Knowledge Economy Relationship Management: Combining MIS with Market Relationship Strategies

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Introduction

Strategic decisions in the knowledge economy require fusion of management information systems (MIS) and marketing techniques. MIS relational data analysis and knowledge management tools harness opportunities in the form of business intelligence, while the marketing advances in customer relationship and supply chain management improve opportunities for e-commerce business models. Because of advancements in the analytical capability of digital technology, data mining has become a standard technique for creating and maintaining customer relationship management (CRM) as the most effective e-business marketing strategy. Simultaneously, the reliance of these emerging MIS and marketing techniques on accessing and retrieving personal employee/customer information poses serious data security risks.

Consumers are increasingly concerned about the privacy and security of their personal information, as well as their buying behavior information. They fear the unknown digital observer, compromised anonymity, and the possibility of inference of secondary information (private) from the mining of primary data sets. Ultimately, the success of CRM, data mining, and e-business marketing will depend heavily on the integrity and trust that consumers attribute to privacy preservation practices, thus creating a need for a new balance in the digital markets. By coupling the strategic digital core competencies of MIS and marketing, we believe a balance can be achieved between the impending knowledge economy opportunities and threats. To that end, we develop a *Knowledge Economy Relationship Management* (KERM) process that combines the strategic advantages of relational data *systems* with market relationship *strategies*, to enhance information security in the knowledge economy. However, because of the reliance on digital distance-commerce networks to share valuable personal and organizational intelligence, information security threats are considerably heightened in the knowledge economy.

Knowledge economy customers/clients enter into tacit agreements to trade personal data for customized, personalized, and more convenient digital services. This inherent digitally constrained problem of "identification" has been widely acknowledged as a primary determinant of knowledge economy e-commerce winners and losers, because business costs are incurred even when the data privacy orientation of prospective customers prevents e-commerce suppliers from fulfilling their business model promise of value delivery. Ultimately, the success of these fused MIS digital data mining *systems* and e-commerce marketing relationship *strategies* depend heavily on the integrity and trust attributed to privacy preservation practices by employees and customers/clients. Accordingly, we address this ubiquitous information security risk in our proposed KERM process.

The proposed KERM process synchronizes micro-level knowledge management with the macro-level dynamics of the broader knowledge economy. Just as MIS and marketing factors drive micro-level KERM business planning, parallel macro-level digital technology and knowledge relationship management forces drive the knowledge economy. First, we establish a conceptual foundation for the knowledge economy by reviewing literature indicating the convergence among MIS and marketing e-commerce techniques, including implications for information security. We illustrate how the progression in economies is divided into three phases. Next, we stipulate the KERM stages as a business planning process for enhanced digital market opportunity while reducing information security threats. Following the discussion

of the KERM process conclusions are advanced for knowledge economy e-commerce strategy and academic research on digital information security.

Knowledge Economy: Towards a Convergence of MIS and Marketing

From a strategic e-commerce perspective, effective business management in the knowledge economy combines the digital core competencies of MIS and marketing. Figure 1 charts the evolving convergence of MIS and marketing techniques from a traditional physical space industrial economy past, through the present informational intangible space service economy, towards the future intelligent digital space knowledge economy. There is a firm consensus in the economics and business literature supporting the phased transition of economies in advanced societies based on shifts in how value is defined (Allee, 2000).

The knowledge economy's emergence is grounded in studies by Schumpeter (1947) to distinguish between information and knowledge as assets in capitalist economies, Hayek (1945) to establish the economics of knowledge, Machlup (1962) to associate knowledge as a factor in the emerging U.S. service economy, and Bell (1973) to analyze implications of post-industrial U.S. society. Following these conceptual foundations a succession of scholars have plotted the evolution from a physical goods industrial economy towards an information intensive knowledge economy. For our purposes, this progression in economies is divided into three phases, which we develop in the next section. These three phases depict the primary modes of MIS and marketing convergence in the business planning process. They are upheld by the economics, business strategy, and knowledge management literature (Peters, 2004; Sweet, 2001; Tissen *et al*., 2000; Allee, 2000; Kellerman, 2000; Antonelli, 1999).

However, Sweet (2001) "value configuration logics" is the most direct antecedent for our progression of economy phases. Like Sweet, our objective is to divide the economy's evolution based on "microeconomic paradigms" for business value creation that correspond to distinct "macroeconomic paradigms" for value creation in society. Sweet's macroeconomic continuum contains four phases—industrial, service/information, knowledge, and Web/network—which by logically merging "knowledge" exchange content with "Web/network" exchange conduits yields essentially the same charting presented in Figure 1. Further, the "value configuration logics" connecting Sweet's macroeconomic societal phases to microeconomic business functions characterize the observed convergence of MIS and marketing techniques as the knowledge economy emerges. These mappings to the digital economy realm aid our development of the KERM process as well as the privacy actuary measure.

We can, for instance, associate Sweet (2001) "value-adding" configuration logic with the industrial economy roles of MIS and marketing in the business planning process. MIS as an information *function* for largely material value business processes served a *supportive*, while marketing as a customer-oriented *fragment* of an inherently commodity-oriented business process, performed as a *separate* value activity. Next, Sweet's "value-extracting." phase points to the service economy's abstraction of "intangible value" from material facilities and forms. The role of MIS becomes more *facilitative*, since data system *support* is directly relied upon for service delivery. Marketing's customer-orientation becomes a primary "focus" of business planning and is *synthesized* into the process of satisfying subjective service valuation.

For the knowledge economy future, Sweet's configuration logics of "value capturing" and "value-creating" are merged to depict the *intelligence value* imperative for business planning that requires MIS data systems to be seamlessly *fused* with marketing strategies, thus a convergence. In turn, the *learning* goal essential to all knowledge economy enterprises is achieved because of business planning *synergies* that stem from combining digital MIS relational data mining *systems* and e-commerce marketing relationship management *strategies*.

Aligning micro-level enterprise knowledge management determinants with macro-level knowledge economy dimensions anchors our research to the definitive origin of the "Knowledge-based Economy" concept—the Organization for Economic Cooperation and De-

velopment (OECD). At the *macro-level*, the OECD provided a systematic definition of "Knowledge-based Economies" as: "economies which are directly based on the production, distribution, and use of knowledge and information" (OECD, 1996, p.3), and later enriched the concept by including; "economies characterized by investment in knowledge," as well as "expenditures directed towards activities with the aim of enhancing existing knowledge and/or acquiring new knowledge or diffusing knowledge" (OECD, 2001, p.14). The latter facet gave rise to the research focus on "knowledge-based industries" which is the focus of our information security study of knowledge economy enterprises.

As micro-level knowledge management data systems and marketing strategies fuse, a parallel integration of knowledge networks and relationships is transpiring in the macro-level to expand the knowledge economy's diffusion. This broader *societal* impact has resulted in wider reaching compliance directives in the areas of shopping and merchant credit (FACTA, 2003), academic and trade education (FERPA, 2002), as well the full range of healthcare practices and products (HIPAA, 1996). We can see the mounting impact of these public and private sector knowledge economy risks in the expansive policy directives, legislation, and regulation related to information privacy and data security – as noted in the three phases of Figure 1. Initially, information security concerns were anchored in the *financial* sector, and spawned the Sarbanes-Oxley Act of 2002 aimed primarily at knowledge economy enterprises. As the convergence of data systems with marketing strategies evolved, *digital* networks became transparent with commercial shopping and e-commerce consumers sought online privacy protection to secure personal data. The Online Privacy Protection Act of 2001 was the resulting compliance directive to help secure these increasing e-commerce services.

Parallel with the evolution of the knowledge economy has been the extensively documented rise in information security risks for e-commerce business enterprises, digital technology networks, and general society welfare (Castells, 1996, 1997). This trend in information security threats, which parallels the micro/macro knowledge economy evolution, raises concerns for enterprises and customers alike. Having traced the knowledge economy's evolution based on the progressive convergence of MIS and marketing digital core competencies—and highlighted prevalent information security threats, the importance of knowledge management process for minimizing privacy risks in this era of intensive intelligence gathering, analyzing, and sharing is further discussed.

The KERM Process: Securing Enterprise Systems and Strategies

Proprietary business and government agency customer/client data is a valuable commodity, whether it is used to profile employee benefit programs and promotion potential, or predict customer/client contract sourcing patterns (Wenninger, 1999). Knowledge economy e-commerce networks rely on proprietary business and government agency data like material commerce networks rely on the liquidity of credit/bond ratings to facilitate the flow of exchange value. For a price, commonly set by an economy's interest rate, consumers use credit in the material marketplace to obtain the benefits of convenience, availability, and income augmentation. Likewise, for a price, set by the risk of privacy invasion, e-commerce employees and customer/clients share proprietary data to engage in more personalized knowledge economy e-commerce exchanges (Chellappa and Sin, 2005). In the case of customer's information privacy risks, the price is paid to obtain benefits such as efficient shopping for exchange value options, customized contract terms, rapid delivery and installation, price discounts and credit, as well as ongoing maintenance and warranty servicing (Norberg and Dholakia, 2004; Gardyn, 2001). Figuring out which customers will engage competing knowledge economy e-commerce suppliers in a mutually beneficial business model is referred to in modern economics as the "problem of identification" (Bajari and Ye, 2003).

Consequently, engaging in data sharing and data access arrangements with knowledge economy e-commerce suppliers raises the potential threat to valuable data assets (Zhu, 2002; **?**). These potential information security threats (intended or unintended) are

Figure 1
The Evolution of Micro/Macro Knowledge Economy Architecture

	Industrial Economy (tangible value) "Loading"	**Service Economy (intangible value) "Linking"**	**Knowledge Economy (intelligence value) "Learning"**
1. Micro-Level Convergence Determinants of Knowledge Evolution			
MIS	Functional Data systems *subordinate* to business planning processes	Facilitative Data systems *supportive* to business planning process	Fused Digital MIS relational data-mining & E-commerce Marketing relationships Create Business planning process Synergies
Marketing	Fragmented Market strategies *separated* to in business planning processes	Focused Market strategies *Synthesized* in business planning process	
Tissen, et al. (2000) KE Enterprise * Knowledge Intensity * Service Level	Industrial Prodution Company	Service Providing	Knowledge Creating Company & Value-Adding Knowledge Creating Company
II. MACRO-Level Catalyst Dimensions of Knowledge Economy Evolution [Economic, business Strategy, and Knowledge Management Literature]			
Antonelli (1999)	Peripheral Information	Parallel Knowledge	Core Competency
Kellerman (2001)	Information-rich	Information-based	Information-dominated
Sweet (2001) Macro/Micro Value Logics	Industrial/Value-adding	Service of Value-extracting	Knowledge & Web/Network Value-capturing & Value-Creating
III. META-Level Security Compliance Doctrines of Knowledge Economy Evolution			
	Financial (Sarbanes-Oxley)	Digital (Online Privacy)	Societal (Credit, Education, Health)

manifested through data leakage, violation, and error, which in turn lead to trust eroding concerns such as identity theft, inaccurate human resource and benefit records, procurement fraud, competitive espionage, and compromised customer integrity (Friedman, 2000). To address knowledge economy e-commerce "problem of identification" in an operational mode, a three-stage KERM process is posited to clarify how MIS data mining *systems* and marketing relationship *strategies* can be meshed to attain the promise of information secure e-commerce exchanges (Goel and Carter, 2004). Figure 2 diagrams the three KERM stages and factors associated with each stage.

Step 1: Identification: relationship reveals realization

a. First *criterion* for *identification* in KERM comes from realizing shared strategic roles in achieving "value-creating" knowledge economy goals. The business strategy literature's "value chain" construct provides guidance for fashioning a KERM process that bridges the two seemingly divergent knowledge economy goals of *value delivery* and *information security*. Porter (1985) original value chain presented a channel connecting inbound resource flows from suppliers, operational "value-adding" activities, and outbound resources flows to customers. By connecting suppliers, firms, and

customers like links in a unified chain, the focus is trained on value creation rather than vested separation.

Each link in the value chain has a role to contribute towards supporting (suppliers), creating/delivering (firm), and sustaining (customer) value. Customers provided preference information, which indirectly informed suppliers about the nature of inbound resources, and directly enabled the firm to calibrate operations to align supplier resources with customer requirements. Of course the value chain could just as easily send signals from supplier through the firm to customers (e.g., resource innovations or shortages), or allow firms to send signals bi-directionally to customers and suppliers (competitive attack or defense).

Figure 2
The Knowledge Economy Relationship Management Process

KERM Process Steps	Conceptual Premise and Criterion Principles	Knowledge Economy Advantage
(1) Identify	(a) *Finding* E-Commerce "Value" Exchanges (Virtual Value -Chain) 	Suppliers & customers have core competency knowledge connections
	(b) *Forming* Knowledge Identity Relationships (Customer Relationship Management [CRM]) 	Suppliers & customers synchronize knowledge profiles & processes
(2) Classify	*Filtering* Anonymous Identities 	Suppliers & customers configure trust-based knowledge networks
(3) Commercialize	*Fitting* Knowledge to Learning Need (*Trust* = *Sharing*) a) Disposition to Trust – Interpersonal Value b) Institution-Based Trust – Digital System Access c) Trusting Beliefs -- Value -Creating Learning d) Trusting Intentions – Strategy Sharing	Suppliers & customers create trust-based value-learning knowledge asset relationships

The strategic advantage provided by "value chains" is the ability for suppliers, firms, and customers to operate in strategic relationships, and not by separate rules. Increasingly, these strategic intelligence dialogues are mediated by digital "agents of exchange" (Wind *et al*., 2000; Carter, 1997) - especially in the business-to-customer (B2C) domain. KERM embraces this digitization of value-chain messaging to more robustly identify signals of shared knowledge enterprise relationship roles.

b. Second *criterion for identification* comes from managing relationships to learn which *customers are loyal*. Customer relationship management (CRM) is a systematic process for profiling and tracking customer patterns to accrue the proven business merits of ongoing customer loyalty. Data mining is an MIS system supporting CRM to address the problem of identification. It is precisely through data mining that knowledge economy enterprises employ the digital networks to identify loyal customer profiles that support the e-commerce business model. In this manner, MIS relational data *systems* are fused to achieve both the loyalty criterion of identification and the value delivery goal of CRM marketing *strategies*. However, the same digital network access and computational precision that enables knowledge economy enterprises to solve the problem of identification and achieve the goal of value delivery, simultaneously increases the problem of identity violation, which undermines the goal of information security. This privacy paradox is addressed by the second *classification* stage of the KERM.

Step 2: Classification: Anonymity Allows Actualization

The *sole classifying criterion is to collaboratively filter customer identities into anonymous privacy actuary sets*. In a very real sense, the "information age" is manifested in the capacity of business-to-business (B2B) and business-to-government (B2G) customers/clients to "spend" their proprietary data as "information currency" in the digital marketplace (Moore, 2002; Carino and Jahnke, 1998). Those customers that are willing to "spend" proprietary information help knowledge economy e-commerce suppliers formulate profitable business models that deliver higher customer value. On the other hand, strict adherence to information privacy by business and government customers limits the profitability of e-commerce business models (Garau and Ranchhod, 2002; Essler and Whitaker, 2001), in much the same manner that poor driving limits the profitability of the auto insurance business model, or for that matter that unhealthy lifestyles limit the investment returns of medical insurance company shareholders.

Step 3: Commercialization: Knowing Knowledge Needs

The sole *criterion to commercialize* e-commerce knowledge economy relationships is to *learn knowledge needs*. Following step 2 of the KERM process, a set of B2B and B2G customers has been anonymously profiled. Now, in step 3, commercialization draws upon detailed data mining insights to better understand customers' knowledge needs in order to fulfill the primary value proposition of *learning*.

However, *commercializing* data mining insights through knowledge management requires knowledge economy enterprises to understand how *learning* creates value. In essence, *commercialized* KERM achieves a level of trust that encourages sufficient information sharing for the learning process to be achieved in a manner that is distinct, enduring, measurable, and highly valued. Learning is a fundamentally human process that harnesses value by first establishing *trusted* connections with what Malhotra (2000) describes as human "Knowledge creators" within the "virtual organizations" that comprise knowledge economy providers and customers. The added security for organizational and inter-organizational e-commerce knowledge sharing enables knowledge economy providers to plan market *strategies* and digital *systems* that generate distinct, enduring, measurable, and highly valued learning outcomes. Therefore, in the third KERM step, *commercialization* is measured by the level of trust gained by learning value returns on the knowledge sharing investments of e-commerce customers.

Trust is both a marketing strategy and management information systems e-commerce construct. The marketing strategy literature identifies trust as a determinant of the successful knowledge exchanges in e-commerce relationships (Sirdeshmukh *et al*., 2002; Schoenbachler and Gordon, 2002; Morgan and Hunt, 1994), because of customer insistence on data privacy protection and anonymity. A critical mass of information systems research also converges on trust-embedded protocols for securing digital CRM networks (Katsikas *et al*., 2005; Kleist, 2004; Udo, 2001; Kueter and Fisher, 2000), as well as to mitigate the negative consequences of data mining practices (Lindell and Pinkas, 2002; Danna and Gandy, 2002; Mobasher *et al*., 2001). With respect to knowledge economy enterprises, Debreceny *et al*. (2003) and others (Jevons and Gabbott, 2000), regard trust as a behavioral inhibitor of intra-organizational and inter-organizational participation in e-commerce exchanges. Moreover, trust operates as a continuous function (not a dichotomous variable) to simultaneously reduce the risk of knowledge sharing and raise both the quantity and quality of knowledge content provided. This makes trust a vital barometer of effective e-commerce knowledge economy exchanges.

For knowledge economy providers, a "typology of trust types" guides the implementation of the third KERM step of *commercialization*. Adapting the B2C web-based e-commerce model developed by McKnight and Kacmar (2002) to our B2B/B2G knowledge economy enterprise context, Figure 2 itemizes four trust construct indicators of *commercialization*:

a. Disposition to Trust - Interpersonal Socio-psychological Value

b. Institution-Based Trust - Digital System Access

c. Trusting Beliefs – Value-Creating Learning

d. Trusting Intentions - Learning Maximization Strategy

Knowledge economy customer enterprises are first encountered on an interpersonal socio-psychological level and the KERM process proposes to increase trust through (a) "embedded anonymity" data mining and tailored customer service programs to gain (b) institution-based access to knowledge assets stored and exchanged via digital systems. After establishing relationships through effective knowledge management of interpersonal ("disposition to trust") and digital systems ("institution-based trust") indicators, the engagement is elevated to unite knowledge economy missions (c) value-creating learning competencies ("trusting beliefs") and strengthen strategic collaboration (d) shared relationship marketing strategy ("trusting intentions").

Conclusions: Implications and Contributions

Customer sovereignty is the hallmark of customer-oriented marketing because it preserves the right of free-market customer choice in the information intensive domain of e-business. Clearly the market-minded human social needs entailed in the marketing discipline's customer orientation ethos is merely a starting point for technology oriented protocols and systems. However, in the final analysis, it is the director of information privacy that holds they key to e-business success. More than anything else, digital customers prize their anonymity and confer trust, loyalty, and market success on enterprises that attain the goal of data driven e-commerce while preserving personal information privacy. Our KERM paradigm contributes in two venues:

a. Academic literature: statistical data modeling, decision science data mining, marketing and digital consumer behavior, and customer relationship management in electronic commerce environments.

b. Management practice: Improved customer targeting and profiling, higher data mining certainty with improved privacy preservation, effective customer relationship management through distinctive competencies, and the resulting consumer loyalty related to privacy preserving data tracking methods.

The KERM process, therefore, addresses the rising information security concerns among e-commerce providers and customers by incorporating both the

digital system and relational strategy dimensions that comprise the knowledge economy's architecture.

a. Preserves the anonymity of digital market consumers while including meaningful transactional data patterns in data mining analyses through clustering and modeling techniques.

b. Creates specific dynamic profiles that fit the service/product/interest—not customer prototypes.

c. Establishes the basis for information privacy actuaries capable of translating online consumer privacy risks into dollar denominated economic exchange values. These economic values directly align data mining as a market intelligence function, information privacy as corporate governance and marketing ethics function, and the revenue generating e-commerce business model.

d. Expands the revenue generating potential of e-commerce business models through "privacy risk insurance" and "anonymity policy" packages tailored to specific classes of online data sharing markets (e.g., auto, healthcare, home, credit card, education, etc.)

Future research may draw upon our conceptual framing of digital strategy considerations for the knowledge economy and provide a more formally structured quantitative analysis of the merits of the KERM process stages outlined above. An operational statistical technique for conferring "embedded anonymity" is plausible using the HMM method, which has been shown to benefit data mining for market relationships (Netzer *et al*., 2005). These operationalized "embedded anonymity" tests would contribute rigorous support for emerging synergies shared by marketing and MIS knowledge economy strategies, which have been advanced here by way of literature survey and theoretical constructs.

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