E-BUSINESS PLANNING AND ANALYSIS FRAMEWORK

INTRODUCTION

This appendix describes a framework that has been successfully used to analyze the e-business capabilities of an organization with a view to developing its e-capability maturity levels. This should be the first stage of any systems development project. The framework has been used widely within startup companies and well-established companies, both large and small; it has been deployed in the service and manufacturing sectors. The framework has been applied by practitioners and consultants to help improve e-business capability levels and by academics for teaching and research purposes at the graduate and undergraduate levels.

This appendix describes the e-business planning and analysis framework (E-PAF) and demonstrates how it works via an abridged version of a case study (selected from hundreds that have been produced). A brief account is provided of each of the three techniques that are integrated to form the analysis framework: quality function deployment (QFD) (Akao 1972), the balanced scorecard (BSC) (Kaplan and Norton 1992), and value chain analysis (VCA) (Porter 1985). The case study extract is based on an online community and dating agency service identified as VirtualCom, which has been produced through a consulting assignment with the founding directors of that company and has not been published previously. It has been chosen because it gives a concise, comprehensive example from an industry that is relatively easy to relate to.

BACKGROUND

Kalakota and Robinson (2001) argued that organizations must bear in mind not to focus too much on the ‘e’ component of e-business. The greatest threat to an organization is either failing to deploy the Internet or failing to deploy it strategically and, therefore, without efficacy (Porter 2000). Organizations should deploy an e-service only if it is concordant with its strategic needs. Not all e-business mechanisms are right for every organization (Lord 2000). The correct application must be chosen or developed with both the process it supports and the strategic objectives of the company in mind. A deadly assumption would be to believe that technology is the answer to all process and strategic weaknesses; in response to this concern, the E-PAF framework was developed.

Many types of analysis frameworks are available (Ballantyne and Brignall 1992). According to Wu (1992), good frameworks should guide managers toward a method or solution uniquely suitable to the particular situation in question. On the whole, frameworks should not be too complex to use, and information interaction within the framework should be clear and concise to avoid information overload. Lee and Ko (2000) proposed a framework for strategic business analysis by integrating SWOT (strengths, weaknesses, opportunities, and threats), balanced scorecard, quality function deployment, and "Sun Tzu’s the art of business management strategies" techniques. In a similarly proposed framework, Lee et al. (2000) integrated the SWOT (de Witt and Meyer 1998) BSC, QFD, and the Malcolm Baldridge National Quality Award's (MBNQA) education criteria to formulate policy for vocational education in Hong Kong.

Although many analytical techniques, such as SWOT, SLEPT (social, legal, economic, political, technical) (de Witt and Meyer 1998), and the BSC analyses, can be used to identify an organization’s strategic needs, none provides a direct mechanism to prioritize the needs and convert them into operational processes or to then translate those processes into a specification that can be used to develop or acquire supportive software systems. In contrast, other analytical techniques, such as Porter’s (1985) value chain analysis (VCA), facilitate the analysis of processes within a company but do not provide an easy mechanism to link these to high-level business objectives. One analytical tool that does provide the ability to convert high-level business objectives (“what” the business wants) into processes (“how” the business delivers those “whats”) is QFD, which has had these benefits discussed widely by Akao (1972), Mazur (1992), and more recently by Ko and Lee (2000) and Lee et al. (2000). However, QFD has its own weaknesses; two of these lie in the initial generation of the “whats” and “hows.” The analytical framework presented in this article deals with these weakness by marrying up QFD with two other complementary analytical techniques:

e-business capabilities

The abilities that an organization is able to leverage in order to deliver online products and services; often described in terms of their “maturity levels.”

e-capability maturity level

Conceptual model describing how advanced an organization is in the adoption of Internet-based solutions that support the organization’s strategy and operations. The levels range from “low” (little adoption) to “high” (sophisticated levels of adoption).

e-business planning and analysis framework (E-PAF)

A combination of QFD, VCA, and BSC that supports strategic e-business initiatives.

quality function deployment (QFD)

A tool for converting user requirements into functional requirements that facilitates trade-off analysis, benchmarking, and deployment of requirements from a high level down to a detailed specification. It attempts to build in quality from the initial stages of any systems development project.

Appendix C: E-Business Planning and Analysis Framework

The Three Techniques of the E-PAF

<table>
<thead>
<tr>
<th>Primary purpose</th>
<th>Balanced Scorecard (BSC)</th>
<th>Value Chain Analysis (VCA)</th>
<th>Quality Function Deployment (QFD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Establishes strategic objectives.</td>
<td>Establishes the high-level logic of the value-adding activities within customer-facing business processes.</td>
<td>Analyzes and manages the tradeoff between business objectives (“whats”) and business processes (“hows”) and deploys these to lower levels of definition for detailed systems design.</td>
</tr>
<tr>
<td>Main strength(s)</td>
<td>Sets high-level business vision.</td>
<td>Defines high-level, value-adding activities (primary and secondary).</td>
<td>Can deploy high-level objectives and processes (e.g., users requirements) into detailed tasks and systems requirements.</td>
</tr>
<tr>
<td>Main weakness(es)</td>
<td>Difficult to translate these into detailed processes or system requirements.</td>
<td>Does not generate high-level vision; difficult to translate value-adding activities into system requirements.</td>
<td>Difficult to generate initial business vision and high-level value chain.</td>
</tr>
</tbody>
</table>

**balanced scorecard (BSC)**
A tool for developing “measures,” “objectives,” “targets,” and “initiatives” for “financial,” “customer,” “internal process,” and “learning and growth” categories derived from the overall company vision statement.

**value chain analysis (VCA)**
A tool for mapping business processes that are either primary to the business operations or serve as support processes. Variants of the model are produced for service and manufacturing sectors.

**systems development lifecycle**
A logical and iterative sequence of activities that highlight the phases of any development project. These phases typically include analysis, logical design, physical design, test, measurement and implementation, and maintenance, and are often performed as concurrently as possible.

- BSC to generate a set of high-level business objectives, targets, measures, and initiatives for finance, internal operations, learning and growth, and customer satisfaction. The outputs from this analysis (including the weightings) become the “whats” in the initial QFD analysis.
- VCA to generate detail about operational processes. The outputs from this analysis become the “hows” in the initial QFD analysis.

The relationships between these are summarized in Exhibit C.1. Through the complementary use of the BSC, VCA, and QFD, the comprehensive, yet easily understandable, e-business planning and analysis framework (E-PAF) has been developed.

**THE E-BUSINESS PLANNING AND ANALYSIS FRAMEWORK**

An eight-step approach is followed to apply the E-PAF, as shown in Exhibit C.2 (Tan and Tang 2002; Tan, Tang, and Forrester 2003, 2004). Note that more detail of Step 1 is shown in Exhibit C.3 and more detail of Step 2 in Exhibit C.4. The eight steps are as follows:

1. Using BSC to develop “whats” for QFD Matrix I
2. Using VCA to develop “hows” in QFD Matrix I
3. Completing QFD Matrix I
4. Identifying critical business processes from QFD Matrix I
5. Inputting critical business processes to QFD Matrix II’s “what”
6. Listing e-service applications to QFD Matrix II’s “how”
7. Completing QFD Matrix II
8. Identifying critical e-service applications from QFD Matrix II

The following sections describe how the framework has been applied to VirtualCom, a recently established online startup company specializing in establishing community groups and providing dating services; it presently has relatively low e-capability maturity. It should be noted that E-PAF (Exhibit C.2) should be applied within the initial analysis stage of a systems development lifecycle, the remaining stages being the logical design, the physical design, testing, implementation, and maintenance, which for reasons of conciseness are not discussed here.

Prior to applying the framework, the situational factors (e.g., political, economic, social, technological, environmental, and legal) behind the business strategy must be established. In brief, it was observed that the majority of the environmental drivers are pro-online dating. However, despite the fact that online dating has been around since 1998 (e.g., match.com), the industry has new entrants coming in on a monthly basis, making the industry highly competitive. The nature of the competition is such that well-known, trusted online brands attract most of the new users, thus becoming bigger and bigger and leaving the competition behind because the size of a particular community is a key basis of sustainable competitive advantage. Due to the increasing number of competitors, margins are shrinking and profits decreasing. Moreover,
the majority of new entrants are offering free services to attract visitors and seek revenues from other streams, such as banner advertising and database marketing.

The bargaining power of customers is significant; substitutes are just a click away, making it difficult to create switching costs. Any successful attempt to differentiate from the pack tends to be copied immediately and the advantage lost. The main switching barrier seems to be related to the attraction of belonging to the community itself because users hopefully develop personal relationships and in some cases strong feelings of belonging and even addiction.

Finally, many vendors are working on substitutes, such as mobile dating applications, taking advantage of specific mobile functions, such as location-based services (LBS) and 24/7 access. However, there are many indicators that the most successful community services of the next decade will be those that will be able to merge Internet and mobile technologies into a seamless user experience.

All of the factors just described, combined with low-entry barriers, make the industry highly competitive. This means that a company must have a clear understanding of its systems development lifecycle, particularly in the initial stages. Each step is now explained further using VirtualCom as an example.

**STEP 1: BALANCED SCORECARD**

A BSC analysis was conducted for VirtualCom to give objectives, targets, measures, and initiatives to the financial, internal process, learning and growth, and customer perspectives; an excerpt of this can be seen in Exhibit C.3 (one example for each category is shown as an example; others used in the case study are simply identified by name in the QFD I).

**STEP 2: VALUE CHAIN ANALYSIS**

Concurrent with the BSC analysis, a VCA also was generated for VirtualCom. Because VirtualCom is a service-based company, it was more appropriate in this case to use the commerce value chain analysis by Treese and Stewart (1998), as opposed to the generic value chain analysis by Porter, which would be used if a manufacturing-based company were being analyzed. The factors identified for VirtualCom’s value chain based on Treese and Stewart’s work (1998) can be seen in Exhibit C.4.
## EXHIBIT C.3  Summary of BSC Analysis

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Measures (increase or decrease is expected)</th>
<th>Target/Initiative</th>
<th>Weighting (1 low, 5 high)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expand customer base</td>
<td>Increase number of new customers, build brand awareness and image, reduce attrition rate of visitors.</td>
<td>1 year: 100,000 paying members— increase 400% from potential decrease to 20,000 months: attrition rate &lt;90%.</td>
<td>3</td>
</tr>
<tr>
<td><strong>Internal business process</strong></td>
<td></td>
<td>Six months: make all Web pages max five clicks from login homepage. Six months: clean database quarterly.</td>
<td>5</td>
</tr>
<tr>
<td>Quick transactions</td>
<td>Increase efficiency of automation— reduce application response times, reduce database interrogation time (system resources/time).</td>
<td>One year: retain services of online marketing agency. Two years: double technical personnel.</td>
<td>4</td>
</tr>
<tr>
<td><strong>Learning and growth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>Increase percentage of employees at sufficient level of training for all relevant operating procedures, investment of time and costs incurred on training.</td>
<td>Three months: change from banner advertising and keyword sponsoring to affiliate payments.</td>
<td>5</td>
</tr>
<tr>
<td><strong>Financial</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased profitability</td>
<td>Increase net contribution (daily, weekly, monthly subscriptions); monitor contribution of each different revenue stream (subscription fees, advertising revenue).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXHIBIT C.4  Key Factors in VirtualCom’s Value Chain Analysis

- **ATTRACT customers**
  - Online banner advertising
  - e-mail/database advertising
  - Search engine keyword advertising
  - Internet radio advertising
  - Affiliate programs
  - Interactive PR
  - Targeted offline advertising

- **INTERACT with service**
  - Free posts of personal ads
  - Free posts of photos
  - Unlimited search and browsing among user profiles
  - Special offers/trial period
  - Time limited free trial of full service

- **ACT on customer instructions**
  - Member generation
  - Member identification and authentication
  - Order processing
  - Payment processing
  - Order fulfilment – delivery to appropriate service – access level to the purchased service features

- **REACT to customer requests**
  - Invoice generation
  - Receipt generation
  - Troubleshooting and inquiry processing

- **SUPPORT**
  - Financial accounts and analysis
  - Training
  - Knowledge management

- **RETAIN customer base**
  - Loyalty program
  - E-mail marketing
The factors produced by the BSC analysis then become the “whats” in the QFD I analysis, and the factors from the VCA become the “hows” for the QFD I analysis (Exhibit C.5). From the QFD I analyses of the interrelationships between “whats” and “hows,” the top four critical business processes identified to meeting customer needs were:

- **Usage analyses** process (score = 368.8) ranked first. This process is critical to aligning the service with the customer’s desires, thereby increasing loyalty. It is not currently performed but is of critical importance for sustainable revenue generation and providing evidence for how best to present the service to a first-time visitor.

- **Order processing and payment processing** processes jointly ranked next highly (scores = 362.5). These are both closely related to one of the new business model objectives (e.g., improvement of financial performance by the introduction of subscription fees).

- **Affiliate program** process (score = 295.8) ranked fourth. This process is important to obtain critical pre- and post-purchase behavior of visitors and members.

The results demonstrate a high dependence on efficient order and payment processing to ensure that the business survives. Additionally, usage analysis enables the online company to further understand the needs and behaviors of its users, and affiliate programs would further enhance the experience and perceived benefits by its users and members.
### STEPS 5 THROUGH 8: QFD II MATRIX

Having determined the critical e-business processes, the next step is to conduct a second QFD analysis to identify critical e-business applications. In this step, the output of QFD I becomes the input to QFD II, so that the “hows” in QFD I become the “whats” in QFD II. Because VirtualCom is an existing online service, the only e-business applications considered were those that qualified as potential enablers of identified missing or underperforming e-business processes (see Exhibit C.6).

At this stage, VirtualCom shortlists candidate e-business application types (see Exhibit C.7). The results from the QFD II Matrix in Exhibit C.6 showed that the e-business applications under the heading of “Usage Analysis” came in first (score = 238.9); the three e-business applications under “Act” came in jointly second (score = 234.8). The affiliate system, under the “Attract” heading, came in third (score = 191.6). Note that no application types are suggested for “React” and “Interact” because no critical processes were identified in that stage.

The validity of these results can be further reinforced with the following explanations:

- VirtualCom requires a tool for site usage analysis (e.g., a Web logger or Web transaction application) in order to determine users’ behavior. This will help to contribute in the design of the services to

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### Exhibit C.6 QFD II Matrix: VirtualCom’s Key Business Processes and Candidate Software Solutions

<table>
<thead>
<tr>
<th>Direction of Improvement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attract</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affiliate Program</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order Processing</td>
<td>5</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment Processing</td>
<td>6</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retain</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Usage Analysis</td>
<td>9</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Importance of the WHATs</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliate System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>295.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Database Management System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>295.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order Processing System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>362.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment Processing System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>362.5</td>
<td></td>
</tr>
<tr>
<td>Web Log Analysis System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>368.8</td>
</tr>
</tbody>
</table>

| Overall Importance        |   |   |   |   |   |   |   |   |   |   |
| Percent Importance        |   |   |   |   |   |   |   |   |   |   |
| Max = 26.5                |   |   |   |   |   |   |   |   |   |   |
| Percent Importance        |   |   |   |   |   |   |   |   |   |   |
| Min = 21.3                |   |   |   |   |   |   |   |   |   |   |

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**Online Service**

The provision of an intangible value-adding activity using Internet-based technology.
increase customer loyalty, as well as increasing the rate of conversion for first-time visitors into repeat customers. Thus, a Web log analysis system enables the capture of accurate firsthand data in order to better understand visitors’ and customers’ online behavior.

- The order processing and payment processing applications under the Act heading will enable VirtualCom to streamline order and payment processes as it replaces the existing manual processes. The database management system will provide the necessary database upgrade to meet the new demands on the database management system, due to the introduction of different statuses and privileges of free and paying members (after the planned introduction of subscription fees).

- The affiliation system will provide VirtualCom with a more cost-effective method of attracting new customers rather than using banner advertising or keyword sponsoring. This is because an affiliation system is used to pay affiliates only when they actually deliver new fee-paying members, whereas banner advertising and keyword sponsoring costs VirtualCom the same amount regardless of how many visitors actually convert into paying customers.

Once the initial analysis phase has been conducted, the next phases of the system’s development lifecycle can commence. This will start with the logical and physical design of the system, defining what will be outsourced to external vendors and what will be developed in-house.

**FUTURE TRENDS**

Organizations will continue to develop their online e-business capabilities. It will not be sufficient to merely maintain existing technologies, applications, and business models. It will be necessary to continually assess changing customer requirements and competitor performance against incumbent practices and systems. It will, therefore, require business development managers to use a planning and analysis framework that has the capability of capturing the planned business vision and standard operating procedures, which can then be deployed down into technical requirements that are understandable to information systems designers.

The speed of change will accelerate in the future; technological solutions will become more proliferated; and inter- and intrabusiness connectivity requirements will become increasingly important. The emergence of mobile devices for customers and employees and increased application of radio frequency identification (RFID) to product and inventory management systems will add yet another level of complexity to e-business planning.

**CONCLUSION**

In conclusion, this appendix drew together three well-established management and design tools into an integrated planning and analysis framework (referred to as E-PAF) to help develop e-business capability maturity levels. None of these tools alone meets these needs, but together they have proven very successful. Hundreds of examples have been produced in a combination of industrial projects, consultation and research assignments, and in academic teaching scenarios.

The outlined case given here has been taken from a practical project conducted with a new company in the service industry. It formed the analysis phase of a standard systems development approach. The E-PAF has also been applied successfully in the manufacturing sector and has demonstrated itself effective in both large and small organizations in many countries. A suggestion of the possible outcomes is indicated by this case study.
Appendix C: E-Business Planning and Analysis Framework

REFERENCES


