E-BUSINESS INNOVATION
Surviving the Coming Decades

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Abstract: Innovation is invention or application of technologies or theories that radically alters business and the economy. For the last 200 years, innovation and the economy have been locked in 80-year cycles, which might imply that innovation is an economic driver, and vice versa. Based on this relationship, some forecast that innovation and the economy will decrease sharply due to several forces: a) rapidly decreasing economic growth, b) increasing demand for custom services, c) more entrepreneurial work environments, and d) urban and environmental degradation. Should such forecasts hold true, business may need to alter its offerings, operations and organization to survive. Such a scenario may also necessitate applied e-Business innovation: the combining of existing internet, wireless, broadband, and video technologies. One possible result: highly flexible front offices seamlessly integrated with highly efficient back offices. Such an e-Business could comprise: a) a customer-based and transaction-based organization, b) functions for adaptive offerings that anticipate consumer need, c) highly responsive, real-time, operations having no inventory, and d) value-based front-end, and automated back-end, decision making.

1 DEMOGRAPHIC CYCLES

The economy is complex but its change over time is not. A key to understanding its change is to focus on underlying forces. For example, demographic cycles can tell you if a market crash is just an extreme correction due to an overvaluation cycle or the beginning of a long-term economic decline. The economy appears to be cyclic: it over-expands when growth sets in and then cuts back to continue future growth. For example, since 1985, the U.S. economy has been growing due to rising earnings, spending, and productivity of the baby-boom generation. This demographic has driven economic growth (Figure 1) and corporate growth (Figure 3).

1.1 The Next Decade

Innovation is often associated with invention or application of technologies or theories that alter business and the economy. Innovation is a major economic driver, and the economy is a major innovation driver. For example, in the last 200 years, technology innovation and the economy were locked in upward 80-year cycles. Some forecast future U.S. economic downturn, due in part to the demographic cycle (i.e. a peak spending drop) and the end of the current 80-year technology innovation cycle (i.e. fewer new companies, products and jobs). Pundits see the cause for the downturn being primarily due to four forces: a) rapidly decreasing economic growth, b) increasing demand for personalized services, c) more entrepreneurial work settings, and d) urban and environment degradation.
1.2 The Birth Cycle

These forecasts are based on expected population growth peaks in many developed countries by 2010 and by 2070 worldwide. The rate of change is noteworthy: prosperity and urbanization appear to be causing rapid birth rate declines in industrialized countries (e.g. China, India, Europe, and Japan). The impact to e-Business innovation could be profound. Decreasing population growth over the next 30 years may cause less fundamental technology innovation4 (which occurs 25-35 years after birth) and less fundamental business innovation5 - decision making, organizational design, management theory (which occurs 45-60 years after birth) - in that same period.

1.3 The Spending Cycle

Spending is correlated to births. U.S. Department of Labor reports6 show two major components to U.S. spending. The first, the weaker of the two, is family formation, which occurs 25-35 years after birth (e.g. it drove the U.S. economy from 1955 to 1985). The second component, the stronger of the two, is peak spending, which occurs 45-60 years after birth and may drive the economy upward until 2010. At that time, population growth will slow, causing spending to slow likewise. This is causing some weakening in U.S. wireless sales7, paid internet phone usage8, search ad revenues9, and online sales10.

1.4 The Economic Cycle

Spending is coupled to innovation due to innovation creating new products and jobs. For example, fundamental (e.g. electricity, steel, and motors) and applied (e.g. assembly lines) innovation brought standard products to mass markets, along with factory jobs and urban living. Today, fundamental (e.g. wireless, internet, broadband, video) and applied (e.g. produce-to-order systems) innovation are bringing custom products to affluent markets, along with outsourced jobs and exurban living11 (e.g. small quality towns and distant urban rings). But, sustaining such remote work depends on today’s e-Business technologies and future innovation.

2 TECHNOLOGY CYCLES

Technology cycles and demographic cycles feed off each other1: population grows and then innovation occurs, which enables more population growth. Five forces create a technology cycle: First, radical technology changes business fundamentals (e.g. railroads brought Sears goods to remote towns). Second, no one first knows how to profit from the new technology (e.g. 30-second TV ads). Third, shared infrastructure requiring large investment is needed (e.g. internet, wireless, broadband, video – see Figure 2). Fourth, the economy is healthy, and thus can make such investment (e.g. the U.S. economy from roughly 1980 to 2010). Fifth, low inflation favours investment in innovative firms. By the end of the cycle, a few companies survive (e.g. Dell, eBay, Amazon, AOL, Yahoo!, Cisco, Google).

2.1 The 80-Year Cycle

Major technology cycles last roughly 80 years and have four stages12: Startup: Fundamental innovation causes new companies to emerge. Growth: Those firms grow into the main-stream. Shakeout: Slowing growth and overexpansion cause a consolidation. Maturity: The surviving companies compete for final market share. For example, the last major U.S. technology cycle, computing technology (Figure 2), began around 1950 with the advent of the early mainframes. Cheap computers, fast networks, and massive storage emerged in 1995. Internet, wireless, broadband and video will reach maturity by 2030.
2.2 The Internet S-Curve

It took about 20 years for the Internet to have widely accepted standards. Similarly, cars reached 10% of U.S. homes in 1914, and then jumped to 90% market penetration by 1928, with a shakeout occurring in 1921. Likewise, the Internet reached 10% of U.S. homes in 1996, grew fast, then hit 50% penetration in 2001. Near that point, a major industry shakeout was expected and did occur – the “Dot Com Crash” happened about 80 years after the 1921 automobile industry crash. Internet usage has now reached its maturity stage, and firms such as eBay, Amazon, AOL and Google made it through the shakeout.

2.3 The Wireless S-Curve

Technology adoption follows an S-curve pattern: a new technology goes “main stream” and then grows fast, much faster than the economy, until it reaches 90% market penetration. Wireless technology (e.g. mobile phones, PDAs) penetrated U.S. markets on pace with Internet adoption, and now electronic commerce services are being offered to end-users. It hit 10% market penetration in 1994, 50% in 2001, and hit 90% this year. Most importantly, the combination of internet, wireless, broadband and video technologies is being looked upon by many as one likely next wave of e-Business innovation.

2.4 The Broadband S-Curve

So, a major change in e-Business is possible, and it may occur as broadband and video technologies reach most individuals. Broadband connections (e.g. DSL, cable modems) hit 10% market penetration in 2001, over 30% in 2004, and the shakeout is formally over. Digital cameras and wi-fi networks are emerging at similar rates. By 2030, the combined technologies of internet, wireless and broadband will reach 90% market penetration. This maturity, coupled with multi-modal e-Business transactions, sets the stage for applying technology combinations to support affluent and niche markets.

3 CONTEXT AWARE BUSINESS

Economic and social success drives the rise-and-fall business cycle. Each rise calls business to reorganize its structures for higher population, wealth, and standard of living. This occurred before 1914, when fundamental technology innovation (electricity, steel motors) enabled the assembly line, followed by fundamental business innovation (Sloan’s product divisions and functional units) that enabled office work and suburbs. The coming period of decreased spending may again require business to reorganize – this time to become hyper-aware of customers, and the socio-economic factors that affect their buying.

3.1 Arrival of Mass Affluence

Mass affluence is the current U.S. economy, where “affluence” is defined as a household having income over $100,000 and net worth over $500,000, apart from the home. In 2001, there were 20 million such households, with 30 million expected by 2009. The latter may account for 50% of total spending. This affluent market is not wildly wealthy, but is beyond the middle-class standard of living that emerged in the last economic cycle. As it ages and becomes austere, this group could dominate U.S. markets, and could reshape business for several decades (e.g. demanding premium products at value prices).

3.2 Premium Market Growth

From 1970 to 1990, discount firms (e.g. Wal-Mart) made goods very affordable (Figure 3). This freed up discretionary income for premium goods (e.g. Callaway). So, standard firms (e.g. Sears) are getting squeezed out. But the expected austerity wave may create a new value market segment, where aging consumers obtain premium products at discount prices by using electronic bargaining agents. In such a market, an e-Business could exploit XML to define and create product fragments that can later be combined into highly customizable solutions.
3.3 Old Culture Scrutinized

Firms are now recognizing mass affluence. Affluent households: a) value quality over quantity, b) value service over price, c) make their own decisions, and d) make a difference versus just doing a job. This means new consumption, and a new business model (e.g. individual pricing for mobile e-Commerce services). If the old culture (devalue customer time, optimize worker time, suppress worker talent and motivation, and maximize shareholder return while service levels drop) is scrutinized, that may set the stage for a corporate power shift.

3.4 Corporate Power Shifts

While at General Motors, Alfred Sloan invented a new corporate model that gave trade-up brands to the middle class. But this model is now meeting diminishing returns in the face of premium product growth. Rising self-esteem and self-actualization of workers are causing them to exit to start their own business or to work for higher-growth firms. A new business model – producing personalized products – is emerging that can give a competitive edge to those firms that understand and implement that design early in the next major 80-year economic cycle.

3.5 New Management Model

Personalized products require many fragments and combination options. The old business model has too many top-down policies trying to coordinate too many processes to allow for personalized products or service. The solution is the produce-to-order model. It coordinates real-time production through the automation of logistical and scheduling tasks. It permits direct ordering and delivery of customized goods with “little to no” inventories and less bureaucracy – Dell being one example. Companies that embrace this new model can use e-Business concepts and constructs to reorganize into a network of smaller businesses, subcontractors and vendors.

4 TRANSACTIONAL ORGANIZATION

The produce-to-order model, with its bottom-up management powered by internet, wireless and broadband, leverages software, data and networks to maximize business response and productivity. Wintel technology that created the client-server platform for distributed office work, has given way to the instantaneous, network-centric, World Wide Web. But e-Business 2.0 cannot be fully realized without simplifying the front-end, and that occurs with decentralized decision making. Thus, complex front-end processes, and back-end bureaucracy, must be simultaneously simplified (e.g. Figure 4).

4.1 End-to-End Transaction

When e-Business is designed top-down, it leaves a firm incapable of defining and executing the optimal response to the customer event that initiated a transaction. “Produce-to-order” lets the e-Business focus on the entire, end-to-end transaction from the customer’s perspective. The result: the spanning of all parties, activities, events, responses, messages and data across the entire supply chain. For example, multiple firms participating in a federated execution of a single transaction require: a) coordinated and secure message flows, b) information exchange agreements, and c) coordinated message tracking.

4.2 Customer-Based Business Design

Satisfying an affluent market means adapting the e-Business for each customer and small market. This means personalizing each front-end sub-transaction according to the customer’s language, culture, etc. This is context-sensitive design. The context is: customer, events, and expected responses. The design is what some now call “customer-based inter-organizational systems,” and some call it activity building authenticity into operations. As a design aid, models can be developed to explain how customers could use an e-Business, and such models have been shown to help people and systems adjust operations to accommodate customer expectations.

![A Transactional Organization Architecture](image-url)
4.3 Business Replication by Market

All customers are not alike; and now, using current internet technology, like-minded customers can band together via electronic brokers, which bargain on their behalf to acquire custom products at value prices. The result is a plethora of dynamic small market segments! So, the front-end sub-transactions should be built on an adaptable e-Business platform that enables rapid replication and alteration to fit the language, culture and nuances of each customer or market segment. Otherwise, an e-Business may not keep up with customers changing their events and expectations around the responses to those events.

4.4 Full Service Response

To achieve high adaptability, the response to an end-to-end transaction should come from a distinct functional entity that is standardized to yield profit. A best-in-class design has: a) highly modular, plug-and-play, responses, b) a public interface of defined events and responses, and c) dynamic, context-sensitive, class loading of non-standard responses. This “full service response” comprises modular, coupled, and optimized sub-transactions. It is object-oriented with functionally-oriented, standard components, each of which is designed to achieve the same level of: reputation, user trust, information quality, functional availability and readiness, speed of response, and domain-specific characteristics.

4.5 Browsers and Butlers

Personalization increases product complexity and information distribution. Thus, human assistants, narrowly focused “browsers,” are needed to help customers choose, personalize, and use products. These e-Professionals oversee: trust, security, privacy, version and access control, configuration management and delivery dispersion. Similarly, back-end assistants are needed, since similar buyers can have conflicting priorities. These “butlers” have a wide focus: they know the whole end-to-end transaction in depth. This is crucial; service failures are directly related to a lack of in-depth knowledge, resulting in product/service personalization errors.

5 ADAPTIVE SOLUTIONS

The Internet is an adaptive medium. Its mechanisms can change a product, a service, or a brand faster than other media. It can distribute changes almost instantly across a company, a market, or a supply chain. It is an ideal platform upon which a solution can be structured, configured, delivered and serviced to meet affluent buyers who demand personalization. This section and Figure 5 give an example of how an adaptive service solution can be architected.

5.1 Value Chain

The increasing solution complexity that is now driving buyer-supplier relations in consumer-based markets is addressed in three stages. First, all companies that touch an end-to-end transaction are organized into a value chain. Second, that transactional organization is made to operate on an internet-based platform that can: a) be rapidly branded, and b) selectively opened or closed to any customer or market segment. Third, ebXML (i.e., today’s defacto standard for message exchange, trading protocol, common terminology, and registered process) is used by each company in the value chain to implement its standard response.

5.2 Internet Branding

Each value chain member has a brand. Highly personalized solutions require the e-Business to: a) preserve brand equity for each member, b) enable brand change, emphasis and transparency, and c) enable member differentiation, identification and interactivity. For example, individuals are part of the value chain for a contract labour solution. Today, people brand themselves on social networks. The staffing industry calls this a “video resume.” This language falls short: a resume documents experience and skills, whereas social networks can demonstrate competency, demeanor, presence, and articulation.

Figure 5
A Service Solution with Real-Time Branding
5.3 Brand Transparency

During design, each internet brand goes through a chartering process: create, structure, communicate, direct, manage and maintain. “Transparency” is the decision to: a) hide who is responding to achieve transactional continuity, or b) show who is responding to build trust. The design is implemented using internet frames to “nest” brands within brands. For example, the checkout sub-transaction of an online purchase may make visible the checkout vendor’s brand or logo to build trust with the buyer.

5.4 Configurable Workflows

When an e-Business is a service, it comprises many sub-transactions, each having an operational life of its own. One can describe each sub-transaction by a workflow. For adaptability, all workflows should be highly modular and granular, with well-defined configuration rules. This enables reconfiguration of workflows in real-time to meet customer preferences and business standards. For example, today, artificial intelligence technology is used to deduce customer need, buying intent, and tendencies. This knowledge is then used to reconfigure the workflows for each specific customer or small market segment.

5.5 Data Integrity and Privacy

Data integrity across workflows permits flawless end-to-end transactions. Failure or delay occurs if sub-transactions use different data definitions or if they shirk their responsibility. Such cases can be mitigated using secure message-oriented middleware having a shared data object pool, and passing extra messages to verify data and function alignment. In like fashion, data privacy should be built-in: By isolating the back-end from the front-end, response data is protected by limiting export to the functions needed for a response. Data privacy must include a policy, automated audits, and formal consent.

5.6 Anticipation of Customer Need

Reengineering is not anticipatory. Instead, back-end butlers study analytical reports of customer activity to understand collective needs, and use that knowledge to migrate standard workflows to better serve all customers. At the same time, front-end browsers are building trust and reputation with customers and the value chain. Once in a trusted position, they participate in strategic-level dialog for new uses of the value chain. They create rational trust by: a) engaging with the customer, b) listening and framing needs, c) envisioning new solutions.

6 RESPONSIVE OPERATIONS

Moving to a transactional organization that produces adaptive solutions is a migratory activity. Success starts with mapping current operations: organization, codes, process, rules, and so on. Using that picture, operational elements are identified and modularized into autonomous business functions that correctly contribute to each and every response to each and every business event, and any sub-transaction that initial event spawns. This section and Figure 6 give an example of the result of this design activity: a full service response having specific operational goals: order and service management, sourcing strategy, transactional alignment, and real-time reporting.

6.1 Order Management

Orders actually start when customer and provider share organizational knowledge and XML forms for orders and fulfillment. The former comprises codes (e.g. departments), structure (e.g. hierarchy), and rules (e.g. designees). Once this knowledge is shared, optimal ordering can be achieved using electronic flow down of orders and fulfillment rules. This kind of digital binding of companies using a single management scheme transforms operations and reduces variations and handoffs. Note here that “optimal” does not mean “minimal.” In a complex value chain, some suppliers become inefficient when they are electronically integrated.
6.2 Sourcing Strategy

Sourcing is complex, especially when opportunity timing is a deciding factor. Some sourcing can be automated by: a) locating opportunities via strategy-based profiles, b) adjusting selection criteria using prior query experience, c) maintaining opportunity classifications, and d) using analytics to refine that classification. Best-in-class profiles have three dimensions: differentiation, cost, and personalization. Many tools now exist to "mine" internet sources, and their effectiveness hinges on building trust. But, companies still rely on manual sourcing when: a) supplier trust is unknown, b) duties, taxes or quotas are required, c) logistics or transportation is involved, d) transaction risks exist. All these factors go into an internet sourcing strategy.

6.3 Service Management

Uncontrolled product personalization (during sales) leads to inaccurate demand forecasts, high inventory investment, and poor customer service. So, just like with product replication by market, the variations of service delivery must be carefully controlled. Service management after product delivery is thus crucial. For example, a contract labour management service is often implemented along two dimensions: the actual work of the hired person, and the human resources management of that person. When service management succeeds, the tactical objective of the value chain solution is met: well-managed orders; fulfillment within customer-desired service levels; satisfactory quality of the delivered commodity; good follow-on service. Tactical fulfillment paves the way for the provider to become a trusted advisor.

6.4 Transactional Alignment

Nothing can ruin response faster than transactional misalignment. Response requires sub-transactions to work correctly, and correctly together. Misalignment causes product, process, or data errors – the results of which require costly adjustments after transaction closure. For example, incorrect state tax on labour, an error found in contract labour solutions, creates charges which require subsequent adjustment. These can be eliminated if all sub-transactions share the same tax rules. So, the design or deployment of an e-Business should be reviewed end-to-end to ensure function, data, and rule alignment among all of its sub-transactions.

6.5 Real-Time Reporting

A best-in-class e-Business has three types of reports: Progress Reports tell how the value chain is doing against the customer's outsourcing objectives. Best-in-class versions have two dimensions: product or service quality, and delivery process. Predictive Reports visualize order patterns and deduce their causes: need, business cycle, economic context, etc. Best-in-class versions anticipate customer need and predict if that need can be met. Performance Reports trend defect, compliance, productivity, etc. Best-in-class versions use a variety of performance metrics, capture highly granular data, and display summaries and trends via desktop dashboards.

7 OPTIMAL DECISION MAKING

A transactional organization becomes virtual when multiple companies participate in the e-Business. Optimal decision making happens if the e-Business permits autonomy, cooperation and control among business functions. Today's top companies use this approach to adjust their operations to generate new electronic revenue streams and enable new service mix strategies. But since functions need rules to operate and coordinate, a transactional organization becomes durable only with a flexible framework of rules; specifically an XML-based framework for optimal decision making. This framework has two dimensions: standards-oriented (industry, company, customer) and process-oriented (language, practices, service). This creates a design space (e.g. Figure 7a, b, and c) for XML-based code sets that together, can support value-based front-end and automated back-end decision-making for an e-Business.
7.1 Language-Based Decision Rules

The semantic automation of an e-Business starts with industry-specific terminology that is captured in an ontology. This framework comprises five distinct sets of terms: a) process, b) information, c) application, d) data, and e) infrastructure. Optimal operations can occur when terms are standardized. But language must be a strategic consideration; a shared company language is insufficient unless it accounts for nationalistic interpretations of words and their implied meanings. Within the context of intensified competition in a market that demands high personalization, the ability to market, sell, and support using the customer's language becomes imperative. So, an e-Business architecture should contain: a) a message-passing mechanism for buyer-supplier interactions, and b) a declarative language for expressing customer requests.

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Figure 7b: Process-Oriented Interface Definitions

7.2 Practice-Based Decision Rules

Once language is settled upon, standard practices can emerge. At the highest level, these are industry best practices. When encoded in XML, including measurable objectives and dependency relationships among practices, they can easily be embedded into manuals or systems. The second level of practices, often called standard operating procedures (SOP), simultaneously enables business replication by market and full service response. When encoded in XML, this company knowledge can be immediately deployed exactly where and when needed. The third level of practices, used during replication by market, adjusts the SOP to meet customer needs (e.g. market niche, natural business cycle, unique value proposition, special contracts). The best way to adjust is to overlay customer operations atop the SOP. This way, company functions are not changed, but instead are replaced, by customer functions.

7.3 Service-Based Decision Rules

With language and practices in place, service levels are then defined. The first set comprises an industry benchmark for each sub-transaction. When added together, a true measure of "response" is obtained for each end-to-end transaction. These metrics feed the performance reporting system. Inside industry benchmarks are metrics for SOP. Besides speed and cost, they can measure usability, trust, loyalty, innovation, flexibility and financial impact, and they can occur when the buyer, or the supplier, or both, are mobile. These metrics feed the predictive reporting system. If the customer requires service levels that exceed industry benchmarks and SOP, the customer-facing business functions receive new metrics. Besides speed and cost, service levels can define product quality and service quality. These metrics feed the progress reporting system.

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Figure 7c: Standards-Oriented Rule Set Overlays

8 SUMMARY AND CONCLUSION

e-Business is here to stay, but it may likely change over the next 15 years as population growth declines and new XML-based architectures, for providing highly flexible front-end and highly standard back-end e-Business platforms. To summarize:

8.1 More Applied Innovation

Innovation is invention or application of theories or technologies that radically alters business and the economy. Since innovation is a major economic...
driver, and vice versa, any economic downturn could impact e-Business innovation. Slowing population growth and exiting aged workforces can deplete both the number of inventors and those capable of using investments for fundamental business innovation. In parallel, the simultaneous maturation of the Internet, wireless, broadband and video may provide new opportunities for combining these technologies into solutions for the mass affluence economy. More applied, and less fundamental, innovation is likely.

8.2 Architecture Innovation

Those consumers capable of demanding premium, personalized products dominate the mass affluence economy. These consumers are also tech-savvy, and can exploit the Internet by creating intelligent agents that build dynamic small markets of like-minded consumers to negotiate with suppliers for premium, personalized products at value prices! Since this market could grow to over 50% of the overall economy, e-Business must become hyper-aware of their needs and buying patterns, and must be “architected” into a highly flexible front-end (to flex to each individual or small market) and a highly standardized back-end (to enable cost-effective operations). Architecture innovation could be a key to e-Business survival in the coming decades.

8.3 XML Platform of Contracts

Internet technology now exists to “architect” flexibility with standardization. A crucial technology is XML. It is an internet-based software language for defining business language, practices and service levels (thus enabling standardization), and allowing them to be easily changed and distributed across all business functions (thus enabling flexibility). Couple this mechanism with an architecture of “customer within company within industry,” and you have a platform for standardizing business contracts and then overlaying the more esoteric rules required for meeting the varied and changing demands of the individuals and small markets in the mass affluence economy. Future market forces could likely make an XML-based contracts platform commonplace.

8.4 Front-Line Decision-Making

Such architecture requires an investment – shed top-down control, reduce bureaucracy and decentralize decision-making. The XML platform of contracts lets a company define its operational rules while also enabling giving up control for how to apply those rules for each customer or small market segment. That is the job of front-line “browsers,” who know their customer best. They can apply standard rules appropriately, and can overlay customer-specific rules atop the corporate standard. At the same time, back-end “butlers” use their “all customer” perspective to improve the standard rule set. In this way, best practices are centrally defined and immediately distributed to the front lines. Context-sensitive e-Business (i.e. high-flex front-ends with standard back-ends) may become the norm.

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REFERENCES