essential work practices and how employees at the site responded by creating shadow IS that helped them pursue their business responsibilities and objectives. We draw on a compliance view of technology use to suggest that unreflective compliance can be counterproductive; paradoxically, reflective non-compliance may bring greater benefit to both the organisation and its customers. We conclude with nine implications of our findings for practitioners and for researchers interested in IS innovation, adoption, and diffusion.

Keywords: Workarounds, Compliance, IT Governance, Enterprise Resource Planning (ERP), Shadow IS

1   Introduction

This paper presents a case study that reflects and amplifies central points in the CFP of the ECIS 2019 track on IS Innovation, Adoption, and Diffusion, viz.: "Many of our core theoretical perspectives derive from the time when computers were new and unknown to many individuals" and "when computers were unfamiliar to many organisations". Variables such as perceived ease-of-use and perceived usefulness seem mundane now, when it is common to download free apps, play with them a bit, and decide whether they might be worth using. In all but the smallest organisations, standardisation and efficiency needs outweigh individual preferences and perceptions and call for mandatory and consistent usage of corporate IS such as Enterprise Resource Planning (ERP) and Electronic Medical Records (EMR) systems. Simultaneously, spreadsheets and other tools provide much greater capability to produce localised 'shadow IS' that bypass aspects of corporate systems in situations where the corporate systems prove inadequate.

Moving beyond adoption of fixed IT artefacts. The current environment calls for a holistic approach that goes beyond focusing on variables that contribute to adoption, installation, and usage of fixed IT artefacts. From an organisational perspective, the key issue is achieving business value, which often requires substantial adaptations that begin when shortcomings of the original IS/IT innovation or its organisational implementation become apparent.

Those adaptations frequently take the form of workarounds rather than official, fully recognised modifications of the hardware/software configurations or expected work practices. Employees have a choice about what to do about unrealistic expectations of using an inadequate IS that renders them inefficient or ineffective. One approach is to do the best they can with whatever technical and informational resources are provided. An alternative approach is to work around the inadequate IS, in essence resisting expectations of conformance to externally imposed software-controlled practices to achieve better ways to achieve desired outcomes. Paradoxically, workarounds are sometimes highly beneficial to organisations even when they violate corporate governance expectations. Business professionals often depend on workarounds to accomplish tasks when the official software is inadequate for the intended purpose (Alter, 2014, 2015; Davison and Ou, 2018). Similar phenomena appear in many accounts of medical practitioners working around aspects of otherwise useful EMR systems that obstruct their everyday work practices (e.g., Koppel et al. 2008; 2015; Gawande 2018).

Goal and organisation. The research gap associated with this phenomenon concerns developing a deeper and more dynamic understanding of workarounds and other adaptations in the context of IS innovation, adoption and diffusion. Our broad research question is: How do workarounds and other adaptations by business professionals help them attain desired business results even when those actions override corporate expectations? Seeing IS innovation, adoption, and diffusion from this viewpoint changes the focus by emphasising operations and business value instead of individual perceptions and preferences.

The context of our research involves an exploratory investigation into the Hong Kong operations of Scatex, a Europe-headquartered, globally-operating conglomerate that employs close to 200,000 people worldwide. The focus of our investigation is the warehouse that receives all international shipments and distributes goods around Hong Kong. The dominant IS in use across Scatex's global operations is Navision, an ERP software that is part of the Microsoft Dynamics suite of applications.

This introduction leads to a literature review that mentions inadequate IS, workarounds that try to compensate for IS inadequacies, and past research related to IT innovation, adoption and adaptation in organisations. We outline our research methods, which are oriented around a case study that draws on interviews with 29 employees in Scatex's Hong Kong warehouse. We employ work system theory (WST) (Alter, 2013) and a systems theory of IT innovation, adoption and adaptation (Alter, 2018) in our analysis of the case and discuss implications of our findings for practitioners and researchers.

2 Literature Review

This literature review summaries relevant aspects of research related to inadequate IS, particularly in the context of work systems, workarounds, and IT innovation, adoption, and adaptation.

2.1 Inadequate Information Systems

The very considerable literature that deals with the adoption and use of IS in organisations is remarkable for a pervasive yet curious omission: there is very little attention to contexts where technology provided for employees is inadequate for their needs. A key contributing factor to this omission is the way much research associated with IS adoption and use focuses on behaviour at the intention or pre-adoption stage, up to the point of technology usage, yet seldom engages in a more careful examination of post-adoption usage, except in longitudinal studies that examine continuous usage. An exception to this omission can be identified most readily in the limited literature that deals with resistance to technology as well as the associated workarounds that employees sometimes devise. The literature on resistance often involves modification of work practices by employees who find that the technology obstructs their natural or preferred work practices. Although the resisted technology may not be described in this literature as 'inadequate', this is often an appropriate term to use.

McAfee (2003) suggests that resistance to IS is widespread, even as it is relatively understudied (Lapointe and Rivard, 2005; Azad and King, 2008). The inadequacies that constitute the antecedents for resistance include poorly designed applications, inappropriate management expectations about employee behaviour, employee reluctance to use IS as designed and other socio-technical factors. Most early researchers viewed resistance negatively (e.g., Cook and Brown, 1999; Landry and Bristow, 1988; Kossek et al., 1994), seeing it as a form of opposition to or subversion of managerial control (e.g., Ferneley and Sobreperez, 2006). Other scholars held a more positive view, recognising that IS can be poorly designed, inadequate or unfit for purpose (e.g. Mumford et al., 1978; Markus, 1983; Ignatiadis and Nandhakumar, 2009). In such cases, resistance may be the only viable option.

2.2 IS in the Context of Work Systems

Socio-technical systems researchers and practitioners have recognised for decades that a "work system" is a natural unit of analysis for describing and improving socio-technical systems in organisations (e.g., Trist 1981; Mumford, 2006). According to WST, a work system is a system in which human participants and/or machines perform processes and activities using information, technology, and other resources to produce product/services for internal and/or external customers (Alter, 2013). A work system operates in an environment that includes: national, organisational and professional culture, policies and history; competition; technological change; other internal and external stakeholders. Work systems rely on human, informational, and technical infrastructures that are shared with other work systems. An IS is a work system, all of whose activities are devoted to capturing, storing, retrieving, transmitting, manipulating and/or displaying information.

2.3 Workarounds

There are many examples of workarounds in IS and other fields. Prominent examples include Ignatiadis and Nandhakumar's (2009) study of employees developing workarounds in order to by-pass controls in ERP, and Subramaniam et al.'s (2013) documentation of "the workarounds users devise to deal with the challenges of incorporating ES (Enterprise Systems) packages into everyday work routines". More recently, Davison and Ou (2017) analysed how employees at a chain of hotels in China created workarounds to overcome IS inadequacies.

Alter (2014) integrates a larger body of workaround research into a complex process theory of workarounds, with an analysis of different types of workaround types and rationales for workarounds. Alter (2014, p.1044) defines a workaround as follows: "a goal-driven adaptation, improvisation, or other change to one or more aspects of an existing work system in order to achieve a desired level of efficiency, effectiveness, or other organisational or personal goals by overcoming, bypassing, or

minimising the impact of obstacles, exceptions, anomalies, mishaps, established practices, management expectations, or structural constraints that are perceived as preventing that work system or its participants from achieving their goals".

A corporate governance perspective frame treats workaround behaviour in terms of compliance. Alter (2015) notes that compliance with organisational expectations can be detrimental to the organisation and/or the employee in some situations, while non-compliance can be beneficial in other situations. Non-compliance may appear in workaround behaviour (see also Andrade et al., 2016). Workarounds can be expected to undergo development, with stages of learning, experiencing, diffusion and feedback (Safadi and Faraj, 2010). A workaround may be a temporary fix to an immediate problem or anomaly (Kobayashi et al., 2005), creating short-term value before disappearing when software is updated or work processes change. Alternatively, the value of a workaround may be more generally appreciated by managers and institutionalised into regular organisational practice and routines (Pentland and Feldman, 2008). Not all managers are so enlightened: some workarounds may always exist in the shadows if they run counter to established and seemingly immutable organisational norms. Workarounds addressing the inflexibility of standardised ERP often involve importing and exporting data to and from Microsoft Excel, where data can be further analysed and consolidated (Soh and Sia, 2004).

2.4 IT Innovation, Adoption and Adaptation

The corporate ERP initiative in our case study is an IS innovation that was adopted and then adapted for specific corporate requirements. IS adoption research to date has focused on three broad contexts. Much of this research involves conceptual models that are tested based on the statistical significance of relationships between variables. Many of the independent variables are perceptions or beliefs such as perceived usefulness, perceived ease-of-use, performance expectancy, social influence, and satisfaction. The most widely cited model that describes antecedents and correlates of adoption is the technology acceptance model (TAM) (Davis, 1989) and its many derivatives. Such models "tell us very little about how and why specific classes of IT tools and technologies are adopted and used" (Grover and Lyytinen, 2015). These models fall within what Ramiller and Pentland (2009) call the "variables-centered" research paradigm, which "appears to distance researchers from the organisational actors, such as managers, to whom they would give advice and counsel".

Karahanna et al. (1999) examine continued IT use through theoretical models based on pre-adoption and post-adoption beliefs about the adoption or use of IT. If adoption is voluntary, those beliefs and attitudes lead to behavioural intentions about adoption and usage. Hypotheses in Bhattacherjee's (2001) expectation–confirmation model express relationships between perceived usefulness, confirmation, satisfaction and IS continuance intention. Limayem et al. (2003) move toward an integrative model that spans adoption and post-adoption by including attitudes, subjective norms, perceived behavioural control, behavioural intention, and initial usage. Initial usage enables IS continuance, which is affected by perceived usefulness, confirmation, and satisfaction, leading to continuance intention.

Other research addresses post-adoption phenomena. Ahuja and Thatcher (2005) trace the impact of four variables on: trying to innovate, autonomy, overload, autonomy/overload interaction, and gender. A model of post-adoptive behaviour in Jasperson et al. (2005) includes both an organisational action model linking work system outcomes, sensemaking and interventions, and an individual cognition model that includes post-adoptive intentions, behaviours and technology sensemaking. Other variables include individual attention, individual differences, use history, and user-initiated learning interventions. Sorgenfrei et al. (2014) propose a reference framework for IT adoption that starts with five categories of antecedents and contextual factors that contribute to a series of beliefs which lead to motivation, use, post-acceptance beliefs, post-acceptance motivation, effective use and outcomes.

Most of this research focuses more on perceptions, attitudes, and related variables than on achieving business value. For example, a recent literature review (Laumer et al., 2016) related to objects of user resistance to IS implementations noted that most of the objects of resistance involved individual perceptions focusing on the technology itself as an object of resistance. That study used WST to expand

the topic by treating both technology and work routines as objects of resistance. In addition to perceived ease-of-use and perceived usefulness it introduced perceived ease of executing work routines and perceived usefulness of work routines. Our research continues this direction: we employ a case study to highlight workaround and adaptation actions that follow from initial perceptions related to technology, work routines, and other factors. We apply an extension of WST to focus on how business professionals organise available resources to achieve business value even when the prescribed software is inadequate for their work needs.

2.5 A Work System Perspective on IT Innovation, Adoption and Adaptation

Our case analysis builds on the above literature by integrating a holistic "systems theory" of IT innovation, adoption and adaptation (Alter, 2018). Our analysis reflects the six parts of this systems theory that can be summarised as follows: in organisational settings, the entity that is adopted, adapted or improved in IT innovation is a work system that uses the new IT capabilities. The adoption of the IT rarely matters if other parts of the work system do not change. Common drivers and obstacles to IT-related change are associated with different parts of the definition of a work system, such as customers, product/services, processes and activities, participants, information, and so on. IT innovation in organisational settings goes through five stages related to the work system life cycle model (Alter, 2006, 2013). The stages are impetus, invention, implementation, post-implementation improvement, and routine operation. Three common catalysts in the micro-dynamics of IT innovation in organisational settings relate to the way participants *need*, *understand* and *like* the innovation. Each catalyst can operate at: 1) the individual level (by affecting acceptance vs. resistance); 2) the level of management vs. employee (agreement or disagreement for each catalyst); and 3) the group or organisational level (related to business impacts and benefits). Compliance, non-compliance and workarounds may occur at any point in the evolution and implementation of an innovation, and can have positive or negative effects. The same IT innovation may elicit multiple, inconsistent evaluations from different stakeholders who have different concerns. Below we detail the case and the subsequent analysis using these six parts of the systems theory.

3 Research Context and Methods

Scatex is a global firm in the home textiles industry. Prior to 2010, each of Scatex's global operating sites had the freedom to implement and operate ERP on a local basis. In Hong Kong, the local ERP software was Movex M3. As part of a strategic shift in 2010, Scatex's global headquarters (HQ) decided that a single standardised ERP should be implemented in all operating locations. This was to be Microsoft Dynamics' Navision. The global roll out took several years. As one of the last locations, Hong Kong finally went live in November 2016. Scatex Hong Kong's Distribution Centre Manager informed us that the Hong Kong office had long resisted the installation of Navision, arguing that unique characteristics of the local environment had a poor fit with Navision. These objections were robustly rejected by Scatex's global ERP project team. Navision was implemented and Movex was removed. Navision has five installations in Hong Kong: one in each of the four retail stores and one more in the consolidated warehouse that services the four stores.

Our investigation focuses on the use of Navision by a variety of employees. In order to minimise bias (Myers and Newman, 2007), we selected employees who work in different job functions and at different levels. These employees work in the Hong Kong warehouse that processes all inbound freight traffic from suppliers and distributes products to both retail stores and individual customers in the greater Hong Kong region. We interviewed 29 employees (14 female and 15 male) of the 199 who work in the warehouse. Table 1 indicates the job titles of interviewees, and explains the two-letter codes, e.g. [PC], used to identify interviewees in the text. We developed a detailed interview protocol in English, but the interviews were conducted primarily in Cantonese, the language most widely spoken in Hong Kong. Interviews averaged 30 minutes, were recorded and were first transcribed into written Chinese before being translated into English. The translated transcripts for 29 interviewees contain a total of 20,995 words. A thematic and inductive interpretive analysis of the interview transcripts organised this material

into seven major themes according to our research: routine duties at work, problems or deficiencies associated with Navision, workarounds developed by the employees to solve problems associated with Navision, evaluation of Navision, use of social media applications in the workplace, thoughts on training offered by Scatex, and thoughts on the IT governance policy of Scatex. These interviews form the primary data source out of which we develop our case study.

Code	Job Title	Code	Job Title
CL	Logistics Trainee	MS	Product Quality Specialist
DW	Customer Delivery Supervisor	NF	Business Navigator
EC	Logistics Trainee	PC	Recovery Manager
IL	Warehouse Business Manager	RL	Goods Flow Team Leader
IY	Goods Flow Manager	RY	Warehouse Manager
JA	Customer Delivery Supervisor	SA	Logistics Trainee
JK	Customer Delivery Supervisor	TA	Sales and Supply Support Specialist
JL	Warehouse Goods Flow Manager	TI	Business & Operations Manager
LT	Customer Delivery Coordinator	YE	Admin Specialist
MA	Senior Inventory Control Manager		

Table 1.   Codes and Job Titles of Interviewees Referred to in the Text

3.1   Case Description

Although Navision is supposed to create value for Scatex, its design limitations created problems instead of facilitating some daily activities in Hong Kong. We start the case description with an identification of the problems that the employees experienced, followed by an examination of the workarounds that employees devised to cope with the problems. Subsequently, we interpret the case through a theoretical lens premised on the previously mentioned systems theory of IT innovation, adoption and adaptation (Alter, 2018).

3.2   Problems that Employees Experience with Navision

The change from Movex to Navision necessitated changes in process logic that appear to have been poorly communicated, for many staff informed us that they did not understand why it was necessary to change from Movex to Navision. They also noted that the previous work flows did not fit Navision's new standard operating procedures. [PC] is typical, noting "…the system doesn't fit the current workflow … our workflows are continuously changing". Navision supports some of the standard work processes undertaken at Scatex, but our interviewees were able to identify areas where Navision could not support work that they needed to accomplish. [IY] commented that "the pre-set logic of Navision was developed for Scatex's global workflow". This makes sense in most locations, but fails to reflect unique requirements related to essential business activities in specific locations.

For instance, [MA] explained that a key discrepancy between the normal work flow in Hong Kong and the globally standardised work flow, as designed into the software, concerns what is referred to as 'delay picking'. In most Scatex retail locations, a purchased item that needs to be delivered to a customer (not taken away in person) is typically removed from the storage facility or warehouse (usually proximate to the store) and earmarked for delivery. This process is known as 'instant picking' because the item is instantly picked from the warehouse. However, instant picking is not possible in Hong Kong since: a) the four stores do not have their own individual warehouses; instead, there is a single consolidated warehouse that services all four stores; b) there is inadequate storage space for picked items in the warehouse; and c) the delivery teams are outsourced contractors whose schedules do not allow for immediate delivery. When a purchased item needs to be delivered, the customer receives a range of possible delivery dates depending on the delivery location. More remote locations may see only one delivery per week. Since storage space in Hong Kong is at a premium, items are generally left in the

warehouse inventory until the night before delivery, hence the term 'delay picking'. Navision cannot accommodate delay picking. Its design assumes that a purchased item is immediately removed from the warehouse and earmarked for delivery. The store where the item was sold updates its Navision database to reflect the sale, but the warehouse's Navision database is not updated until the item leaves the warehouse for delivery to the customer, which may be several days later. This creates discrepancies between inventory levels across different databases and requires the distinction between total inventory and saleable inventory. Total inventory includes saleable inventory, sold but not yet delivered items and also returned items.

A second problem with Navision relates to data importing and analysis. As [CL] explained, Navision "does not permit batch importing of data" from an external source such as shipping arrivals. Items must be entered into Navision manually, one by one. As [TI] further indicated, "if you need to import 1000 items you must do 1000 data entries manually, one at a time". [IL] observed that importing from an application like MS Excel would be much easier, but Navision does not currently provide a data importing function. Further, even when data is imported, it is not instantly updated across the five Hong Kong databases of Navision [YE]. The lack of immediate synchronisation creates inconsistencies across the databases, with some showing outdated stock levels [EC]. As [MS] pointed out "imagine that there are 100 items in the warehouse and that this data is synchronised across all four stores. Let's say one store records an order of 50 items (and 50 remain); the inventory level will not be updated immediately to all the stores, so another store may order 70 or 90 items, not realising that only 50 are available. … Navision cannot update the inventory levels in real time". Furthermore, several employees reported that Navision has very limited functionality for data analysis, such as sorting [JL], forecasting [JK], delivery management [MS], report generation [TA], delay picking management [RY], handling of oversize items [RL], and checking delivery details [LT].

A more serious problem relates to delivery rescheduling. An extreme weather event in Hong Kong, such as a typhoon, causes all deliveries for several hours or days to be cancelled and rescheduled. Since it is impossible to do a batch reschedule in Navision, each delivery must be rescheduled individually for each customer [DW], which may be very time consuming if there are hundreds of orders. As [LT] explained "I take care of 600-700 orders per day. In the past (using Movex) it took 2-3 hours to get the work done, but now it takes more than 3 days if I use Navision".

Space constraints do not permit a full description of all the various problems experienced by Scatex's employees with respect to Navision. Nevertheless, the short set described above highlights how a globally standardised ERP that seeks to control all operations may not fit well with local practices that are beyond the control of the local employees, i.e., not just a matter of employee preference. Thus Navision, the global ERP that Scatex has rolled out, cannot cope with delayed picking, rescheduling, delivery via contractors or more sophisticated analysis of data. In order to accomplish these tasks, the employees created workarounds, which we examine in the next section.

3.3 Workarounds Created by Employees at Scatex

Although the employees describe a variety of different problems, it is remarkable that a single external application is employed in almost all cases to provide a workaround solution. That application is Microsoft Excel. Navision can only export data in xml format [CL], but employees routinely export this data to Excel where they clean it up so that they can process it in order to create reports, delivery lists for the outsourced delivery contractors, forecasts, and for other purposes. These Excel files are shared across the warehouse on share drives as well as by email [YE]. As a result, there is a huge amount of information that is only available locally, completely invisible to global managers who have access to Navision [SA]. Use of Excel in this way is clearly not compliant with the corporate expectation to use Navision, but as we heard consistently and repeatedly from different employees, since Navision does not have the requisite functionality, this non-compliant use of Excel is in effect mandatory, if an employee wishes to complete his/her work.

The Warehouse Manager [RY], one of our main informants about workarounds, commented extensively on Navision's inability to support local work practices that are necessitated by local circumstances. Since Navision cannot support a delayed picking process, all the customer delivery functions are managed through Excel. As [JK] reported "Basically 100% of my work requires workarounds". These workarounds include the generation of a report called a 'loading list' which is shared among colleagues from logistics and administration [YE]. If deliveries need to be rescheduled, this is also processed in Excel [DW]. [MS] noted that "we use Excel to manage deliveries. Excel enables us to acquire the data for delivery that is sent to the delivery contractor. … After gathering and sorting delivery information in Excel, we can determine the number of delivery vans required, the number of items to be delivered, the places to go, the payment to the drivers. Excel is used to handle all these arrangements. Without Excel there is no way to undertake the delivery of goods".

It is remarkable that the employees make no attempt to hide their workarounds either from each other or from their managers [JA]. They often talked about how they used share drives to share the Excel files amongst the different teams. [NF] related that "We tried to explain the situation to the boss, but he doesn't understand and suggests that we should not use workarounds. We ignore this and insist to use workarounds because we just want to get the job done". The visibility of the workarounds in Scatex's warehouse is remarkable: in the literature, workarounds are often described as kept deliberately in the shadows, out of sight of senior managers (e.g., Kopper and Westner, 2016; see also Röder et al., 2014 for examples of visible workarounds). In sum, as [LT] recounts "Every day we do our work in Excel rather than using Navision. We use Excel to integrate the information from Navision. We download the data from Navision to Excel, where we do the analysis. Most of the daily job routines involve Excel. … this workaround has become part of the regular work routine".

An underlying theme in this case study is whether HQ still obtains the information it needs despite non-compliance between actual work practices and work practice expectations from HQ. We pursue this issue by depicting the old and new Hong Kong work systems in a single view (Table 2) using the format of a work system snapshot, a semi-formal modelling tool at the core of the work system method (Alter 2006, 2013). The format of the combined view in Table 2 is augmented by noting whether Navision or Excel was used in specific activities. It is possible that Table 2 is incomplete in some ways because we did not have the opportunity to study Navision in detail. Table 2 focuses on processes, starting with inventory replenishment orders sent to headquarters and ending with post-sales transfer of sales data and other performance data to headquarters. Each step in the processes and activities section contains [N] if it uses Navision directly. The non-underlined text and the descriptions of original process in the work system snapshot present our assumptions about how the Hong Kong work system would operate if it operated in a manner that was completely consistent with Navision. The underlined text indicates the differences between the pure-Navision work system and the Navision + Excel work system. It appears that the Excel-enabled workarounds support HQ needs.

Customers	Product/Services
• End customers who buy Scatex's products • Headquarters operations • Headquarters marketing • Headquarters finance • Local management in Hong Kong • <u>Outsourced delivery contractors</u>	• Sale of items to customers • <u>List of customer order details for delivery</u> • Delivery of items to customers • Inventory replenishment orders • Sales and accounting data for local management • Sales and accounting data for headquarters

Major Processes and Activities	
• **Inventory control staff** determine replenishment requirements and submit orders to headquarters [N] • **Warehouse staff** receive and store replenishment orders to inventory [N] • **Customers** purchase Scatex's products at stores; Navision is used to record purchase transactions [N] • **Sales staff** create customer orders [N] • **Inventory control staff** <u>extract data from Navision [N],</u> <u>then manipulate it with Excel in order to pick and pack</u> <u>customer orders before delivery.</u> (***original process:*** *extract data from Navision [N] to pick and pack customer orders*) • **Customer delivery staff** <u>extract data from Navision [N],</u> <u>manipulate it with Excel plan for delivery capacity and</u> <u>create a delivery list for the outsourced delivery contractors.</u> <u>They also manage the rescheduling of delayed deliveries.</u> (***original process:*** *deliver customer orders*)	• <u>**Outsourced delivery contractors**</u> <u>deliver</u> <u>orders</u> (***original process:*** *does not exist*) • **Customers** receive purchased products • **Product returns staff** process returned goods [N] • **Forecasting staff** estimate future product demands [N] • **Local management staff** <u>extract data from</u> <u>Navision [N], and manipulate it with Excel</u> <u>to generate customized business analysis</u> <u>reports</u> (***original process:*** *view/generate business analysis reports [N]*) • **All staff** coordinate/share information across the stores and the warehouse using phone, email, WhatsApp and <u>Share Drives</u>

Participants	Information		Technologies
• Inventory control staff • Warehouse staff • Sales staff (in stores) • Customer delivery team • <u>Outsourced delivery contractors</u> • Product returns staff • Forecasting staff • HK managers	• Inventory levels • Replenishment orders • Receipt documentation for replenishment orders • Customer orders	• Delivery schedules • <u>Customer orders</u> • Deliveries • Returns to stores • Estimate of future demand by product	• Navision • MS Excel • Phone • Email • WhatsApp • <u>Share Drives</u>

Table 2.   *Work system snapshot of Hong Kong operations showing workarounds to supplement the inadequacy of Navision (workarounds related items are underlined)*

4   Discussion

We emphasise that while Navision is a software application, its implementation in support of the work systems at Scatex should also be seen in the context of a socio-technical system (Cherns, 1976). Navision must support the processes and activities performed by employees, e.g., picking items, arranging deliveries, ordering replenishments and managing returns. It is possible that Navision supports work effectively in some locations, but Navision lacks the functionality needed by some Hong Kong employees to complete their work tasks satisfactorily. While all employees are expected to use Navision, they also assume the discretion to ignore Navision if it is inadequate (i.e. to discontinue usage) and, where necessary, to adopt other technologies in a form of bricolage (Lévi-Strauss, 1966) in order to ensure that they can complete their work and satisfy customer needs. We find it remarkable that Navision fails to support necessary work practices effectively: the unique combination of local factors in the Hong Kong environment requires delayed picking, rescheduling, delivery via contractors, and other local practices. Therefore, in order to complete their work, employees have devised workarounds that largely depend on the use of Microsoft Excel. These workarounds support work practices in Scatex's Hong

Kong warehouse but do not comply with corporate expectations regarding the use of Navision. The following discussion of the Scatex case is structured around the six elements of a new systems theory (Alter, 2018), which covers: IT innovations as work system innovations; drivers and obstacles to IT innovations in organisations; how an IT-enabled work system innovation evolves in an organisation; three catalysts of IT innovation; the occurrence and impacts of compliant, non-compliant and workaround behaviour; the competing interpretations of the phenomenon.

IT innovations in organisations as work system innovations: In the Hong Kong warehouse, a well-established set of work practices has been developed. Historically, these were independent of any global standard or requirement. In 2010, Scatex's global HQ decided to adopt a standardised ERP worldwide, forcing all operating sites to adopt Navision. Thus, the IT innovation in this situation was supposed to be the adoption of Navision in Hong Kong. Seeing the IT innovation as a work system innovation reveals that the intended innovation did not happen and that the work system changed in ways not intended by the global implementation team. The discrepancies between global assumptions and local realities with respect to work practices reveal that the precise details of work systems may vary considerably across locations, even within the same global organisation and even when the actual work done is very similar. In short, the best way to accomplish a task will vary from situation to situation: it will often be dependent on local contingencies that are not amenable to forced change.

Drivers and obstacles to IT-related change: In any IT-related change effort, it is likely that there will be both drivers of the change as well as obstacles to its successful implementation. These drivers and obstacles will play a significant role in the eventual success (or failure) of the change effort (Gersick, 1991). In the local work system in Hong Kong, we are not able to identify any drivers in the local context, except the corporate decision from the HQ to adopt Navision. However, we can identify many salient obstacles, viz.: processes and activities, participants, technology, environment, infrastructure. The most significant obstacle was the employees' recollection of how they had not experienced task-technology fit problems with the former ERP software (Movex). Given these circumstances, which amount to a stable status quo or equilibrium and a well-oiled work process, there were few drivers of change and many obstacles that created inertia and impeded change.

Stages of IT-Enabled work system innovation: Five stages of IT-enabled work system innovation are identified in the systems theory (Alter, 2018), and all five are problematic in the current case. 1) The impetus for the formal innovation in Scatex neither came from a local problem nor seemed related to the needs of the HK site. 2) The decision to implement this IT innovation (Navision) was made in the corporate HQ. 3) The implementation itself was problematic, because of the poor fit between some of the unmodifiable work processes and the new technology. 4) Employees were forced to accept a new ERP that impoverished their working environment, and to abandon an old ERP that had fitted their working environment well. In consequence, they created workarounds that were basically post-implementation improvements in a work system that was partially hobbled by the new ERP. 5) The new workarounds were not limited to individual employees, but were institutionalised in a routine and transparent fashion in the local context. In effect, work practices that used Excel spreadsheets became incorporated into the institutional routines of several work systems in Scatex.

Three catalysts of IT innovation: The extent to which an IT innovation (Navision) is needed, understood and liked is related to its acceptance and ultimately its success. In the current case, a look at all three catalysts finds negative forces. The vast majority of our interviewees indicated that they did not need the innovation, did not understand why it was imposed on their work, and certainly did not like it, given the additional work that it created for them. These negative views were consistent across personnel at all levels in the Hong Kong warehouse. Although our case focuses on areas of mismatch between Navision's capabilities and local work practices, we note that Navision was used successfully for operational purposes such as sales, stock management and replenishment, and accounting. However, the warehouse employees were unable to identify any work processes that were improved as a result of Navision's adoption. The strength of the negative reaction is striking and it must be far from what corporate HQ could have imagined, suggesting a serious limitation in the original requirements analysis

that led to the acquisition of Navision. The inadequacy of post-implementation evaluation also prolonged the negative feeling surrounding the three catalysts of IT innovation.

Compliance, non-compliance and workarounds: The issue of compliance and non-compliance is complex. Employees spoke as though their primary sense of duty was to their customers. Indeed, Scatex is proud of its customer centricity and its desire to ensure customers are satisfied and their loyalty retained. Given this corporate focus on the customer, it is reasonable to assume that employees would accord customer satisfaction a very high priority. In these circumstances, it is fair to say that the Hong Kong warehouse employees were primarily focused on getting their work done (complying with local work norms) and satisfying customers in a reasonably efficient manner, given the constraints. As a result, compliance with a corporate mandate to use a specific ERP was a low priority, especially if this ERP compliance conflicted with work process compliance. The resulting workarounds are firmly entrenched into employees' daily work routines (Pentland and Feldman, 2008).

Competing evaluations: Our interviews revealed serious inadequacies associated with the Navision implementation in the warehouse, with somewhat different assessments from employees in a range of job functions, including inbound and outbound logistics, delivery, customer services, administration support, inventory management and recovery. Employees in different roles were affected to varying extents by the change to Navision, and so naturally evaluate the software differently. Virtually all the interviewees expressed a negative view about Navision. Some noted that they could get some of their work done in Navision, but not all. Others took a more extreme view and explained that essentially all their work required IT capabilities that Navision did not provide. Unfortunately, we could not interview the HQ team for their view about Navision's adoption or whether it had met their expectations.

5   Implications

The implications of this research can be summarised in the form of nine principles that are potentially useful to both practitioners and researchers interested in IS innovation, adoption and diffusion in organisational settings. These implications are less relevant when usage of an innovation is individual, voluntary, and outside of organisational settings that require coordination.

1. Focus on value not usage. The general topics of value and value creation have received a great deal of attention in marketing, strategy and IS under the heading of 'business value of IT'. In organisational settings, much of the value of IT occurs through being able to perform work more efficiently and effectively and being able to produce better product/services for customers, in other words, through usage to support value creation, not just adoption and usage of fixed IT artefacts. A basic paradox in the Scatex case is why HQ seemed insistent on using Navision capabilities that did not fit with realities of the Hong Kong operation. Although Scatex adopted Navision, it was not fully adopted in Hong Kong. Despite our best attempts, we were not able to interview the corporate IT staff to find out whether they understood the physical limitations and constraints in Hong Kong. What we perceive as a disconnect between a corporate staff and users is not unique to Scatex. Reimers (2003) included somewhat similar issues in a SAP implementation in an international firm. An emphasis on attaining value has direct implications for practitioners, who should visualise IS/IT projects as being about attaining benefit from specific uses of IS/IT rather than mostly about attaining implementation or usage of technologies. For researchers, this implies looking less at individual perceptions and preferences and more at actions that occur along the path from innovations to acceptance and adaptation as organisations try to capture value from IS/IT. Unfortunately, Scatex in Hong Kong does not seem to have received significant value from Navision.

2. Recognise differing needs and interests of different stakeholders. The previous section noted that different employees who were affected to different degrees by the switch to Navision all found it inadequate but expressed different views of its inadequacies. Other stakeholders whom we could not interview might have expressed quite different views. For example, the work system snapshot in Table 2 implies that some HQ stakeholders might be satisfied with attaining their own informational needs related to replenishment and accounting activities even though the workarounds and other adaptations

in Hong Kong constituted non-compliance with corporate mandates. Other IT and HQ stakeholders might be quite concerned about inadequate traceability and vulnerability to shadow IS work done by employees who might be IT amateurs and who might not be aware of corporate IS quality standards.

3. Think of IS innovation as innovation in a work system. Except for innovations focusing on technical infrastructure that is largely invisible to users, the reason for pursuing IS/IT innovations is to attain better business performance, which occurs through better work system performance. For practitioners, this implies that IS/IT innovation projects are basically work system innovation projects. The plan for performing those projects needs to include verifying the feasibility of the expected business processes in their actual settings. For researchers this implies that correlations between various factors and individual psychological and perceptual variables may touch on important issues that can be described much more directly by examining the work systems affected by the innovation.

4. Think of adoption as much more than installation and some degree of use. The work system snapshot in Table 2 says that Navision was adopted and used for worthwhile purposes but required major workarounds because it could not be used in a fashion consistent with designers' expectations. For practitioners, this says that a simplistic view of adoption as a goal or milestone is of limited value. IS creates real value when it sees sustained use over time, long beyond initial implementation. For researchers, it says that a focus on traditional TAM-like variables may highlight some issues, but in cases such as this one could easily miss the bigger picture. A richer appreciation of the nuances in the local context is essential to an understanding of the adoption and use decision and experience.

5. Determine whether and where compliance with standards is necessary. Our interview results imply that the workarounds in the Scatex case were necessary in order to perform work efficiently and serve customers effectively. Hence, the workarounds might be viewed as beneficial noncompliance (Alter, 2015) with designers' intentions and IT governance. We found it surprising that employees openly worked around the official system even though one of their managers told them not to do so.

For practitioners this illustrates the importance of being clear about whether and where compliance with standards is necessary. For example, it is certainly possible to identify the specific points where coordination between branches and headquarters must conform to corporate standards and other points where branches might have more freedom to adjust to local conditions. The work system snapshot in Table 2 demonstrates the perception of the Hong Kong employees in this regard. They used Navision as designed in areas where it did not disrupt their work and where it was important to coordinate outside of Hong Kong, e.g., recording purchase transactions. Their workarounds addressed local conditions such as the lack of warehouse space and the outsourcing of delivery. The issues for innovation and adoption researchers include finding ways to bring compliance versus non-compliance into the entire adoption discourse and finding ways to describe adoption versus non-adoption in the presence of non-compliance, partial usage, and other aspects of interpretive flexibility.

In a broader sense, questioning the relevance of standards may appear to step over a line in firms that are highly concerned with issues ranging from having a "single version of the truth" through maintaining informational and operational security. In this instance we believe it is important to move beyond assumptions related to "best practices", which may be best in some places but not others, and to try to be straightforward about which standards must be treated as rules and which can be viewed mainly as guidelines. In relation to IT, an especially important topic is the governance around "shadow IT". This calls for a balance between ensuring that mission-critical data is not compromised versus allowing employees enough flexibility to accomplish their business objectives efficiently.

6. Focus on "the last mile". Logistics and telecommunications practitioners often talk about the challenges of "the last mile" that brings value to end-users even after everything else is in place. The metaphor of the last mile is equally relevant in corporate IS initiatives. Practitioners need to identify and address last-mile problems if they want to realise full value from their IS investments. IS adoption researchers might be able to treat last-mile problems as a research topic. For example, project managers sometimes say that whatever was scheduled as the last 5% or 10% of the work in a project often absorbs

much more than 5% or 10% of the actual overall effort. IS adoption researchers might look into whether and how this phenomenon applies to innovation and adoption.

7. Take workarounds seriously. Workarounds are extremely common but often are ignored both in implementation planning and in research about innovation and adoption. Both practitioners and researchers could take workarounds seriously by assuming that some workarounds will probably occur and that even though workarounds may be non-compliant, they can still be beneficial. Since software rarely has a perfect fit with work processes, the probability that workarounds will exist is high. In this case study, most of the workarounds involved shadow IS plus other adaptations. In general, implementation teams in major projects could try to identify workarounds that are likely to occur and could decide on the individual merits of these workarounds. In either case they could explain the rationale to employees who might engage in workarounds and who should know whether specific workarounds that can be anticipated should be viewed as beneficial or detrimental. Innovation and adoption researchers might try to incorporate related ideas about workarounds into their research.

8. Recognise the positive value of resistance. Both practitioners and researchers should overcome the temptation to view resistance as inherently negative. In many cases resistance is an expression of attention to the best interests of the enterprise and its employees and customers. Our interviews revealed strong feelings of responsibility on the part of employees who insisted on completing work so as to satisfy customers. They did not regard their application of workarounds as a form of resistance, instead viewing it as a way of doing what the formal ERP system simply did not enable. Both practitioners and researchers should view resistance as an important source of information that deserves a meaningful response. Researchers might usefully focus less on correlates of resistance and more on situation-specific reasons for resistance.

9. Help, don't hinder, employees doing their work and achieving their business objectives. The great irony in this case is that most Hong Kong employees viewed Navision as hindering their ability to achieve business objectives. They responded by developing shadow IS capabilities. More meaningful engagement around how to do their work in the presence of Navision might have led to a better, more professional and more manageable approach for the Hong Kong operations.

6   Future Research and Conclusions

Through our exploration of a unique case, we have identified key problems associated with the application of ERP software in a global firm that has attempted to integrate systems and people. We suggest that future researchers can usefully explore the nature of shadow IS that is created to enhance the value of enterprise systems. Such studies can also look for ways in which shadow IS creates capabilities that add value in situations that the ERP cannot fully handle. An appreciation for the beneficial effects of non-compliance will be central to research in this domain since ERP software seldom perfectly matches work processes and so the application of workarounds that complement the formal system is almost inevitable. The specific details of this case may be unique to Scatex, rendering immediate generalisation to other contexts inappropriate. However, generalisation to new theory (Lee and Baskerville, 2003) that situates IS adoption in the context of how workarounds are created with shadow IS to support work is essential. Such a new theoretical perspective should consider the beneficial-effects of non-compliance in terms of meeting stakeholder objectives, whether corporate, employee or customer.

After relying largely on approaches that have not changed much over the last three decades, research on IS innovation, adoption, and diffusion is ready for new ideas. Our account of Scatex's work system in Hong Kong demonstrated how research in this area can transcend the search for statistical correlations that dominate most related research in this genre. We tried to characterise an interesting and problematic situation, understand its rationale, and focus on actions and value. We hope that our general approach of trying to understand the reality of specific situations will play a larger role in IS innovation, adoption, and diffusion research in the future.

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