Research

Managing information technology (IT) for one-to-one customer interaction

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Abstract

A one-to-one marketing paradigm has emerged that suggests organizations will be more successful if they concentrate on obtaining and maintaining a share of each customer rather than a share of the entire market, with information technology (IT) being the enabling factor. This paper presents four key elements that provide the necessary steps that allow an organization to position its people, business processes, and information systems to establish and take advantage of this emerging paradigm. The key elements are: (1) business process analysis, (2) integration and redesign of customer data, (3) IT-enabled customer interaction, and (4) accessibility/transmission of organizational information. Further, this paper discusses the importance of integrating these four IT elements for achieving effective customer interaction. © 1999 Elsevier Science B.V. All rights reserved

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1. Introduction

As organizations continue to search for a competitive advantage in increasingly tight markets, emerging technology is often considered to be an enabling factor for gaining such an advantage [11]. Information technology (IT), if used effectively, provides an organization with the opportunity to engage its customers in interactive communication and has led to the emergence of the one-to-one marketing paradigm [20]. This paradigm suggests that organizations will be more successful if they concentrate on obtaining and maintaining a share of each customer rather than a share of the entire market, with “IT” as the enabling factor. Pride and Ferrell ([23], p. 12) support this concept by stating that “without an adequate information system, an organization cannot be customer-oriented.”

Both the MIS and marketing disciplines have studied IT’s impact on customer sales and services. With respect to IT, there have been those who have focused on how data integration [27] and customer support activities [9] can be a foundation for improving an organization’s ability to serve customers effectively. There has also been research conducted in the area of applying IT to improve an organization’s marketing efforts [2]. de Ruyter and Zuubier [7] discussed bridging the gap between IT and marketing perspectives with respect to an organization’s design and use of its customer information system (CIS). Within the con-
text of this paper, a CIS is defined as the acquisition, storage, and distribution of customer information.

The goal of this paper is to identify the key elements that must be present for organizations to leverage IT to facilitate one-to-one interaction with customers.

2. Perspectives of customer interaction

Interactivity has been defined as “the degree to which participants in a communication process have control over, and can exchange roles in, their mutual discourse” ([26], p. 10). Rogers et al. [24] studied the nature of interactive communication technologies in business settings, including the defining characteristics of interactive communication technology, such as its flexibility, high degree of participant control, and low degree of social presence. They also discussed strategies for distributing interactive communications technology from organizations to the critical mass, which they defined as the synergy of current and potential users.

We explore one-to-one customer interaction from two perspectives: marketing and IT. Both these areas need to work together with a high level of coordination to produce a seamless process of interaction. Marketing professionals are interested in the application of information technology for establishing effective one-to-one customer interactivity with the purpose of increasing customer satisfaction. Information systems professionals are responsible for designing an effective information infrastructure that will provide marketing professionals with the foundation for taking advantage of interactive applications.

Marketing professionals in the 1990s have discovered there is a fine line between customer sales and service. Effective customer service typically leads to a higher volume of sales. Ives and Mason [12] identified IT as the catalyst toward reversing the trend of standardizing services. They point out that IT can improve customer service strategies in three ways: personalizing service, augmenting service, and transforming products. Organizations are taking advantage of IT to enhance their marketing efforts. Jeffery [13] discusses the advantages associated with utilizing a ‘data mining’ strategy to obtain specific customer profile information. Contrary to conventional access methods that were utilized in a mass-market environment, these types of customer information systems are able to obtain extremely detailed customer information. Before an organization can shift its focus from a mass-market to a one-to-one strategy, a methodical approach should be used to migrate from one paradigm to another in a systematic manner.

The first key element that an organization must consider before it can alter its CIS to take advantage of individual customer information is establishing a strategy for collecting this information [5]. IT and business process analysis are tightly coupled. Lucas and Baroudi [17] discuss how organizational design and IT require a high degree of coordination. Such strategies consist of a complete business process analysis that involves the identification of customers with whom it is profitable to establish one-to-one interaction and whose business processes can be reengineered to accommodate this interaction.

The second key element for successful customer interaction is the integration and redesign of customer data across the organization. In allowing an organization to focus on the customer, it is a widely held view that the IS professionals must integrate customer information across the organization [15]. In addition to integration, an organization must consider the redesign of customer data. Because one-to-one interaction requires a narrow focus on each customer, this strategy must include the collection and accessibility of non-transactional customer information (e.g. suggestions, complaints, preferences, etc.) as well as transactional information (e.g. product purchased, quantity purchased, etc.).

Once an organization has identified the customers for an interactive relationship, a third key element is the means to facilitate this interaction. These methods can be automated or manual. Automated methods include a number of different interface technologies, such as the Internet, electronic kiosks, and computer/telephone integration. Manual methods, such as person-to-person or via the telephone, are the more traditional ways, but even manual methods must be IT-assisted to be effective. More specifically, organizations must leverage their IT infrastructure to interact with their customers effectively when manual methods are being utilized.

A fourth key element is identifying the most effective means for accessing and distributing data that has been gathered from customers during interactive com-
munication. The distribution of this information can be internal or external to the organization. The internal distribution of information will be used for customer and decision support. External information distribution will be aimed directly at the customer. Finally, an organization must consider the type of underlying infrastructure that supports these distribution channels.

Both, the marketing and information systems disciplines play an important role enhancing an organization’s CIS to increase the level of customer service. However, both areas have more experience tailoring their strategy toward a mass-marketing environment—not the one-to-one paradigm.

3. Key IT elements for customer interaction

The key IT elements are illustrated in Fig. 1.

3.1. Business process analysis

When an organization decides to establish an interactive relationship with its customers, the first step is to analyze the current business processes for this communication. This analysis must also focus on how customer support personnel will access customer information as well as how this information can be used by various decision support functions [9]. The analysis will provide a blueprint to identify effective user interface technology for interactive communication with customers. This analysis may lead to a business process re-engineering effort.

According to a large multi-national photo-equipment manufacturer spokesperson, “CIS data that is not related to other customer data, which does not fall within a particular decision-making time-frame, does not meet specific standards of user-friendliness and, consequently, does not result in any behavior, basically has no meaning” ([7], p. 250). Thus, an organization must analyze three major components when it undertakes a business process analysis for the purpose of establishing interactive communication with its customers: customer interaction, customer support, and decision support. An organization cannot take full advantage of engaging its customers in interactive communication unless this exchange is recorded in the organization’s information system and made available for future use.

For an organization that intends to interact with its customers, the first component for analysis is to identify how, where, and when the organization will conduct this form of communication and record it in the CIS for future use. For example, a local retailer may encounter its customers in a variety of ways, such as talking to them over the telephone, answering an inquiry in the store, etc. A large number of organizations manage to record information from these encounters, but do not have an information infrastructure in place to take advantage of it [14]. The purpose of analyzing these opportunities is to identify the points of interaction where useful information can be recorded. The specific method can include focus groups, customer behavior simulation, and customer surveys.

![Fig. 1. Key elements for successful customer interaction.](image-url)
The second component is customer support. Organizations employ a number of different methods to support their customers. Examples include 1–800 telephone numbers and in-store customer help desks. When examining these, organizations may decide to retain, modify, or remove some or all, depending on the customer interaction points. Employees that have direct contact with customers must be trained to use and update the newly organized customer information and to absorb a larger volume of information and new procedures.

The third component is decision support. The process in which decisions are made may be significantly altered when a one-to-one customer interaction strategy is adopted. An organization must properly organize and distribute information to improve the quality of its decisions.

3.2. Integration and redesign of customer data

When redesigning customer data, an organization has two major issues to consider: integrate customer data across the organization and expand the customer data profile. First, the most effective course of action for integrating current customer data across the organization must be determined. Two obvious alternatives are to perform a complete redesign or modify the existing data schema. Second, the customer data profile must be extended to include non-transactional data (e.g. E-mail documents, audio, etc.).

Traditionally, companies have designed their systems along functional lines (i.e. sales, accounting, etc.): this has led to a fragmented profile of the customer [6] (see Fig. 2(a)). This design proved useful for transaction mainframe-based systems but it is no longer sufficient to gather and store information along functional lines. To further illustrate this point, data is often organized by product or account information creating a situation where customers have several identification numbers (i.e. account numbers) within the same system [10]. This fragmented view of the customer creates problems when customer support has to access different systems or is forced to refer customers to other support personnel to resolve issues or problems. Data integration does not provide an organization with a strategic advantage unless this data can be distributed across functional lines and used to communicate with the customer. Therefore, organizations must create a single view of its customer information that is accessible across functional lines (see Fig. 2(b)).

While it may be desirable for an organization to redesign its data model completely, it may not be possible. Reverse engineering tools can overcome this obstacle by facilitating the process of migrating legacy data to new databases, but this method does not reduce the amount of tedious, complex work that is required to complete the process.

In addition to looking for ways to design for integration, customer data profiles must be expanded. While transaction-based customer information is imperative, expanding customer data profiles by capturing non-transactional related customer information will be vital if an organization is to interact with its customers effectively [4, 19]. Pine et al. [21] point out that non-transactional customer data is equally, if not more, valuable. Data in the form of suggestions, complaints, and comments must be included in the expanded customer data profile because this information is what makes customer interaction so powerful.

3.3. IT-enabled customer interaction

Berry ([3], p. 158) referred to technology’s role in customer service as “high touch through high tech.” Information technology can be used in both, manual and automated customer interactions (see Fig. 3).
3.3.1. IT-assisted interaction

IT-assisted interaction is predominantly a manual process that uses IT to enhance the relationship between the service provider and the customer (see Fig. 3(a)).

IT-assisted interaction may be the appropriate choice if an organization is fairly small. An organization in its infancy will usually introduce technology in stages. For example, a local pizza parlor may use a personal computer to track individual orders. This use of IT could possibly migrate toward storing customer address and order information with the intention of using it to facilitate future orders. This is currently being used by major national franchises (e.g. Pizza Hut) and has the potential of becoming an automated interaction process. Also, the nature of an organization’s business may not warrant the elaborate use of IT. A local produce stand, in all likelihood, does not have a need for an extensive use of IT to interact with its customers.

IT can be detrimental to the interaction process if the service encounter calls for human interaction. For instance, a haircut cannot be administered without the presence of two human participants. Nevertheless, even in most cases, IT can play a role. To illustrate this point further, one of the reasons people eat at restaurants is for the social element of the experience, including being seated by a host, etc. However, Outback restaurants distribute beepers to customers who are waiting for a table, allowing them to leave the restaurant until a table is available. Although some IT-assisted customer interactions will never become fully automated, there are several instances where automation is acceptable.

3.3.2. Automated interaction

The key to the automated service encounter is to pass the control of the interaction process to the customer (see Fig. 3(b)). Technical infrastructure is a key consideration when an organization designs its automated interaction strategy. This will consist of a telecommunications network and terminal equipment and can be internal or external to the organization. The differentiating factor between an internal and external technical infrastructure is maintenance responsibility. Maintaining an internal technical infrastructure has advantages as well as disadvantages. Advantages include tighter control over the network, higher security, and standardized terminal equipment. An organization can control such network issues as bandwidth (e.g. transmission speed) and media type (e.g. fiber) plus apply a high level of access security. Depending on the type of interactive interface that is being used, an organization can use terminal equipment that takes maximum advantage of the customer interaction. However, an internal technical infrastructure has disadvantages, including high maintenance costs and limited accessibility.

A good example of an internal technical infrastructure is the use of kiosks. These are multimedia-based workstations that are specifically designed for public
access and can be stand-alone or networked to a larger computer system [25]. They may have touchscreens and are located on the organization’s premises or at a remote location. Kiosk development and maintenance is considerably more expensive than other types of user interface technologies that can take advantage of existing terminal equipment and telecommunication infrastructure.

The use of an external technical infrastructure for interacting with customers is attractive; it is easily accessible by the customer and has low maintenance costs. For instance, an external telecommunications network can come in the form of traditional phone lines or the Internet. Consequently, customer interaction can occur from the customer’s home or office. Utilizing an external infrastructure allows the organization to pass the maintenance responsibility to other organizations (e.g. local phone service) as well as to the customer (e.g. Internet). However, it lacks security and both, the network and equipment are out of control of the organization.

Examples of using an external technical infrastructure for customer interaction are the Internet, computer/telephone integration, and stand-alone software packages. The Internet, via the World Wide Web (WWW), provides organizations with a powerful means to interact with its customers on a one-to-one basis [1]. The commercial activity on the Internet is immediately apparent [22] with roughly two-thirds of Fortune 500 companies maintaining web pages in an effort to interact with its customers [16]. Computer/telephone integration (CTI) systems link the telephone to computer applications and are widely accepted because of user familiarity. Custom-developed software packages present an organization with an alternative to using Internet applications. An organization can develop its own front-end application software, distribute it to its customers, and create an interaction via telecommunications software and a modem.

3.4. Accessibility/transmission of organizational information

The accessibility of organizational information is the fourth key element when considering one-to-one customer interaction. The distribution of this information can be internal or external. Internal transmission of information refers to the distribution of information within the organization for the purpose of enhancing customer and decision support. External transmission focuses on how customer and organizational information will be distributed back to the customer in an effort to enhance the interaction process and, subsequently, improve customer service.

Once an organization has the business processes and the data structure in place to support one-to-one customer interaction, careful consideration must be given to the distribution of organizational information in support of this new environment. One alternative, peer-to-peer architecture, is extremely inefficient because each computer is directly connected to another with no dedicated server in place to oversee network traffic. Another uses client/server techniques with a dedicated server that optimizes network traffic and controls front-end software (client) access to data on a database server. The use of client software is advantageous because it allows different functional areas to construct interfaces that meet their requirements, but at the same time access the same integrated view of the data as other functional areas.

While distributing organizational information within an organization is important, effective one-to-one customer interaction will be accomplished by how well organizations disseminate information directly to customers. An issue in designing a strategy to distribute dynamic, core business information to the customer during the interaction process is the linking of data to the interfaces used during customer interaction. The complexity of this task varies based on the type of user interface technology. Because organizations have tighter control over the network infrastructure when interfacing with kiosks, computer/telephone integrated systems, and custom-developed software, the complexity of linking organizational data to these interfaces is relatively minor. Linking this information to Internet applications is more difficult because of the organization’s lack of control over the Internet’s network infrastructure.

4. Examples of successful IT-enabled customer interaction

4.1. Levi Strauss

The first example, product-oriented in its focus, comes from the apparel company Levi Strauss [18].
This organization has initiated a marketing effort that offers customized jeans for women. Customers try on sample jeans and provide measurement information that is captured to provide an accurate profile of their dimensions. Measurement data is entered into a computer-aided design system and transmitted to an automated fabric-cutting machine where the jeans are custom made. This information is stored in Levi Strauss’ information system and can be accessed for future orders for that particular customer.

Levi Strauss had to verify that an adequate information infrastructure was in place for interacting with its female customers. They can now support their female customers in a new way. Customer support personnel had to be trained in the use of this new technology and in managing this new repository of customer information. Levi Strauss is now in a position to gather a large repository of customer information that can be used for organizational decision making. For example, they can use the feedback it receives from customers to decide how to interact with this targeted group or, perhaps, a wider range of targeted groups.

Similar issues can be applied to the integration of customer data. Once Levi Strauss has stored the customer’s measurement information, future jean orders can be processed by simply accessing this information, manufacturing the jean, and distributing the final product to the customer. However, this type of interaction is only possible if all three participants in the process – sales, manufacturing, and distribution – have the same integrated view of the customer information.

Levi Strauss can interact with its customers using both the IT-assisted and automated methods. There are a number of potential interactive user interfaces; e.g. customers in remote locations can be responsible for obtaining their own measurement information and entering this information via a Levi Strauss Web page, a stand-alone software package, or a computer/telephone integrated application. However, there are instances (e.g. initial measurement) where IT-assisted interaction has proved to be effective.

Finally, the availability and transmission of organizational information is essential for the interaction process to be effective for both, the customer and Levi Strauss. Currently, Levi Strauss has concentrated on an internal transmission of customer information when they order customized jeans. There is an opportunity to extend user interface technology to customers for the purpose of conducting this transaction remotely.

4.2. Ritz–Carlton

The Ritz–Carlton hotel chain provides an example of a service-oriented organization implementing a one-to-one customer interaction strategy [21]. This hotel builds a database of customer profiles that allow its employees to anticipate customer preferences and, subsequently, increase customer satisfaction. This profile consists of customer suggestions, preferences, and complaints. The information originates from two sources – the customer and hotel employees. Ritz–Carlton provides each of its employees with a ‘guest preference pad’ that is used to record information about the customer, based on direct (i.e. face-to-face) interaction with the customer as well as simple observation.

Ritz–Carlton decided to target its entire customer base. However, some customers do not respond well to being observed without their knowledge and, subsequently, having their behavior recorded for future service encounters. A special feature, therefore, alerts other hotel employees if the customer is uncomfortable with such data gathering. Each service encounter will vary and customer support personnel need to be trained to leverage the customer profile information in the best interests of both, the hotel and the customer.

The Ritz–Carlton example magnifies the need for the redesign of customer data. The variety of ways in which a customer can be observed (e.g. seeing, listening, etc.) presents a need to be able to store information in a variety of forms, including audio, video, and images, that can be entered directly by the customer.

Focusing on the customer as the primary source of information makes the choice of an interactive user interface very important. It must be convenient for the customer to record vital non-transactional information, such as attitudes, preferences, and complaints. Because audio is an effective means for gathering this type of information, kiosks and computer/telephone integration are strong candidates for potential user interfaces. Although Internet applications or stand-alone software packages are able to gather this type of information, kiosk or computer/telephone integration currently provides the customer with more conveni-
ence. A kiosk could be placed in the hotel lobby where the customer could either type or verbally record their comments and suggestions. Computer/telephone integration could be used when a customer orders room service; the customer’s preferences could be verbally recorded and stored in the customer profile for future reference.

Currently, the hotel distributes customer profile information within the organization to hotel management, where it is used to analyze trends in customer attitudes and preferences. At the same time, customer profile information is distributed to other Ritz–Carlton hotels, where it is used to anticipate customer preferences. The organization can thus accommodate customers based on preferences from previous visits.

5. Conclusion: An integrated framework for IT-assisted customer interaction

There are obvious interrelationships that are necessary for an organization to realize the benefits of one-to-one customer interaction. However, if an organization develops an integrated view of the customer, it will fail to be successful if it fails to modify its business procedures or provide customers with an effective interactive interface. Also, to ensure that interaction with its customers is successful, organizations will need to focus on the external transmission of customer information via interactive user interface technology.

For Levi Strauss and Ritz–Carlton to be able to effectively interact with their customers, they had to alter their business processes. Earl et al. [8], during the course of their field studies, alluded to the importance of the IT function during business process re-engineering (BPR) when undertaken in the context of customer information. “They observed that IT was somewhat of a spectator sport during most BPR projects, but procedures are organized around the process (e.g. customer system) when changes involved customer information”. However, these procedural changes are limited in their effectiveness if they are not complemented by an integrated view of customer data or an effective interactive user interface.

Levi Strauss’ situation required that more emphasis be placed on the integration of customer information while also addressing customer information redesign issues. Ritz–Carlton focused on the redesign of customer data, while also creating an integrated view of their customer information. Each of these examples illustrates that the integration and redesign of customer data is less effective if it is not complemented with effective business procedures and interactive user interfaces.

Both Levi Strauss and Ritz–Carlton considered a number of different possibilities for interactive user interfaces. As advances in IT continue, the types of user interfaces that are most effective may change. If these interfaces are not working in coordination with the other key IT elements of customer interaction, an organization’s ability to effectively interact with its customers may be severely impacted. If the organization has not restructured its business processes, customer interaction may lose some of its effectiveness. Also, if the customer data profile is not integrated or the dissemination of organization information is limited, the customer or employee may not be able to access or retrieve the necessary information required for effective interaction.

The previous discussion highlights the fact that these IT elements need to be tightly integrated. The success of either element is highly dependent on the effectiveness of the other element. It is our contention that for an organization to maximize its ability to interact with its customers, these elements must be integrated in a seamless fashion (see Fig. 4). While each of these key IT elements has obvious advantages, it is the relationship among these elements that provides an organization with the potential to effectively interact with its customers. When an organization strategically links together each of these key elements, it produces an atmosphere of customer interaction where the product is greater than the sum of its parts. As customer interaction strategies continue to grow, the use of IT as an enabling factor will increase and,
subsequently, so will the opportunity for studying the impact that IT has on one-to-one customer interaction.

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