The Impact of Regulatory Changes on IS Strategy: An Exploratory Study

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Abstract

While a large number of papers have examined Information Systems Strategy and the various factors that impact it, there are a number of areas that have been largely overlooked. One of these is the role of government regulation on the planning and implementation of IS strategy. In this paper we present a preliminary examination of the impact of the regulatory environment on IS strategy and assert that meeting the demands of the regulatory requirements is a driver in an organization's IS strategy. In addition, the study found that regulatory requirements can have both a direct and indirect effect on IS strategy. This key assertion is supported with observations from a multiple case study.

Keywords: IS strategy, Regulatory Environment, Case Study

1. INTRODUCTION

As is the case in many advanced economies, the regulatory environment within the United States is in a near constant state of flux. Various regulations are passed annually, some of them focused on particular industries, such as FDA changes on testing drugs, while other have widespread impact, such as the Sarbanes-Oxley act of 2002 which required all publically traded firms in the United States to change their financial reporting, or face penalties including jail time. Regardless of the reach of the regulations, or the penalties associated with them, the organizations impacted by the regulations must make the necessary changes to their internal policies and procedures to ensure compliance.

Even if there are no changes in the regulations, it is possible an organization may have to meet additional regulatory requirements. For instance, if a company has gone through a merger or acquisition (M&A) recently, they may need to document compliance with regulations that they were not subject to prior to the merger or acquisition. This could be from extending their reach into a new market, or from simply expanding within their own market.

Regardless of the reason for meeting regulatory requirements, the necessity for compliance has a direct impact on the information systems of the organization. Modern organizations rely extensively on their information systems to enforce policies, procedures, and to provide the data to prove that they are in fact following their documented policies (Drucker, 1992; Porter 1987; Mehta & Hirschheim, 2004).

These changes in regulations, or in the need for regulatory compliance, can come about without warning or planning. This fact can lead to problems for IS planners (Granderson, 1999). The IS strategy is supposed to be developed to support the business strategy, and while the businesses strategy may not be impacted by changes to regulations, the businesses could certainly be. If the business has a sudden need to document something new, it is likely that the information systems group will be involved in meeting this requirement.

The purpose of this study is to explore the impact that changes in the regulatory environment can have on IS strategy. As this is not an area that has been explored extensively, this research undertook multiple case studies to examine this question. The rest of the paper is organized as follows. Section 2 presents a review of the relevant literature in both information systems and management is undertaken. Section 3 discusses the case study methodology used in this research. Section 4 presents the data collected and an analysis of the case studies. Finally section 5 contains the conclusions and presents calls for future research.

2. LITERATURE REVIEW

In order to examine the impact of the regulatory environment on a firm's IS strategy we have to define what we are referring to when we mention IS strategy. IS strategy has traditionally been viewed as supporting the business strategy (see for example, Henderson and Venkatraman (1993)). To understand IS strategy, therefore, we must first define strategy from a broader business perspective. While strategy has been conceptualized in multiple ways (Ackoff, 1970; Barney, 1991; Mintzberg, 1987; Porter, 1996), for this paper we focus on Mintzberg's view of Strategy, as a shared organizational perspective on how to achieve organizational goals (Mintzberg, 1987).

Building on Mintzberg's (1987) perspective of business strategy, Chen et al (Chen, Mocker, Preston, & Teubner 2010 pg. 237) defined IS strategy as "an organizational perspective on the investment in, deployment, use and management of information systems" and conceptualized IS strategy in terms of the shared view of IS within the organization. This definition is intentionally broad to encompass not just the technology, but the people and processes related to the technology. This definition fits our need for examining the effect of regulation on the broader organizational information systems and not just the technology.

Based on the above definitions, when we use the term IS strategy and discuss the impact of regulation on IS strategy, we are referring to a broad concept. In discussing the impact of regulation on IS strategy we are indicating that regulation has an impact on the organizational use of IS including the investment, deployment and management of the information systems.

Research has also noted that aligning the IS strategy with the business goals is critical to creating value with IT investments (Grant, 2003). Lai and Chung (2002) note that even issues as seemingly simple as data communication must take the business environment into account when it comes to planning and implementing technology to support the business.

Regulatory Impact

There is some literature that has examined the impact of regulations on the operations of a business (Peterson, 2009; Swartz, 2005). While it is not necessarily in the area of Information Systems, the impact of regulation can certainly be noted within IS.

Banks (2005) noted that the Health Insurance Portability and Accountability Act (HIPAA) of 1996 has had an outsized impact on the operations of medical practices across the United States. The author also notes that the mandates from HIPAA still present challenges when it comes to the actual implementation, particularly for information systems. Thompson and Dean (2009) also note difficulties with IS in health care.

Research has also noted the impact of regulatory uncertainty on businesses. Engau and Hoffmann (2011) note that in the face of regulatory uncertainty, firms may engage in four different strategies (avoidance, reduction, adaptation and disregard). In this instance, the paper specifically examined the impact of the Kyoto accords on carbon emissions for companies and how they adapt to these. However, many of the impacts from Kyoto would require companies to somehow track their carbon emissions. This would be done through information systems. Depending on the tack taken by the company, the impact on the IT organization could be unexpected. For instance, if the firm pursued a disregard strategy, and suddenly could no longer ignore the regulation, there would likely be a sudden demand for a system to track the carbon emissions, which would likely not be a system that was within the organization.

Indeed, in many cases with regulations, a system must be developed specifically to address the concern that exists because of the regulation. Santos et al (Santos, Alfonso, Mendizabal and Dayrit 2011) discuss the implementation of a chemical management system specifically to address a regulatory concern.

In terms of U.S. businesses, arguably the most significant example of the impact of regulation on IS is Sarbanes Oxley or SOX as it has become known. In the wake of several corporate scandals (e.g. Enron, MCI-Worldcom, and Tyco) SOX legislation was passed in 2002 requiring an increased level of assurance in the quality of corporate financial information. SOX mandates additional internal controls over corporate information to ensure the validity and accuracy of financial information reported both the government and the markets. SOX thus impacted the need for companies to track their financial information (Khatri and Brown 2010). While on the surface this seemed like accounting oriented legislation, it soon became evident that SOX would have a large impact on information systems because IS is the infrastructure for producing and storing this corporate accounting and financial information.

It is nearly impossible to successfully develop or audit internal controls and financial reports without understanding the computer-based information system (Cegielski, 2008). SOX thus increased the importance of controls over the accounting information systems and IT infrastructure (Walters, 2007), where management's responsibility for internal controls (Section 404 of SOX) and the accuracy of financial report information (Section 302) are explicitly identified. Given that the reliability of financial information is dependent on an organization's IT (Fox and Zonneveld, 2003), competence in IT is a requisite condition for SOX compliance (Walters, 2007). As stated by Chan (2004, pg 33), SOX compliance "requires an integrated evaluation of automated, IT-dependent, and manual controls in relation to each other".

Based on this literature review, we know that regulations impact companies, the question is do they plan for it and how does it impact them?

3. METHODOLOGY

Before introducing the methodology, some background information on this study is necessary. The authors became interested in this topic separately while working on different qualitative case studies. While undertaking extensive interviews with individuals involved in IT decision making at various companies, both authors noted that the individuals being interviewed would frequently note the impact of regulations on their operations within information systems. The authors followed up on these points during the interviews, which provided the basis for this study.

The authors used a multiple case study methodology for collecting data. Interviews were conducted with multiple individuals within multiple organizations in different industries. In all 29 people in 4 organizations were interviewed as part of this study. A complete list of the camouflaged companies and individuals interviewed can be found in Appendix A. In total, data was collected from four companies: Part Co, Motor Co, Manufacturing Co and Life Co. This methodology is well suited to exploring how and why questions in research (Yin, 1994). In each of the studies conducted, the authors utilized the best practices of data analysis, as exemplified in Dube and Pare (2003).

Each subject in this study was interviewed using a semi-structured interview guide at least once for a minimum of an hour. The interview guides used are presented in Appendix B. Interviews were recorded and transcribed to facilitate data analysis. Once the interviews were transcribed, the raw data was analyzed using well-

established case study methods (Yin, 1994). Specifically, the data was examined and coded for occurrences of either changes in the regulatory environment and for impact of regulation on the organization's information systems.

Several steps were taken to ensure reliability and validity. First, triangulation was used by using a semi-structured interview guide to elicit consistent information across multiple interviews at each cite (Yin, 1994). Second, multiple forms of data were collect when available, such as documentation or related web sites to confirm information from interviews. Third, based on the data analysis, a case write up for each company was conducted and validated by primary contacts at the case sites (Yin, 1994). Any discrepancies identified were resolved by re-analyzing related data and then resubmitting changes to the primary contacts to ensure the accuracy of the data.

4. RESULTS

What became clear during the data analysis of these cases was that the companies interviewed all had felt an impact on their IS strategy resulting from regulatory changes. What also became clear from the data was that these changes came in and, in some instances, radically reshuffled the strategic priorities for the IS group.

The first case study took place at Manufacturing Co. This company is a maker of a variety of home and building products in the mid-western United States. The company had followed a growth by acquisition strategy for a number of years, but had never integrated the systems of the various acquired companies. As a result, every one of the acquired companies had it's own accounting, sales, manufacturing and billing systems. The CIO noted one of the issues cased by this situation:
"You're also losing your customer competitive edge because now you're also forcing your customers to work at the … least common denominator of technology capability that you have".

This lead to numerous problems for the customers of Manufacturing Co, all of whom were also companies (Manufacturing Co did not sell directly to consumers). Specifically, if they placed an order for parts that were made by different entities within the corporate whole (i.e. from different companies that had been acquired over the years) there was no way to give the customer a single order number (as each sales system in the company would generate it's own) and there was no way to coordinate shipping of the products, because the systems could not talk to one another. As one of the IT managers noted:
"It's all different brands and all different order management systems that require configurations…"

This situation created problems for the customers and for the company itself. From the customers' standpoint, it was a problem to track their orders and to pay for their orders, and it was impossible to ensure that the material they ordered would come at the right time. For Manufacturing Co, it was impossible to tell who their best customers were. Each customer existed in multiple sales systems, with no ties between the systems. It was also impossible to cross sell to customers because parts were listed in multiple stand alone systems, and the sales people couldn't see that every customer who purchased part A might also need parts B and C from different companies within the corporate whole.

To address the problems that this was causing for the business, Manufacturing Co decided that it needed to implement an Enterprise Resource Planning (ERP) system. This single system would tie together all of the different operating entities in the company, and would replace a patchwork of individual systems with a single stand-alone system. While this was designed to help the company as a whole, it would also be a boon for the IS department. The IS group would no longer be responsible for maintaining hundreds of different systems – rather they could maintain a single system, with a single customer master and a single parts list. The project was slated to take a number of years, but it was viewed as being an excellent investment and one that was critical for the overall corporate strategy of presenting a single face to the customer.

Despite the strategic and practical importance of the ERP initiative for the company, the entire plan was placed on hold not long after Sarbanes Oxley was passed. The company was suddenly much more concerned with meeting the new regulatory requirements, and so bumped the various compliance projects to the top of the list. As the CIO at Manufacturing Co noted:

"Sarbanes Oxley started … four years ago and just consumed so much time of everybody. And [the ERP project] just kept getting put off and put off and put off and put off."

The strategy for the company had not changed. The importance of presenting a single face to the customer had not changed. But suddenly, rather than being focused on the systems changes that were required for this, the IS group was scrambling to implement system changes to meet compliance with SOX. The irony of course is that implementing an ERP would have made compliance significantly easier as well as meeting all of the corporate strategic goals – but it would have taken too long.

Of course, even when regulations don't change, they can dictate the IT or business strategy for a company to a certain extent. The second company in the study was Life Co, a drug development firm in the mid-western United States. Life Co performs lab testing and delivers drug development and testing services to major pharmaceutical companies around the world. Some of these services can include "first in man" drug testing, as well as drug compound development. Because of the nature of their business, they are heavily regulated. As one IS manager at Life Co noted:
"And what ends up happening is we are a regulated life science company... The FDA would like to see everything documented and documents significantly to prove that not only that we did what we said we were gonna do but that in fact the subject that we said was there, was truly the subject that was there."

Thus, the moves made by the IS department were dictated as much by regulation as by the strategic goals of the company. Even though they were accustomed to operating within this environment, they encountered a new set of regulatory problems when they expanded their operations by buying another company in the same line of business. As one of the CIO noted:
"One of the problems that was introduced with [the acquired company] … because it was so close [geographically to Life Co] - was the fact that subjects would apply for studies … [at] both [acquisition] and [headquarters]… there's very specific [FDA] regs around doing clinical studies [for new drug compounds], as far as once you've done the study, there's got to be a washout period [to flush the drug compounds from the subjects systems]."

The problem that they encountered was that subjects would participate in a drug study at one location and then try to participate in a study at the second location. The regulations in place had not changed, but the company's expansion suddenly put them in a position where they needed to comply with a new regulation. This requirement forced them to come up with a systematic way of documenting for the FDA that they were, in fact, compliant with the applicable regulations. This was not a requirement that the company had every worried about meeting before, because they had never had to manage two drug testing facilities that were in close proximity to one another. As in the first example, the companies goals had not changed, but the regulatory environment forced the IS group to engage in a new project to meet regulatory requirements.

MotorCo presents another example of the impact of SOX on an organization. MotorCo is a subsidiary of a large multi-national corporation headquartered in the Midwest United Sates that makes a variety of electric motors. As a result of SOX, during 2002 MotorCo was tasked with making sure the processes and infrastructure was in place for the information systems to support SOX compliance.

This required substantial planning and effort on the part of the IT department to ensure the information systems could support the required audit trail for the information required to meet the SOX compliance standards. For example, corporate wide there were over forty different ERP systems and each one needed to be evaluated to ensure SOX could be complied with.

In another example, PartsCo a manufacturer of automobile parts engaged in merger activity related to changes in regulation. On December 21, 2000 the EPA signed federal regulations creating strict new standards for diesel engine emissions that began taking effect in 2007. As a result, PartsCo acquired a German company (GermCo) with expertise and proprietary technology related to diesel engine emissions.

Prior to the implementation of the new federal regulations, PartsCo produced a substantial portion of the emission systems for Chrysler, and when Chrysler was purchased by Daimler-Benz, PartsCo was concerned about maintaining the relationship. As a result, PartsCo purchased a minority stake in GermCo because GermCo

had an established relationship with Daimler-Benz.

Use of diesel engines is much more prevalent in Europe and the minority stake in GermCo provided PartsCo with access to intellectual capital and technology related to diesel engine emissions that would help them meet the EPAs new requirements. PartsCo thus purchased the remaining interest in GermCo to be the sole owner of the company.

In this situation, the IS didn't change directly to meet the needs of the regulatory requirements like MotorCo was required to. Instead the information systems were impacted indirectly in the need to assimilate the newly acquired company into the consolidated organization. Further, the IS infrastructure had to be put in place to ensure consolidated financial statements could be produced to meet annual and quarterly SEC requirements.

Limitations

As with all research, this study has limitations. First, a common limitation of all case studies is limited generalizability beyond the individual cases studied. As noted by Lee and Baskerville (2003), however, case study research generalizes via theory.

Second, only companies within the United States were used for this study. Both of these issues could limit how widely the results from this study can be applied directly to other situations. However, it seems reasonable that these findings would apply in other areas of the world as well. Anywhere the regulatory environment impacts the information that companies need to generate and store will likely see similar phenomena.

5. CONCLUSIONS AND FUTURE RESEARCH

From our analysis of the case studies, we conclude that the regulatory environment the company operates within impacts IS strategy in both a direct and indirect fashion. Some regulations, such as SOX, require firms to directly plan out changes to the information technology and processes to ensure compliance. In the case of SOX, companies had specific requirements for information that they need to track and the ways in which they need to report it. Because of the nature of financial reporting, this had a direct impact on the IS strategy as all of this information is tracked electronically. Thus, to be in compliance, the systems must track specific data, in a specific way for specific reports. This, of course, did not line up with the way that financial data was tracked at the majority of publicly traded firs, requiring changes to both policies and procedure – and the systems that supported them both.

SOX is interesting, in that it impacts all publically traded companies, rather than just those in a specific industry (such as drug development). However, this legislation is not unique – there are other legislative mandates (Health care as an example) that will likely impact all businesses within the US, and there could certainly be others internationally.

Other regulatory changes may also impact IS strategy but in a more indirect fashion, such as through the need to assimilate merger and acquisition activity for SEC or FDA compliance. In either case, the data also points to the fact that these regulatory changes impacted the pursuit of an IT strategy. In the case of Manufacturing Co, this was detrimental to the pursuit of a strategy specifically designed to solve a business problem. In the cases of Life Co and Motor Co, the resources they dedicated to solving the problems had to be taken from somewhere within the organization. As most organizations within the US currently run very lean operations, it is likely that this meant that projects elsewhere in the company were delayed.

While these problems are likely encountered on a regular basis by companies, little has been done to examine the actual impact. One stream of research for the future would be measuring the impact of regulatory changes on IS strategy in a more systematic way. This could include both case and survey methodologies to gather data from a wider sample and to more carefully measure the impact.

Another area for future research would be examining methods by which these impacts may be mitigated. Obviously, these changes cannot be predicted with any clarity, and are outside the control of the IT department. In addition, once the changes are made, there can be no question about meeting the new requirements. It's not optional – it's legally required. Thus, the question becomes what changes can be made to IS strategy, or possibly to IS departments, within the organization to make it easier to

adapt to these external forces. What can be done to help IS departments keep regulatory changes from derailing their pursuit of an IS strategy?

It is possible that service oriented architectures (SOA) would help with this problem, as prior research has suggested that SOA can help IS departments be more flexible and efficient (Weigand, Jan van den Heuvel & Hiel 2011). Specifically, they note that SOA can help companies be more adaptive by allowing for more rapid changes in shifting markets. While this has not been examined in this specific context, it should also be examined in future research.

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Appendix A: Companies and Interviews

List of Interviews – PartCo	Tenure with Company
Senior V.P. and CIO	5
V.P. Information Technology	6
V.P. of Technology Infrastructure and Operations	6
V.P. Worldwide Operations	21
V.P. and G.M. CVE& Specialty Products	3.5
V.P. Truck & Industrial Products	25
Director, Technology Integration	15
Director of LVS Finance	14
Director of Program Management Office; LVS IT	20
Manager of Business Systems Solutions, North America	7

List of Interviews - MotorCo	Tenure with Company
V.P. of Information Technology	33
Director of Engineering Administration & Systems	20
Director of Information Technology	21
Director of Marketing and eBusiness	10
Director of Oracle Application Development	26
Director of eBusiness	8
eBusiness Leader	8
Director of Oracle Programming	15
Manager of Engineering Systems	19
I.T. Program Manager	7
Program Manager, Engineering/Configurator	11

List of Interviews - Manufacturing Co
Former Sector CIO
IT Relationship Manager
Manager - Production Systems

List of Interviews – Life Co.
VP for Information Systems
IT Project Manager
Business Analyst
Finance Project Manager
Business Relationship Manager

Appendix B: Interview Questions

As noted in the paper, the authors collected this data during two separate qualitative studies. Thus, two sets of questions are included below.

Guide 1:

1. Tell me about (*M&A Event*).
    a. What was the history of *(M&A Event)*?
    b. What type of M&A event was it? (*Handout*)
    c. What was the timeline of (*M&A Event*)?
    d. What was your role in *(M&A Event)*?
    e. When did it begin in (*M&A Event*)?

2. Thinking about (*M&A Event*), which was a (*merger of equals/acquisition*), what strategy or strategies were used to integrate the information systems after the merger?
    a. Strategies from literature.
3. You chose to use a (*unified/diverse*) approach for the information systems. Why did you choose to do it that way?
    a. What factors influenced the decision?
4. How were the systems integration projects structured after the merger?
    a. Was there a single, overall integration project?
    b. (*If yes to a*) Within this project, were there subprojects?
    c. If so, how were the systems grouped together?
        i. Was it by system type (*handout*)?
        ii. Geographic region?
        iii. Legal entity?
        iv. Other?
    d. (*If no to a*) Were there multiple systems projects?
    e. If so, how were the systems grouped together?
        i. Was it by system type (*handout*)?
        ii. Geographic region?
        iii. Legal entity?
        iv. Other?
5. Did this (*unified/diverse*) strategy for integrating the IS in the merger work well?
    a. Why would you say it did/did not work as well as hoped?
6. Did the systems projects undertaken for the merger go smoothly?
    a. Why would you say it did/did not work as well as hoped?
7. What were your lessons learned from this experience?
8. Before we finish, I wanted to talk about my understanding of some of the characteristics of the (*M&A event*).
    a. *Understanding of these factors will be based on the interview with the CIO*:
        i. The type of merger (*handout*)
        ii. The size of the organizations
        iii. The IT governance approach of the acquirer (*handout*)
        iv. The IT governance approach of the target (*handout*)

v. The IT infrastructure of the acquirer (*handout*)
vi. The IT infrastructure of the target (*handout*)
vii. Other factors

Guide 2:

Semi-Structured Interview Guide

Interviewee: _____ Date: _____

Title: _____ Company: _____

Job Description/Area of Expertise: _____

1. Introduction
a. Explain Project
i. Background of Researcher(s)
ii. Project addresses IS alignment
1. Compares traditional alignment model with TAGA
2. Assess generalizability of TAGA
3. Developed the dimensions of external change
4. Examines the role of IS in enabling organizational adaptation
iii. Discuss Human Subjects Committee Form
1. All interviews are VOLUNTARY
2. All interviews are CONFIDENTIAL
3. Have interviewee sign and date form
4. Provide interviewee with copy
b. Interview Overview
i. This interview will ask questions related to IS alignment in your organization.
ii. Questions will address the alignment factors
1. External Environment
2. Management Decisions (data collection only)
3. Strategic Intent (goals)
4. Strategic Initiatives (means)
5. Organizational Structure
6. IS Strategy
7. IS Structure
iii. Interviewees will be asked to identify and describe change events in each of the alignment factors, including what triggered the changes and any relationships between the changes and other alignment factors.
iv. Interview should take 60 to 90 minutes.

2. Interview Questions

Phase I
Interview Data to Collect for Proposition 2
Degree of Formal IS Planning Process (H2) Answer

Is there a formal IS Planning Process? Yes No
Policies and procedures greatly influence the process of strategic information systems planning within our firm. (Segars and Grover 1999) 1….2….3….4….5
We utilize formalized planning techniques in our strategic information systems planning process. (Segars and Grover 1999) 1….2….3….4….5
Our process for strategic planning is very structured. (Segars and Grover 1999) 1….2….3….4….5
Written guidelines exist to structure strategic IS planning in our organization. (Segars and Grover 1999) 1….2….3….4….5
The process and outputs of strategic IS planning are formally documented. (Segars and Grover 1999) 1….2….3….4….5

Degree of Formal IS Strategy (H3) Answer
Is there a formal IS strategy? Yes No
Policies and procedures greatly influence the formulation of IS strategy within our firm. (adapted from Segars and Grover 1999) 1….2….3….4….5
We utilize a formalized process for developing our IS strategy. (adapted from Segars and Grover 1999) 1….2….3….4….5
Our process for developing our IS strategy is very structured. (adapted from Segars and Grover 1999) 1….2….3….4….5
Written guidelines exist to establish an IS strategy in our organization. (adapted from Segars and Grover 1999) 1….2….3….4….5
The IS strategy is formally documented. (adapted from Segars and Grover 1999) 1….2….3….4….5

List change events that have occurred in the last 10 years. (Important for all Phases)(A change event is defined as any change that resulted in a strategic or structural change to the organization)
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.

Complete for each change event listed

Describe the change event.

What caused the change (Trigger)?

Why was the change significant to the organization (impact)?

Did the change event impact other alignment factors? (Use back of page if additional space is needed)
Alignment Factor Impact on Factor
Management Event (for data collection purposes only)

Strategic Intent

Strategic Initiative

Organizational Structure

IS Strategy

IS Structure

Additional comments?