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Impact analysis of wireless and mobile technology on business management strategies

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Abstract: This research examines whether congruence exists between wireless and mobile technology with impact analysis on a firm's business management development and future strategies. The research adopted the Motorola Inc. as a case and the qualitative approach as the research method. It emerged from analysis that consumers, business management strategies and future strategic directions are embedded in wireless and mobile technology. Despite having high tech wireless and mobile technology, it is not always been possible to appear as the market leader within industry, where future consumer behaviour and business management strategies will differ from the one those exist today. This study proposes a new framework for diversifying intellectual capacity to develop consultancy based growth opportunity at Motorola. This also suggests intense mobile and wireless technological impacts on relationships with customers, enterprise agility and business management strategies in the internet based market structure.
Keywords: wireless and mobile technology, process automation, cloud infrastructure, convergence, business management strategy

Introduction: Demand for investigation of wireless and mobile technological influences on corporate and business management strategies with impacts on consumers are increasing. General areas of academic and business researches typically concentrate on management transformation across several industries and how enterprises are involved in these processes. Through their innovative products and services, they tend to restructure their own strategy, products and services portfolio to capture and sustain within global competitive dynamic environment. This study has focused on particular case of the Motorola Inc. that is believed to be a pioneer in the current communication technology based world. It has a long history of innovation and has invented from the earliest car radio to the most future reaching communication devices. Its product and services port folios include a wide range of workplaces: government or public safety, critical mission of retail to warehouse floors. It also provides wireless and mobile infrastructures, networks and various devices from personal to enterprise customers. In a current deal, the Motorola Inc. is separated into two different companies and sold its Mobility business to Google Inc. Motorola invented six sigma quality improvement processes, which is considered global standard for excellence. It has also been able to set up industry leading wireless and mobile patents portfolio. Motorola Inc. is selected as case study for this research, due to its glorious past, recent crisis and transformational efforts to restructuring its strategy and operation to take the growth opportunity within wireless and mobile industry. The key purpose of this research is to explore wireless and mobile technological impact analysis on a firm's business management development and future strategies.

Literature Review:

2.1 Wireless and mobile technology for business: Transformation of existing business process aligns with corporate strategy and present customer centric trends require resources (Efraim et al., 2008; Gutierrez, 2006). Managing resources internally and hiring from external sources required careful configuration as it requires sound financial, organizational and market driven plan (May, 2001). Present economic turbulence and alternative options such as BPO (Business Process Outsourcing) also need to be considered (Fotheringham and Sharma, 2008). Internet based wireless and mobile devices allows large companies to access to huge consumer base with their digital advertising through digital media channels and enabling customers to e-buying and e-selling through their devices like smart phones, tablets, wifi and wimax connected laptops etc. (Alexa, 2012). All major industries are becoming more and more wirelessly connected for sharing their common platform and form strategic alliances to leverage the advantages of the new market structure of doing business through virtual platform (Chen, et al., 2005).

2.2 Impact analysis of wireless and mobile technology: In this virtual market place; *intellectual property* is becoming vital and Google is facing patent assault by Apple, Microsoft, Oracle and others on its Android mobile operating system (Gartner, 2012). Infringement suits in wireless and mobile patents across the industry cause delaying, heavyweight legal expenses and slim avenue to access potential growth segments. Motorola's patents will allow building a fortress around Google's Android operating system for future dominance in the mobile computing world (CISCO, 2012). This strategic acquisition is to defend Android based smart phone and tablet manufacturers. This strategic acquisition would allow Google and Open Alliance of Handset Manufacturers to reduce the royalty burden using cross licensing agreements (Taylor and Waters, 2011). However, as wireless and mobile technologies required huge investment and rapid technological change is also need to be considered before IT infrastructure plan (Deighton and Kornfeld, 2009). Large corporations are implementing more and more mobile strategy from customer retention and management, business process to corporate strategy for gaining competitiveness among their rivals also increased operation cost, which may have impact on pricing strategy (Bohm, 2006). Organizational and consumers private data security is another major concern as cyber intruders may attack in to the databases (Daim et al., 2012). Network interference, data transfer rate and quality of data capture is important to real time information communications. Involvement in the digital infrastructure as consumer, producer and supplier has huge impact on recent business structure and culture (Dhir, 2004). Wireless and mobile health issues have also implications as research founds radio frequency impact on human brain cells. Medical body as contrary evidence related health issues and further research required in this field (Guimaraes, 2011).

2.3 Wireless and mobile technology and consumers: A critical evaluation is how adopting changes to the linkages amongst product attributes (Hendeson et al., 1990) or between the firm and its customer base (Abernathy et al., 2007) can drives for adopting new ways of management development within and between firms for real-time information and communication. Organizational strategic decisions influence structural and internal policy alignment along with resources and market based opportunities (Hambrick, 1983) along with functional strategies and business level strategy. From business value perspective, this enables remote and instant collaboration among employees, supply chain partners, and customers regardless of the hardware devices they have (Gupta, 2009). Global business needs ways of collaborating more effectively with third party suppliers and partners. To do so, they need standardize on their information systems and communication process through wireless and mobile devices for mobility of individuals, enterprises and organizations (Turban et al., 2008). Recent digital business strategy trends are becoming social enterprise which enables new competitive advantages. Social media represents a whole new way of doing business (McCrum et al. 2011). They are building long term relationship with customers and other key constituents, primarily through vibrant digital communities where they connect personally and regularly (Hofstede et al., 2010). Because of these relationships, their communities alert them to problems with their products, services and operations, share their knowledge, and introduce customers and potential customers to their organizations and their products and services (Konig-Ries, 2002). Eric Nelson, chief Marketing Officer of Dell says "Customer connectivity and the ability to have conversations that drive our brand are the most important things." "Digital and social are tools that are allowing that to happen (Weber, 2011)."

2.4 Business management development and future strategies: Strategic implementation depends on resource capabilities and market trends along with other factors (Wagner and Majchrzak, 2007). Failure to configure the present and near future in advance may cause huge business impact on any organization's life time (Hax, 2010). Delaying in implant in line with existing market trend may raise concern and threat for competitive advantages in this grave global business competition. Internet based information technology and particularly wireless technology enables manufacturers, end users and channel partners to access to business information in real-time, develop IT based EPM (Enterprise Planning Methodology for strategically and tactically evaluate, forecast and track business process and achieve high performance by aligning business strategy and operational process (Robson, 1997). Information is coming from instrumented, interconnected supply chains transmitting real time data about fluctuations in everything from market demand to the weather. Additionally, strategic information has started arriving through unstructured digital channels: social media, smart phone applications, and an ever-increasing stream of emerging Internet-based gadgets. Every phase of implementation needs to align the data foundation to an overall information agenda that accelerates the organization's ability to share and deliver trusted information across all applications and processes (Mohapatra, 2009). Only with information agenda is it possible to establish information as a strategic asset for the organization. The information agenda identifies foundational information practices and tools while aligning IT and business goals through enterprise information plans and financially justified deployment roadmaps. This agenda helps

establish necessary links between those who set the priorities and strategy of the organization by line of business, and those who manage data and information. A comprehensive agenda also enables analytics to keep pace with changing business goals (LaValle et al., 2010).

2.5 Digital market structure and business management strategy: These topics are important as globalization and electronic commerce are becoming wirelessly connected through internet environment for faster workflows and instantly in an efficient manner. Digital business environments transforming several industries, such as online trading, online banking, digital entertainment industries, software industries and hence the importance of the protection of Intellectual properties are becoming important as an integral part of the overall environment. B2B, B2C and C2C are the multi-stage model of E-commerce which embedded through wireless and mobile technology (Khalifa and Shen, 2008). As e-business requires infrastructures; including hard and soft applications and operating systems through internet to enable alignment with existing business process and to plug-ins with new virtual market structure to attain the strategic objectives (Stair et al., 2008). E-commerce is the conducting of business activities electronically over networks through wireless network and mobile devices to encompass the opportunities of global market. Along with complexity, deployment cost, network interferences it squeezes costs and remove insufficiencies and eliminating intermediaries across supply chain and can lead to higher profits and lower prices for consumers. Effective e-commerce model and strategy based on broadband wireless and mobile technology can renew and expand more business opportunities. M-commerce facilitated the sale of goods and services across the world along with business information process. However, security of wireless transactions, improving network speed and avoiding network interferences are keys to further growth and success (Laudon, 2009). Adoption of wireless and business applications to wireless and mobile channels is today a strategic move to capture electronic market opportunity and leverage existing socio-business cultural wave.

2.6 Wireless and mobile technology and digital convergence: Digital convergence refers to the ability of network platforms to carry essentially s kinds of service. It can take place at different levels as differentiates between technological, regulatory and economic convergence (Rackley, 2011). There is a significant body of literature concerned with technological and regulatory convergence; though within an enhanced theoretical ground of service options and networks, literatures have failed for embedding convergence (Firestone, 2009). As we know that ICT is one of the key drivers of business growth in present digital business environment and undergone a tremendous innovation and transformation process (McElheran, 2007). Though early literatures refers convergence between telecommunications and data communications as telematics and later on arrived its second phase as mediamatics as it converge with mass communications. Today digital convergence emerged as an integrated broadband network (Kramer, 2007).

2.7 Challenges and prospects of enterprise mobility strategy: Enterprise mobility required organizational capacity in terms of allocating resources and managing them efficiently to optimize height level of return. In this process; the first challenge is to develop mobility strategy and its impact on business models (Rebecca et al., 1990). Priority of initial emphasis to implement mobility on B2E, B2B or B2C is critical to its success and depends on different factors associated with corporate strategy (Henning-Thurau et al., 2010). The act of managing, implementing and securing new technology is a grave concern for organizations too. Mobile platform based growth opportunities drives organization to adopt more mobile strategy to leverage existing and future opportunities despite existing challenges. Company like IBM transformed itself from world's largest computer hardware manufacturer into an IT services and consultancy specialist reported its US$ 26.2bn revenues in Q3, 2011 was a success story of dynamic capabilities in the changing information centric business environment (IBM, 2012). They are developing wireless and mobile technology based software for enterprises. Surely growth is there (Infosys, 2012).

Case of the Motorola Inc.: According to the Motorola Inc. (2012), the Motorola Inc. USA presently known as Motorola Mobility and Motorola Solutions has been selected as case study. This has helped to study the phenomenon in its natural setting. By gaining access through its valuable information enabled me to ask 'how' and 'why' in different phases of the development process of research. Another reason was to rely on case study is the nature of the research objectives as it was the convergence of technology and management process and rarity of the similar past research study. As qualitative research need to develop novel insights in the class of phenomenon, the technique of comparative data analysis has also been used for collecting information in different form including recorded audio visual interviews by me, enterprise customer's web based video interviews, secondary interviews from internet source, case study, financial report and managerial overviews based on financial information published for the shareholders and investor relation information of Motorola Inc. USA as they are they are major enterprise information

source in the wireless and mobile technology industry. However, in the process of development of analogy on the basis o the information collected from early mentioned organizations, there has always been awareness to avoid biased information and keep balancing among different stakeholders interest and to meet my research objectives and aims through natural process. For instance, in my research on the role of wireless and mobile technology based strategy-making in Motorola's evolution, the comparative analysis at the company level was along the dimension of time, financial capabilities, future market structure and dynamic capabilities. This led for instance to the insight that Motorola's strategy-making process evolved from an "intra-organizational level of analysis, in contrast, the research compared Motorola's failure in smart phone business which forced it to sell to Google for $12.5B of its Mobility business in relation to the single-mined focus on its highly successful business solutions and wireless infrastructure business under Motorola Solutions, which produced insights about co evolutionary lock-in as a source of strategic inertia (Wansink, 2012).

Methodology: Resource constrains in collecting data includes subject availability; reliability and accessibility are the key factors those have been considered before determining instrument development through data collection to data analysis. As this research was based on technological implications on consumer, business process and strategy, nature of primary data, reliability on it and accessibility due to the nature of confidentiality of business strategy was the major restraining forces that has been faced along with above mentioned factors and constrains. As a source of collecting data while conducting the research, along with primary data, secondary data collection was also played important role (Bryman and Bell, 2006; Crowther and Lancaster, 2012). Motorola's investor relation information, interviews conducted by third party, academic articles and other reliable sources were used for considering and balancing among perceptions of different stake holders was in core attention. Motorola Inc. was used as case study and adopted within research strategy: The boundaries between phenomenon and contextual reality of study were blurred in some point and has driven to adopt case study as research strategy (Belk, 2006). Multiple data collection methods including, netnographic observations, key informant interviews and the collection and content analysis of relevant documents including financial report which was quantitative in nature helped to develop questions and develop background of the study (Heidegger, 2005).

Data Analysis and Findings:

4.1 Wireless and mobile technology for business: Globally integrated enterprises relying on the power of real-time information with possible smartest way to take advantages of new high growth market opportunities and increase performances. The power of ubiquitous wireless and mobile devices, such as smart phones, RFID devices and tablets are becoming integral part of the overall business process as they are use to capture, access and analyze business information in real-time (Begole, 2012). Analytical capabilities drive organizations to turn their mountain of data into insight. Driving by the new business opportunities and to remain competitive, enterprises are transforming their business process, management practices and core business models. To accomplish that, they need to focus on the business outcomes that resulted from technological innovation. Enterprise-class analytics and reporting provide data on consumer utilization of the service, enabling rapid feedback on effectiveness in order to drive adjustment in several phases and to reshape strategies and operational process accordingly. According to the research firm IDC, the global data volumes will increase by 29 times over the next 10 years to 35 Zettabytes (A Zettabytes is a 1 followed by 21 zeros). Enterprises needs to capture, access and analyze these valuable data in real-time to optimize their operational efficiency and figure out future opportunities. According to IBM Inc.'s 2015 road map, analytics is expected to grow to $16B in revenue by 2015.

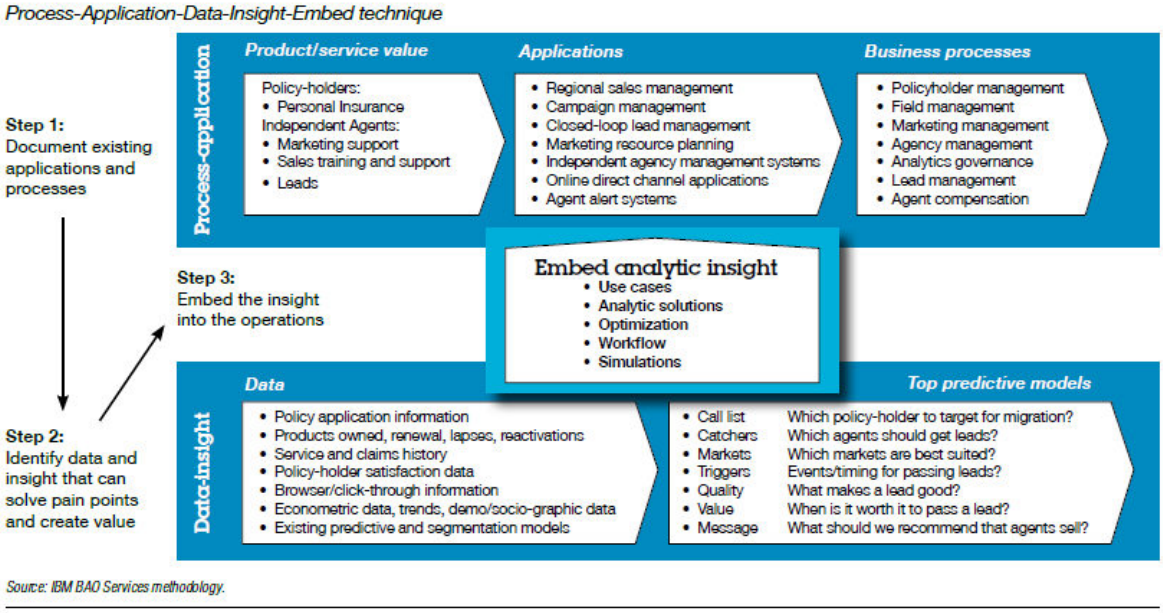

Figure 6: PADIE (Process-Application-Data-Insight-Embed) technique is a three-step process by which a company can operationalize insights drawn from data: first, document processes and applications; second, use analytic techniques to gain insight from data; and third, select the most appropriate ways to embed insight into operations.

Figure 1: Process-Application-Data-Insight-Embed technique (Sources: IBM, 2012; MIT Sloan Management Review and IBM Institute for Business Value study, 2010).

4.2 Impact analysis of wireless and mobile technology: Sarah Rothman Epps, analyst at Forester Research says 'Kindle Fire' is a device which encourages the use of Amazon services and also a platform of third party apps. On the other hand Mark Mahaney, analyst at Citigroup noted that between 30 to 40 percent of Amazon's business is media such as books and music, which are rapidly digitised (Forrester, 2012). They need to hedge themselves against that structural change. This new gadget along with new faster web browser call 'silk' will enable its user for accessing content from the cloud. Another example of recent strategic sift by tech giant Google Inc. and Motorola Mobility is important as wireless and mobile technologies impact in new structural transformation is immense. The deal worth $12.5bn, enabling Google to access to 17000 patents in the wireless and mobile network infrastructure which escalate the search company's rivalry with Apple and gives it control over more patents (Jopson et al., 2012).

4.3 Wireless and mobile technology and consumers: The PADIE (Process-Application-Data-Insight-Embed technique) enables business and analytics team to work together to create analytic models based on use cases and captured and stored information that show analytics in action. Motorola Mobility and Motorola Solutions, USA is the producer of world's largest data capturing and accessing device portfolios. Wireless and mobile technology enables enterprises to capture data and access in real-time. In this century, intellectual capacity derived from knowledge and information is creating economic value and making the differences in the highly competitive market place.

4.4 Business management development and future strategies: As recent business strategy and models are shifting because of the transformation towards digital era, cloud computing is established as a new business model across the world and major IT service providers are developing cloud infrastructure which combined Physical and soft layer along with deploying data centre across global strategic points. In this highly competitive business environment; major organizations must adopt three things for their competitive advantages namely mobility through wireless network, access to cloud infrastructure to leverage from new market structure and finally social enterprise as social networks are becoming more and more powerful business model to connect with their customers, employees and partners. A salesforce.com (2012) study conducted by Coleman-Parkes Research, surveyed 150 CEOs and managing Directors across several UK industries to understand the role social network through wireless and mobile technologies play in helping them achieve business priorities (Salesforce, 2012). Amazon launches 'kindle fire' a head on to the dominance of Apple's iPad with a low price wifi enable tablet computer to intensify competition over the way people

consume digital books, music and video. Right now major tech giants are converging their business on digital media sales and distribution through wireless and mobile internet devices. Now companies like Motorola, Amazon, Google, Apple etc, are shaping their business strategy based on wireless and mobile infrastructure and new market structure based on internet. Amazon is a service provider and willing to treat hardware as a loss leader while apple has made higher margins on its hardware.

4.5 Digital market structure and business management strategy: The PADIE (Process-Application-Data-Insight-Embed technique) enables business and analytics team to work together to create analytic models based on use cases and captured and stored information that show analytics in action. Motorola Mobility and Motorola Solutions, USA is the producer of world's largest data capturing and accessing device portfolios. Wireless and mobile technology enables enterprises to capture data and access in real-time. In this century, intellectual capacity derived from knowledge and information is creating economic value and making the differences in the highly competitive market place. Workforce automation and customer relationship management software tools are beginning to offer mobile editions. Similar mobile technologies have been developed to tackle and to integrate functions such as human resource management, asset management, mobile purchasing, remote inventory monitoring. Mobile cloud computing provides enterprises with capacity on demand and a resilient and ubiquitous wireless and mobile infrastructure. Unique combination of business and technology insight through analytics helps organization to realize and develop successful strategy and transform across their value chain by introducing innovative business models, business process re-engineering and delivering sustainable business change. Motorola is well positioned for growth targets and re designing its products and services by incremental and sustained differentiation to capitalize the opportunity related to enterprise mobility trends.

4.6 Wireless and mobile technology and digital convergence: Collaboration among products, manufacturing process, services and customers expectations are critical to business success and growth. However digital convergence enabling manufacturers, business process automations and customers to be more integrated as present business models and technology and virtual market environment creates such environment. Early literatures not given many attentions to the digital convergence as a market model and strategy rather focused on network, communications, internet and technology. The study in this area emerge that online market place are the output of digital convergence and enabling consumers in various way to involve from the expectation to the production process, review and customizations. The concept of cloud computing business model and thus accessing in to cloud is a business strategy for major enterprise. Based on literature review and perception of cloud computing, the definition of cloud computing as an *" IT deployment model, based on virtualization, where resources, in terms of infrastructure, applications and data are deployed via the internet as a distributed service by one of several service providers. These services are scalable on demand and can be priced on a pay-per-use basis* (Bohm et al., 2009)*."*

4.7 Challenges and prospects of enterprise mobility strategy: Since 2008 onwards it was transforming and implementing strategies to regain its fair market share within rapidly growing smart phone market and other wireless and mobile segments. Increasing competitions, new business models, changing market and technological structures are key challenges to its top strategist to remain within competition. In early 20011, Motorola separated into two different companies to strategically focus on each segments and surprisingly after seven months of separation its Mobility business acquired by Google Inc. It is very significant strategic moves towards future. It was emerge from interview that top level strategists are focusing from operational excellence to differentiation strategy through incremental and sustained methods to remain and to regain fair market share within industry. But their decision to sale Motorola Mobility for US $12.5bn was considered from different perceptions by industry analyst.

The main challenge is to integrate hardware, software, platform and giving consultancy and flexibility to enterprise customers according to their needs. Recent global economic recessions force organizations to reduce their operational cost at every level where possible and impacted spending on enterprises mobility. Dramatic shifts in technology is another big challenge for Motorola as it requires constant upgrading in technology to remain competitive within industry as growth opportunity creates intense competitions and influence pricing strategy. Competition within its Android platform is key challenge for its enterprise mobile portfolio which pushes it to develop more enterprise ready application, software and integrated network and hardware to differentiate its products and services. It required for more RandD budgets and key barrier to timely introduction to the market. However, despite the complexity of the enterprise mobility products and services integration and other factors associated still has future growth opportunity and that's the way to grow for future. Mobility has deep implications in the process of Motorola's product and service development and strategy for future growth in enterprise solutions business. Managing this complexity leads Motorola

towards industry leadership. Capacity of delivering enterprise mobility increased its reach towards international, enterprise and retail sectors along with mission critical, public safety wireless and mobile devices for Government sectors globally. Google paid that large amount to access to Motorola's Industry leading mobile and wireless IP port folio and patents. Motorola's Wireless signalling patents are its competitive advantage and core to its competency within both mobile and wireless industry. On the other hand its smart phone operating system Android is owned by Google Inc. It is clearly evident from the facts and analyst's perception and my analogy regarding the industry is Google is strategically well positioning itself to control mobile world and paid the price for Motorola's intellectual capacity. The table below showing Motorola's wireless sales growth despite global economic down turn in 3rd quarter 20011. Despite increased sales compare to 3rd quarter, 2010 and increasing global opportunities for smart phones and tablets:

In millions, except EPS (earnings per share)	**Q3 2011 $(mn)**	**Q3 2010 $(mn)**	**Change (%)**
Total Sales	2,105	1,908	10%
GAAP Operating earnings	253	211	20%
Non-GAAP operating earnings	358	289	24%
GAAP EPS from continuing operations	0.45	(0.04)	--
Non-GAAP EPS from continuing operations	0.65	0.54	20%

Table 1: Motorola solutions Reports Third-Quarter results (Source: Motorola Solutions, 2012).

Conclusions: As we know management and business practices are always influenced by technology, PEST (Political, Economical, Social, and Technological) analysis is very important management tool to consider external business environment before develop strategy. Organizational capabilities, resources and market driven approach along with consumer behaviours, immense competitions within industry, dynamic market trend and rapid technological changes are always influencing strategy. The study is based on Motorola Inc. which operating its business within wireless and mobile industry. Enterprise mobility is increasingly popular as it gives agility and optimizes performance in real time. HRM practices, CRM, Inventory monitoring, mobile purchasing and workforce automation are transforming through the power of wireless and mobile devices in cloud infrastructure to generate faster business information and thus create competitive leadership. Motorola is pioneer in developing wireless and mobile devices to capture and updates data in real time for several industries including public safety equipments. Now it is time to capture the software and consultancy services and develop soft architects for services. Motorola's strategic decision is very important for its future and may transform its operation in the wireless and mobile industry in a different manner as of we are observing. If Motorola able to show their dynamic capabilities and core competencies and innovate new technology in the mobile and wireless architectures, they may lead the industry in terms of new intellectual properties and patents. IBM was world's leading computer manufactures and transform it as world's second largest software and IT consultancy firm with huge success. Motorola is well positioning its wireless and mobile eco system to create convergence among mobile and computing. It also attempting to organic acquisition and develop strategic alliances and merger to capture the new wave of consumer trends. Within ubiquitous computing environment, the demands for digital contents are increasing. Convergence strategy based on wireless technology in cloud computing environment was adopted by Motorola as increasing market share under Android platform is relatively difficult because of highly competitiveness. Convergence strategy among product and services also creating overall ecosystem for its enterprise and individual customers to get new experience and future platform for content development as consumers are consuming digital contents increasingly.

Recommendations

- Motorola need to develop long term strategy to defend its Intellectual Property in the wireless and mobile industry. As it is core to its competency and enabling it to control global mobile and wireless network infrastructure, public safety and mission critical business.
- Invest more in RandD to research and to innovate next generation wireless signaling and security, network interference and develop new patents in advance to secure and capitalize changing technological environment.

- Develop new soft products for enterprise mobility devices, such as applications for mobile devices to capture real time information for CRM, Workforce automation, software development for enterprise customers.
- Develop strategic alliances and investment to capture growth area and new opportunities. Merger and acquisition to strengthen own in house capabilities.
- Operational excellence across overall value chain to increase efficiency and to develop incremental and sustained differentiation across product, services and quality.
- Convergence strategy need to be develop through vertical integration among own devices and network infrastructure to minimize dependency and to remain competitive within industry.
- Geographical diversity, inventory and supply chain need to be strategically design to being able to market product faster than competitors.
- Diversity of channels is important and need to manage enterprise, retail and online channel along carrier partners and ensure marketing and communications integration within channels.
- Operational and strategic flexibility need to be ensured to make Motorola more agile to become more competitive and better able to support customers and move quickly to create new technology for promising markets.

Key activities (Milestone)	**Time Scale Plan of Action**	**Resources Required**	**Remarks**
Team Building	4 weeks	Existing skilled human resources profile mapping and hiring.	
Strategy for functional area	8Weeks	CRM, MIS, PM Software, Cross functional RDMS, Analytics software	
Meeting	1 week	Meeting room, projector, Finance	
Submission of the final report.	6 weeks	TQM system software, computers, Review of financial analysts.	
Monitoring and evaluating	4 weeks	MS Project Manager	

Table 2: Motorola's Proposed Strategic Implementation time Scale (Synthesis elaborated by Hassan and Azim, 2012).

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