

A Strategic Business Tool for Mobile Infrastructure

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Abstract. This paper outlines the use of a strategic business tool to assist decision makers in applying mobile applications in their commercial operations. Outline examples of mobile business applications in hospitals, retail operations and customer relationship management are presented to improve quality of service. The paper also describes examples of wireless technologies in relation to geographic ranges and the implementation costs of mobile technology into various business environments. A framework is proposed to assist practitioners in applying mobile technology to business infrastructure.

1 Introduction

Mobile applications and e-business can offer competitive advantage by creating new platforms to reach global markets [1]. The e-business services allow business companies to reduce costs and increase revenue from distribution. Increased online sales and the use of mobile devices can enhance mobile business activities. Mobile applications are currently being used in warehousing, Small and Medium Enterprise (SME) and Customer Relationship Management (CRM) systems that allow tracking of parcels etc. These types of mobile devices suit the business needs and activities of the companies concerned. This principle of distribution and transaction can be adapted for e-government or e-society applications. In these cases information can be distributed electronically similar to the e-society i2010, which the European Commission is developing for a European Information Society that promotes growth and jobs in the nation [2,3]. John Hopkins Hospitals implemented mobile applications to assist in their medical activities, such as e-prescriptions. This implementation saves the hospitals \$1,000 per day by providing the pharmaceutical information and the medicine that the patient needs [4]. Addenbrooke's Hospital, in Cambridge, England, uses Blackberry mobile devices that link to a central database to provide access to donor list information relevant to emergency surgery and operations [5]. Partly as a result of the success gained from 176 kidney and liver transplants, the hospital has a reputation in the use of modern technology for retrieving quick and accurate information [6,7]. The use of data retrieval through a mobile device can be similarly used in warehousing; Wal-Mart stocks can be identified using Radio Frequency Identification (RFID) tags read from a special mobile RFID reader [8]. Nissan automobiles have a similar approach with CRM activities that allow the salesperson to answer customer queries on the spot [9].

Web-enabled and standalone databases are two mobile data retrieval technologies. The Web-enabled architecture involves mobile devices to send and retrieve information from a centralised database. Mobile devices that are used at John Hopkin's Hospital and Wal-Mart are examples of web enabled database applications. With the standalone database, the data are distributed and stored on the mobile devices. The database can share the data among mobile devices, but the original data remain in the mobile device. Examples of this mobile application include survey collecting mobile devices.

The type of wireless technology, such as Wireless Local Area Network (WLAN), Wifi, Bluetooth and WiMax, will also affect the type of mobile application that a company can apply in their business activities. The most popular ones are Bluetooth and Wi-fi connections as they are simple and less expensive to use. Japanese Wagamama restaurant chains in the UK [10] apply this type of mobile devices. Wi-fi applications are more technically diverse as they can support both Personal Digital Assistants (PDA) and computer laptops. The evolution of mobile technology has provided new opportunities by extending mobile infrastructure into the business, which enables the business to gain competitive advantage. Although there are many strategic tools and techniques available such as Porter's competitive analysis and Value Chain [11], strategic tools for mobile applications appear to be limited. This paper outlines a framework to assess strategic applications of mobile technology and pertinent infrastructure.

2 Application of Wireless Technology

The recent evolution of mobile technology has been dramatic and is evident from the range of specifications of mobile phones. In the last five years, the bandwidth of media content transmission has increased from one to three gigabytes of data to accommodate a variety of built-in cameras, mp3 players and web browser capabilities. PDA applications evolved from organisational tools to combine GSM (Global System for Mobile Communication), GPRS (General Packet Radio Service) services while incorporating cellular coverage and wireless technology, like Bluetooth and Wi-fi. In addition the mobile devices allow users to make phone calls and send messages by Short Messaging Service (SMS), or Multimedia Messaging Services (MMS). They can also send emails and have access to the web. British Telecom has recently introduced BT Fusion, as shown in Figure 1, which allows mobile users to switch their phone calls to Wi-fi allowing Voice over IP (VoIP) communication. Using VoIP can be less expensive than standard land line calls [12]. When the user's mobile phones are close to a hotspot, or a Wi-fi connection, the phones automatically changes its cellular coverage to Wi-fi connections. Currently, users can make calls 10p/hour on landline, 15p/hour on BT mobile phones, 25p/hour on other networks and make cheaper calls overseas compared to a normal landline and mobile coverage. The BT Fusion mobile phone features the ability to change network coverage to a Wi-fi connection, as the user steps in and out of the Wi-fi zones. Setting up a Wi-fi access point or WLAN, is uncomplicated but involves purchasing a wireless access point and a monthly subscription for the internet connection. The wireless access

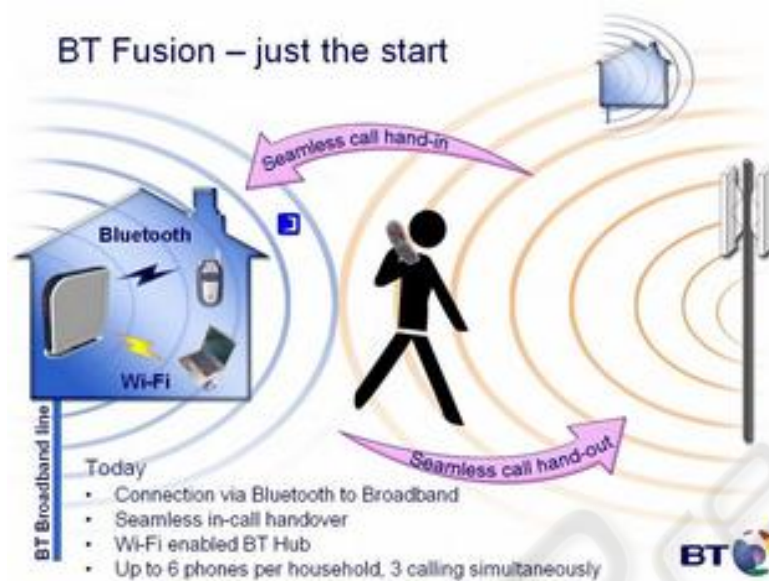


Fig. 1. BT Fusion and BT Wi-fi Phones [13].

point has a simple step-by-step instructions which the user can follow through and apply the necessary security and internet settings. However, to set up a business WLAN, such as BT openzone, requires expertise to set up an online payment website to allow their customers to access to the WLAN or internet connection. Customers can either pay for a prepaid voucher that allows them temporary access to the internet or they can register and pay a monthly subscription that allows them full access the wireless service [13].

The advantage of this wireless technology is that it can provide managers with access to the wireless devices in their business activities. However, the system needs careful planning to minimise costs and exclude unnecessary wireless components. Figure 2 depicts some available wireless technologies and the geographic range they can provide in a business. The location of the wireless access point affects its effective performance. WiMax provides an option covering a large area with wireless access. It also supports mobile internet services which can be an advantage for most PDA users. WiMax can however, be relatively costly to implement. Depending on how many WiMax features are required at each base station, it costs around £8,000 to £10,000 per unit [14]. Figure 2 indicates that it can be cost effective to mix Wi-fi and long range relay components to maximise efficiency and provide appropriate coverage for various business activities.

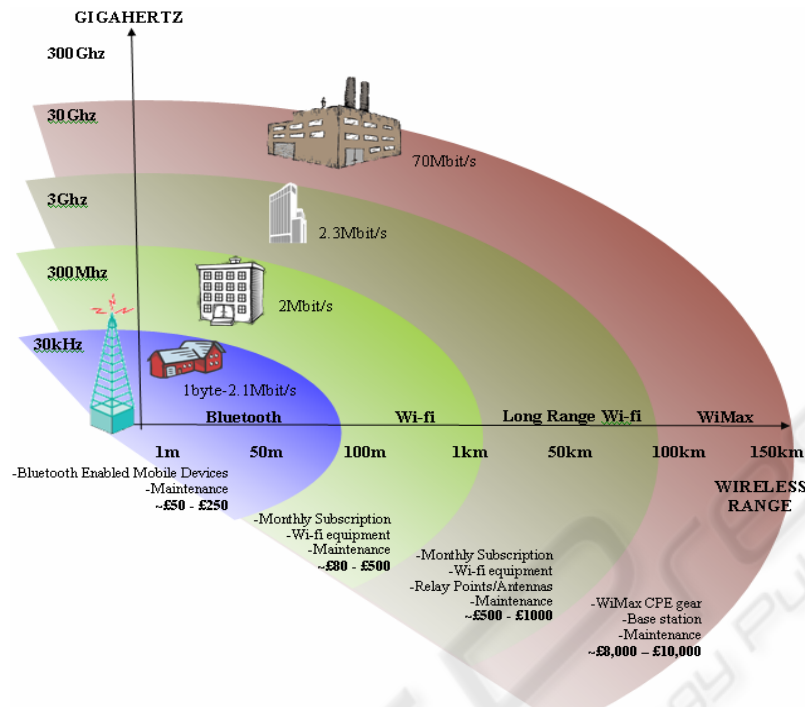


Fig. 2. Wireless Range Components and Costs.

In some cases the business may be located in geographical areas unsuited to direct wireless coverage. While Wi-fi components can cover the area of the local community, the clustered environment of a village and the distance of the nearest neighbouring village, may limit the Wi-fi range. Wireless relay points can overcome these obstacles, but the geographical landscape may block the frequency. In these instances it can be advantages to apply WiMax technology to provide wireless coverage, such as in Baramati, Calcutta as shown in Figure 3 [15]. The implementation of WiMax is efficient compared to spreading numerous Wi-fi relay points around the area. The advent of new 3G technologies and the coming of WiMax involved around 47,000 base stations in the UK. Moreover two thirds of these installations are on existing buildings. When WiMax is used in conjunction with Wi-fi components, it can cause increased radiation exposure including thermal effects. This radiation is concentrated around wireless installations [16]. For public safety, base stations and wireless components are at a safe distance from densely populated areas. Despite this separation, exposure to this radiation can affect some people in the vicinity [16]. The health and safety issues with regard to implementing this technology should be assessed to ensure the proposals comply with international standards [17,18].

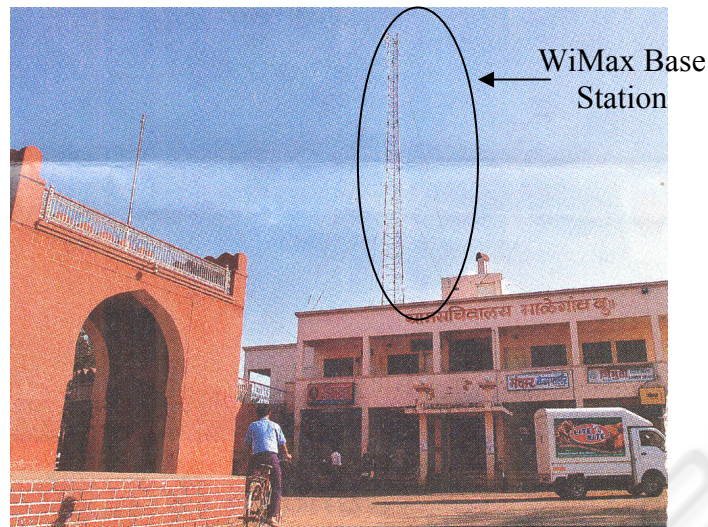


Fig. 3. Implementation of WiMax Base Station in the City of Baramati, Calcutta [16].

3 Strategic Planning Tool Model

Strategic planning is often used in starting a new product or in improving business activities in a competitive environment. Managers often use strategic tools for forward planning, or to propose a new solution to increase business profits. The planning usually involves identifying weaknesses, or opportunities in the business environment. The use of strategic management tools can provide insights helpful in competing against competitors. Some business strategic tools involve applying new technology, including sharing other business services to decrease costs and increase profit. Other strategies suggest concentrating on the source of income, such as ensuring customer satisfaction, or improving relations with the suppliers and buyers. Some strategic ideas are ineffective because of the inability to predict environmental changes, coordination, and communication with the suppliers and the customers. There is a need for strategic tools, providing managers with guidance to assess and coordinate the business and to provide possible competitive advantage in the business environment. To find a strategic tool that applies to the specific business tends to be problematic. Business tools such as the SWOT (Strength, Weaknesses, Opportunities and Threats) and PEST (Political, Economical, Socio-Cultural and Technological) are commonly used for marketing and in IT for business strategy. Strategic tools, such as the Strategic Grid [19], Porter's Five Forces [11], Value Chain [11], IT Business Alignment tool [20], can improve business activities and assist in providing competitive advantage. The proposed Mobile Business Application Framework, shown in Figure 4, is an aid to business management in decision making within the three regions of user mobility. The framework consists of two sections, firstly the Financial Scorecard, as shown in Section A of Figure 4. The Financial Scorecard is used to assess the business process, activities and financial standing, similar to a cost

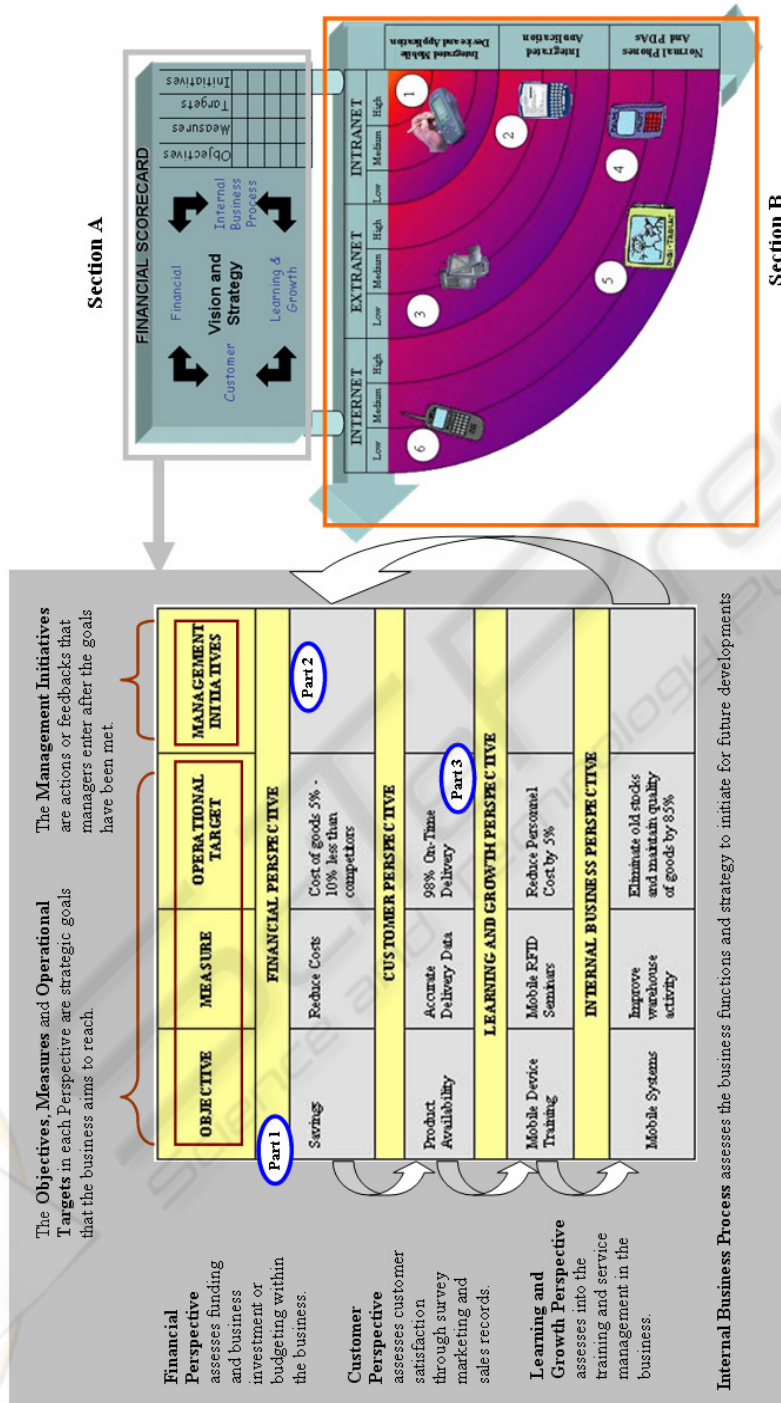


Fig. 4. Mobile Business Application Framework – Financial Scorecard (Section A).

benefit analysis, and can identify the weaknesses and opportunity of the company [21]. The Financial Scorecard helps the business to measure performance and resolve customer relations and strategy issues. Figure 4 illustrates that the financial scorecard has four types of perspective as shown in Section A: the Financial, Customer, Learning, and Growth, and Internal Business Process respectively. Each of these perspectives evaluates the strength and weaknesses of the business by assessing the previous records of its activities. An example of the use of the scorecard is when a company is considering implementing a mobile technology to improve the inventory system using Radio Frequency Identification (RFID) technology. The company could evaluate the expected benefits by using the process cycle of the Financial Scorecard.

1. In Part 1 of Figure 4, the process cycle of the Financial Scorecard starts with the Financial Perspective. Management assess Financial Perspective, looking at previous records or accounts of the business activities, to set objectives, measures and operational goals. At the end of the business process, the management can view the record and comment on the Management Initiatives. This feedback checks if the business has reached their intended goals or requires additional procedures to enhance their business.
2. These Scorecard procedures are repeated for the Customer, Learning and Growth, and the Internal Business Perspective.
3. The Internal Business Process uses the Mobile RFID Technology to enhance stock location processes in the warehouse. The Management Initiatives column indicated in Part 2 of Figure 4 will be used to record the success factor at the end of the implementation.
4. As the cycle repeats, the Management Initiatives for the Financial Perspective are assessed and recorded, to monitor the effects of implementing a mobile technology in the business. This iterative process is repeated for the Customer, and the Learning and Growth Perspective.
5. After completing the cycle (anti-clockwise in Part 1 of Figure 4) the Internal Business Process for implementing the mobile technology is assessed against the target goals as shown in Part 3.

In Figure 5, Section B illustrates the strategic framework and identifies the type of mobile device that would be suitable to the business. The framework indicated in Part 1 illustrates a radial wave, or a ripple, which depicts the mobility range for mobile applications involving the Internet, Extranet, and Intranet (Mobile Application Region). These three regions are shown on the horizontal axis of the Framework. Part 2 of Figure 5 shows the implementation of the mobile RFID technology is contained within the warehouse, consequently this is an Intranet region. In each region, there are also circular bands of mobile usage. These bands are colour coded to signify 'critical data transfer,' which indicates the importance of data transmission to the business applications. The three different regions differentiate the types of mobile device and determine how the software application can be implemented in relation to business operations. The type of mobile device, or application, used in the business is shown by the vertical axis of the diagram (Mobile Technology Infrastructure, Part 3). The Intranet and Extranet region of the framework, illustrated in Figure 5, can apply a fully integrated mobile device or customised application using normal mobile phones, such as Wal-Mart Wireless Inventory Checking [8]. Also users within the

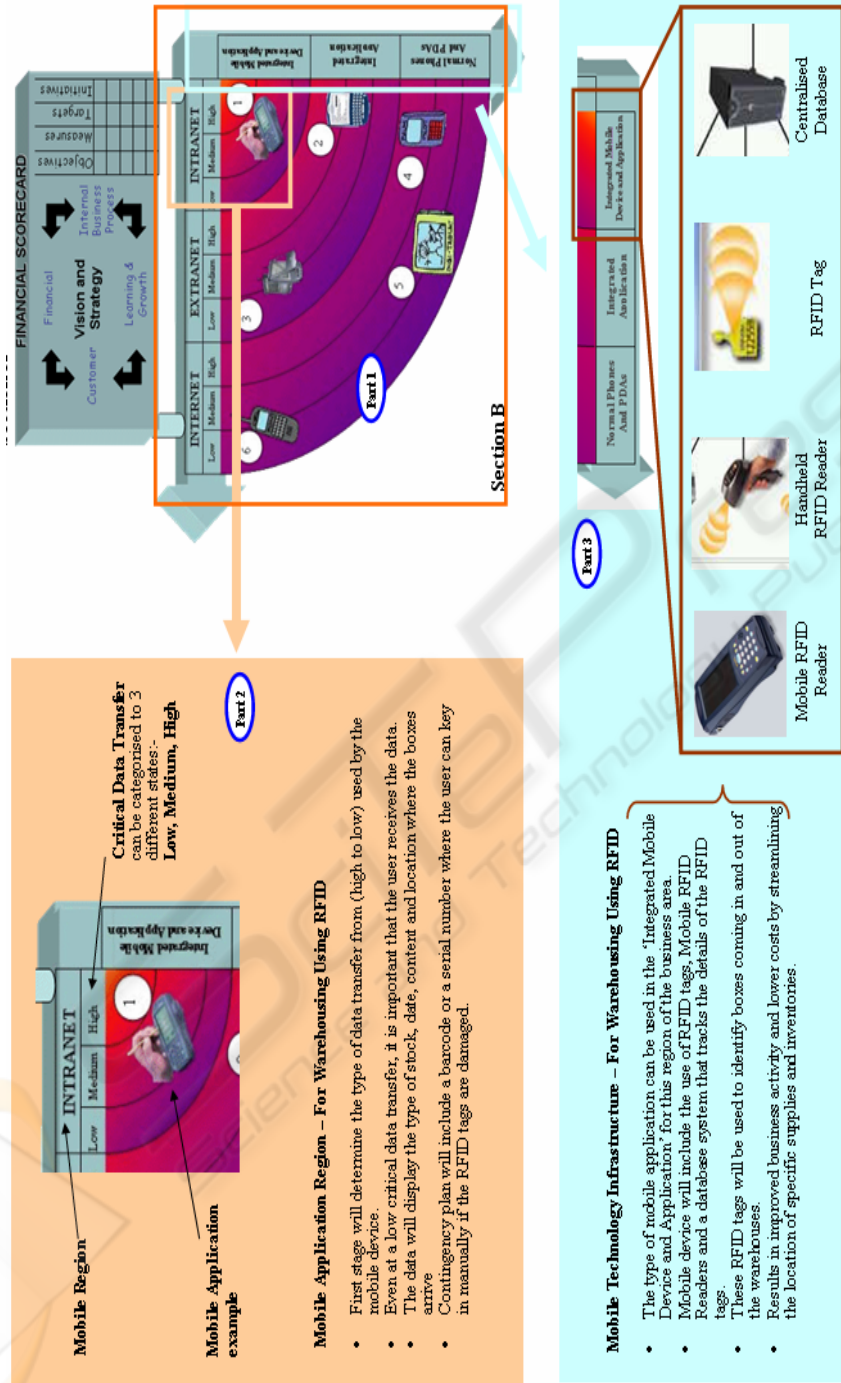


Fig. 5. Mobile Business Application Framework – Mobile Technology Application (Section B).

Internet region can use normal mobile devices but they will link or visit a web-enabled e-commerce database, to connect to an application, for example an SMS vending machine [22].

4 Conclusion

The strategic framework tool presented here is designed to help managers identify where mobile technology can enhance their strategic business operations. The business strategy should align with IT strategy, organisational infrastructure and information system infrastructure, in order to provide competitive advantage. Popular types of wireless technology are Wi-fi and Bluetooth technology. These technologies are effective because of the small wireless range. A short wireless range allows a more secure system, as the data transmission signal may be contained within the business area; the Japanese restaurant Wagamama [10] have implemented short range Bluetooth technology within their business. WiMax, can be normally used to overcome geographical boundaries, or to avoid the costs of cabling, as it has a greater geographical range. This paper outlines the applications of the proposed strategic framework to several mobile commercial applicants. It demonstrates the use of a Financial Scorecard to evaluate the business cost effectiveness. Departmental goals within the company can be assessed, allowing managers to identify and align strategic initiatives to the business [21]. In the case of mobile technology, the strategic framework assesses the suitability of mobile devices for the business and considers the type of security and applications appropriate for a particular mobile device. The proposed mobile strategic framework is designed to assist managers to make informed decisions and increase competitive advantage in mobile infrastructure enhancements.

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