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# Exploring the Antecedents of B2B e-Marketplace Success: A Perspective from a Global Mining Company

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## Abstract

*This paper presents the results of a preliminary study into the antecedents for B2B e-marketplace success. A confirmed model of e-business transformation was used to examine the participation of a large global buyer organisation and develop detailed case study analyses. The study confirmed the validity of the e-business change model but further identified those factors which were fundamental to successful B2B e-marketplace implementation. This provided the basis to understand the specific dependencies within the model and the performance indicators for success.*

## Keywords:

B2B e-Marketplace, supply chain automation, process integration, change management

## INTRODUCTION

Numerous papers have been written about e-business and how this concept will change the way companies do business, characterised by rapid exchange of information within a virtual network of customers and suppliers working together to create value-added processes (Burn and Barnett, 2000; Jansen et al, 1999; El Sawy et al, 1999; Ticoll et al, 1998). However, little information is available on how to successfully integrate e-Business projects with ongoing B2B e-marketplace systems (Kaplan and Sawhney, 2000; Segev and Gebauer 2001). As more and more established organisations realise that they need to form alliances with their customers, partners and suppliers over the Internet, e-business integration with B2B e-marketplace systems becomes a critical issue (Osburn and Kisiel, 2003; Koch, 2002).

Several studies relevant to the topic of B2B e-marketplaces have been completed in the automotive sector, e.g. studies of Covisint on e-enabled procurement in the European automotive industry (Arbin, and Essler, 2002; Thomson, and Singh, 2001) and in Australian automotive industry by Tanewski, Collier and Leech (2003) on how to achieve strategic benefits for suppliers. However, these studies do not address the foundations of successful B2B e-marketplaces within the automotive sector. Further, BHP Billiton a founding shareholder of Covisint initiated the development of two other e-markets in Australia, corProcure, and Quadrem for the mining industry (Segev and Gebauer, 2001). We understand no study on the Australian mining industry has been attempted.

This paper reports on the initial findings from a case study of a global mining organisation's ongoing e-business projects within a B2B e-marketplace. This involved the collection of most recent information using multiple interviews and web-based secondary data. The key findings from the case study are analysed against a staged model for e-business transformation and related to a federated planning model that can be applied across all stages of growth of the extended enterprise. The application of these case based research models, are used as the basis to explore the business drivers, the outcomes and performance objectives of supply chain automation and online processing using web enabled sourcing technologies. Further, to contribute significantly to an understanding of the motivations behind the benefits of e-business adoption in B2B e-marketplaces.

## THEORETICAL FRAMEWORK

We define a B2B e-marketplace (or e-Marketplace). as a virtual marketplace where multiple buyers and sellers can interact with information and transactions supported by additional value-add facilities. This involves the application of Web-based technologies, including "sell-side" and "buy-side" applications. In this case study QTX represents the mining industry's global public e-Marketplace organisation and Global Mining Corporation (GMC). is the alias name of a large internationally distributed mining company (Figure 1).

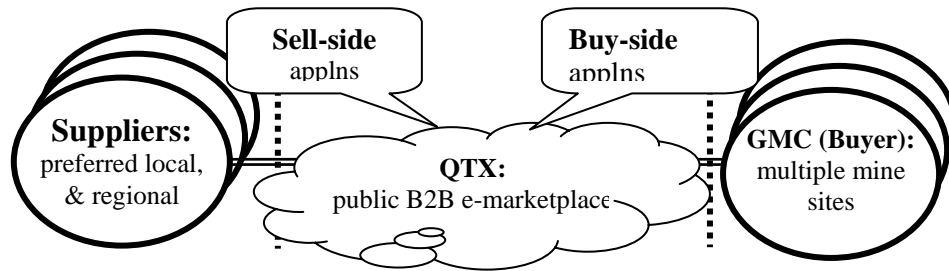


Figure 1: QTX Public e-Marketplace

### e-Business Transformation

The model of e-business transformation developed by Ash and Burn (2003) represents a comprehensive view of e-ERP as the fusion of the three research models, mapped into various stages of e-business development; integration, differentiation, and realisation of value propositions. The authors argue that successful e-business transformation with ERP occurs when *value propositions* are realised through *integration* and *differentiation*, of *technologies* used to support new *business models* to deliver *products and services* online.

Table 1 represents a map of the issues distilled from the findings of this longitudinal three-stage study. The results of the analysis can be mapped along the e-business stages of growth as: integration of e-business technologies for e-malls and B2B commerce, differentiation of products and services for e-business positioning, and the realisation of value propositions of the e-partnerships:

**Stage 1** - Integration of technologies is critical for cost reductions and operating efficiencies along the supply chain;

**Stage 2** - Differentiation of products and services is critical for e-business market positioning through effective resourcing across multiple supply chains;

**Stage 3** - Demonstration of value propositions within an inter-organisational network to design and leverage multiple interdependent communities to create superior economic value across the virtual supply chain (Singh and Thomson, 2002; Venkatraman and Henderson, 1998).

Business Dimensions	Stage 1: Integration	Stage 2: Differentiation	Stage 3: Realisation of Value Propositions
<b>Technology</b> (virtual infrastructure)	<u>ICT</u> ERP with e-Sales and e-Procurement applns.	<u>Differential Resourcing</u> ASP v's cost of ownership on the outsourcing spectrum	<u>Innovative Technologies</u> ERP and non-ERP networks for e-marketplaces
<b>Products and Services</b> (virtual experience)	<u>e-Malls</u> e-Mall integration and information exchange	<u>e-Branding</u> Customisation versus standardisation, Brand identity and integrity	<u>e-Communities</u> Foster customer, supplier, and employee expertise. Emerging collaborative online communities
<b>Business Models</b> (virtual B2B interactions)	<u>e-Commerce Integration</u> B2B Integration of e-Sales & e-Procurement systems B2B <sup>C</sup> + B2B <sup>S</sup>	<u>e-Positioning</u> B2B positioning within a range from open to private e-marketplaces	<u>e-Enterprise</u> One2Many v's One2One Distinct focus of One2One partnerships
<b>Examples</b>	Remote experience of e-catalogues. More tasks, "group ware" skills for online communication.	Assemble and coordinate assets through effective use of online services	Business network to design & leverage interdependent e-communities. Dependent on relationships

Table 1: Stages of e-Business Transformation Matrix

\* The shaded cells represent the elements of e-business transformation that best represent GMC's characteristics organisational transformation with e-business

## CASE BACKGROUND - GLOBAL MINING CORPORATION

Global Mining Corporation (GMC) is one of the world's largest producers of precious metals. GMC is the only precious metals producer ranked in both the Standard and Poors 500 and the Fortune 500. With mining operations in North America, South America, Australia, New Zealand, Indonesia, Uzbekistan and Turkey – the company has implemented e-business across cultures to achieve a unified global corporate supply chain strategy.

The Company is advancing two exploration projects in Ghana, and are expected to become the next core operating district. GMC employs approximately 14,000 people worldwide and is committed to the highest standards for environmental management, health and safety for its employees and neighbouring communities with its mine sites.

### GMC Core Asset or Sub-cases

The company's four core assets are mine sites in Peru, Indonesia, Australia (with six sites) and Nevada operations in the United States which combined represented 4.9 million ounces of reserves at year-end 2002:

**GMC[1] (Peru)** – GMC's mine site in Peru was instrumental in developing a "Procure-to-Pay" (P2P) digital document suite and was the first GMC site to implement. The level of monthly purchase orders transactions has risen from 80% to almost 100%. GMC[1] has created a joint task force with the Peruvian government to potentially eliminate the need for paper based invoicing. Paper invoices are still required for the collection of Value Added Taxes on goods and services. GMC has been a front-runner in enrolling micro Peruvian suppliers, high in the Andes Mountains – going as far as partnering with local internet café owners to train and assist small suppliers in transacting via QTX.

**GMC[2] (Indonesia)** – one of two GMC's Indonesian subsidiaries, transacts online between US\$6 and \$9million each month in spend to more than a hundred suppliers worldwide. GMC[2] has aggressively targeted the small local suppliers as they are a critical component to GMC's social license to operate. To date, GMC[2] has held over a half dozen supplier summits with the specific objective of enrolling Indonesian suppliers onto the QTX marketplace. This has the effect of developing the Indonesian suppliers, thereby making them more competitive and sustainable within the context of the global marketplace.

**GMC[3] (Nevada, USA)** – one of GMC's North American sites transacts over 3,100 electronic purchase orders per month, representing over 50% of their monthly purchase orders. GMC[3] has directly integrated with a few of its key suppliers that have a high volume of transactions with GMC. Nevada has also streamlined its bulk receiving process through a Goods Receipt Notice (GRN). The GRN electronically consolidates receiving reports thereby eliminating the manual compilation and reconciliation processes. This benefits both GMC and its bulk suppliers. Finally, GMC[3] has a small business initiative whereby they actively recruit local community suppliers to transact electronically.

**GMC[4] (Australia)** – This has been GMC's quickest e-business on-ramp to date, by integrating to QTX in less than a month and very quickly transacting with well over 100 of its suppliers. GMC[4]'s situation is a bit different than the other GMC sites as it is an SAP shop and it covers 6 mine sites across continental Australia, and one site in New Zealand. GMC[4] has also undertaken an electronic Tendering effort for complex multiple line item out-line agreements (forward purchase agreements). Finally, GMC[4] has been able to utilize the decision based functionality of QTX's e-sourcing application to lower their total cost of ownership for goods purchased.

### QTX Organisation – The e-Marketplace

GMC developed a very positive and close working relationship with QTX at the onset of its e-business Program at both the regional and corporate levels. Because QTX is a globally distributed company – operating on 6 continents – they were able to provide quality people to support GMC's global implementation. The QTX team have been an integral part of GMC's success from a supplier enrolment/training effort as well as listening to GMC's business requirements and developing the digitized solutions that deliver value. A good example of this close working relationship is the development of the QTX "Procure to Pay" (P2P) digital document suite.

## METHODOLOGY

This case based research uses a model for e-business transformation developed by Ash and Burn (2003) derived from the results of a longitudinal analysis of e-business implementations with existing ERP systems. Three separate research models were used to analyse different stages of e-business growth and the results of their multi-stage analysis consolidated into a staged model of e-business implementation. The authors bring

together the antecedents of e-business progress using the case findings of the three separate research models; B2B interaction, e-business change, and virtual organising:

- (i) Benefits of B2B interaction is illustrated by a two dimensional model (3) in which greater e-business activity occurs within a set of B2B models (Carlson, 1995). B2B refers to the class of business-to-business (B2B) models that include; business-to-supplier (B2B<sup>S</sup>), business-to-employee (B2B<sup>E</sup>), and business-to-corporate customer (B2B<sup>C</sup>).
- (ii) e-Business Change is illustrated by a flat model (2), in which progress is across eleven interrelated components within three broad sections based on relevant research in the areas of; “organisational change, strategic management innovation, and information systems evaluation” (Guha et al, 1997, p.121).
- (iii) Virtual Organising is illustrated by a three dimensional model (1) of e-business activity that is “applicable to any company”. Progress is along the three dimensions of “customer interaction, asset configuration, and leveraging knowledge” (Venkatraman and Henderson, 1998, p.34).

Each model reflects a different business focus: organisational strategy, change management, and e-business work practices.

### Data Collection

The study was carried out over a three month period and consisted of multiple interviews of senior project staff of a global mining company involved in extended or integrating e-business applications with the systems of a developing B2B e-marketplace. Data was gathered from three sources; primary, secondary and tertiary:

- (i) Primary data – from semi-structured interviews conducted May and June 2004. Two separate interviewees were conducted for verification.
- (ii) Secondary data – from company documents collected or sent via emails.
- (iii) Tertiary data – from case papers and company reports from the Internet.

Semi-structured interviews were used to collect the primary research data and analysed at 3 levels as in Table2.

Level	* Coding Technique	Data Analysis
1. Top level themes	Open	Cross-case content analysis to determine the highest level themes that are critical/essential to e-business planning using all cases.
2. Next level detail of content within key themes	Selective	Cross-sub case content analysis of selected themes to determine the components that contributes to superior strategic advantage, using exemplar cases.
3. Lower levels of detailed measures	Open and Selective	Cross-sub case content analysis of the components to determine the outcomes, performance gains and measures that contribute to success or failure; using exemplar cases.

\* Coding techniques open and selective are from Strauss and Corbin (1990: 117-118).

Table 2: Case Analysis Techniques

The case material collected was used to verify all the strategic characteristics of e-business transformation and to develop the federated planning model.

## CASE ANALYSIS WITHIN E-BUSINESS TRANSFORMATION MATRIX

The e-Business Transformation matrix describes that successful e-business transformation with ERP occurs when *value propositions* are realised through *integration* and *differentiation*, of *technologies* used to support new *business models* to deliver *products and services* online. The associated management issues evolve through self-service, care and empowerment towards extensive relationship building with multiple alliances.

### Technology

GMC leverages the QTX e-Marketplace as a core component of its supply chain solution. The e-Marketplace is a global XML-based transaction platform and trading partner community of large Buying organizations and more than 6,000 suppliers. Using QTX's e-Marketplace, GMC's 12 buying global locations transact with over 800 suppliers from all over the world. Currently GMC processes between \$250 - \$300 Million in electronic

orders and 60,000 e-documents annually. These metrics are expected to grow as GMC strives to digitize 100% of its transactional activity.

#### Stage 1: Integration of Information and Communication Technologies

QTX digitises procure-to-payment processes with a full suite of electronic documents that crosses over organizational boundaries: Table 3 below summaries how this process enablement is broad and detailed within the QTX suite of digital documents.

Business Process	Departments Affected	XML e-Documents Utilised
Competitive Tendering	<ul style="list-style-type: none"> <li>○ Purchasing and Contracts</li> <li>○ End Users (Operations, maintenance and administration).</li> </ul>	<ul style="list-style-type: none"> <li>○ Request for Quote</li> <li>○ Quote</li> </ul>
Ordering	<ul style="list-style-type: none"> <li>○ Purchasing and Contracts</li> </ul>	<ul style="list-style-type: none"> <li>○ Purchase Order</li> <li>○ Change Order</li> <li>○ Order Acknowledgement</li> </ul>
Logistics	<ul style="list-style-type: none"> <li>○ Purchasing and Contracts</li> <li>○ Warehousing</li> <li>○ Transportation / Logistics</li> <li>○ End users</li> </ul>	<ul style="list-style-type: none"> <li>○ Advance Shipping Notice (ASN).</li> <li>○ Order Status Request</li> <li>○ Order Status Response</li> </ul>
Receiving	<ul style="list-style-type: none"> <li>○ Purchasing and Contracts</li> <li>○ Warehousing and Receiving</li> </ul>	<ul style="list-style-type: none"> <li>○ Goods Receipt Notice</li> <li>○ ASN</li> </ul>
Payment	<ul style="list-style-type: none"> <li>○ Purchasing and Contracts</li> <li>○ Accounts Payable</li> <li>○ End users</li> </ul>	<ul style="list-style-type: none"> <li>○ Invoice</li> <li>○ Remittance Advice</li> </ul>

Table 3: QTX P2P digital document suite

GMC, QTX and Mincom as the ERP provider, participated in a two week requirements workshop to develop this industry based solution that digitizes and streamlines the entire transactional process.

*Buying Integration* – GMC’s buying applications, Mincom’s Envoy for Elipse and SAP’s Enterprise Buyer Pro (EBP), are being integrated with the e-Marketplace for maximum efficiency and spend visibility across the enterprise. Employees on the shop floor can access supplier catalogues, submit requisitions for approval, and then submit orders using pre-approved catalogue items and prices. Orders and associated documents then flow across the e-Marketplace until the final transaction of payment is completed.

Currently GMC is integrating two buying applications at its Nevada and Australia locations. The strategy at these two sites is to access GMC supplier hosted catalogs (Blackwoods, Corporate Express in Australia, and Cashman in Nevada) to allow instant access to the items and their related availability. “We believe this will ultimately reduce stock and eliminate costly reconciliation processes for GMC and its suppliers – both hard dollar benefits.”

*Supplier Integration* – GMC provided QTX with target suppliers for whom integrating their back end systems would add even greater transactional efficiency. GMC, via QTX, has established multiple integrations in multiple countries with integrated suppliers for a range of XML documents.

#### Stage 2: Differentiation of Technology Resourcing

GMC engaged Mincom to provide the middleware that facilitates connection to the e-Marketplace and was the first customer of Mincom’s *Axis* product. GMC intends on expanding their use with medium and small sized suppliers through on-line catalogues hosted on the QTX e-Marketplace.

Suppliers connect to QTX via *SupplyCentre*™, a hosted order management application. Using *SupplyCentre*, GMC suppliers can receive and respond to the full suite of P2P documents mentioned above for maximum efficiency and error reduction. GMC conducts strategic sourcing using QTX’s *Quest* solution. *Quest* automates the “request for quotation” process reducing sourcing cycles and adding powerful bid analysis functionality that evaluates price and non-price variables. The result is strategic sourcing enterprise-wide, based on total cost of ownership.

#### Stage 3: Realisation of Value Propositions with Innovative Technologies

In a special circumstance where suppliers in the Peruvian Andes did not have access to the Internet, GMC partnered with QTX and local Peruvian business people to ensure their ability to transact via QTX through third

party internet providers, or internet cafes. These cafes have had a cascading development effect as many small Peruvian suppliers have now purchased personal computers for online business use.

For GMC's operation in Peru, third-party freight forwarders provide a key service in delivering materials to the operation. GMC is working with QTX and the freight forwarder integrated systems so off-site goods receipt notice is sent to the local GMC operation to indicate a specific order has been delivered by the supplier and is on its way. This represents extending the supply chain to local suppliers.

## Products and Services

Content about the second business dimension "Products and Services" of the e-business transformation matrix was not revealed from the case analysis.

## B2B Business Models

GMC is leveraging QTX's e-Marketplace to position itself as a major buyer in this distributed global mining industry exchange. QTX represents a global public B2B e-marketplace. This positioning by GMC demonstrates a differentiation towards a public B2B e-marketplace to further enhance its local license to operate obligations.

## CASE ANALYSIS WITHIN FEDERATED PLANNING MODEL

The final conceptual framework is described in terms of a federated planning model for e-business implementation. The federated planning approach is a strategic collaborative process between alliances where there is a continual review of alignment of the e-business transformation against business objectives. This is quite distinct from the 'one size fits all' approach of centralized planning and allows strategy to evolve with changing market conditions. This approach provides the means to explicitly define and manage relationships between supply network partners and to monitor trends and trigger a revisiting of strategic decisions across the network (Oliver et al, 2003).

The changing strategic focus across the stages of the federated planning model is defined in Table 4. At stage one of the extended enterprise, the focus is very much internal with top-down planning and an emphasis on training employees to become proficient in self-service to improve operating efficiencies and increase returns on investment. The first shift comes when the enterprise extends its relationships across the full supply chain for products or services. At this stage, the focus is on empowerment and self-learning through bottom up planning within the organisation. There is also a realignment of business objectives to include external alliances across the supply chain. Finally, the planning focus will be directed towards re-engineering the supply chain through collaborative planning to gain value enhancement throughout the networked community. In Table 1 this occurs with a migration of the type of business model towards the e-enterprise.

Table 4 is represents a revised version of the Burn and Ash (2003) Federated Planning model using the key components of the case findings from the GMC study.

	Stage 1	Stage 2	Stage 3
<b>Strategic level</b>	Self-service	Empowerment	Relationship building
<b>Development level:</b> * e-Business processes	Internal BPR	External Coordination	Re-engineering for value enhancement
Learning Communication	Training Top-down	Self-learning Bottom-up	Community Collaborative
<b>Management level:</b> * e-Business change management * People	Shared vision  Teams	Change coordination  Preferred Suppliers	Cultural readiness?  Partners: QTX, local suppliers, Micom
<b>Reporting level:</b> Outcomes and * Performances (KPIs)	Improved operating efficiency / Return on investment (ROI)	Virtual and economic value added (EVA)	Sustained innovation and growth (SIG)

*\* Key components exhibited in the GMC case study - updated from Burn and Ash (2003).*

Table 4: Federated Planning across stages of e-Business Transformation

## **e-Business Processes**

At the development level, business process was a critical component in GMC's e-business effort. The company had to devise the best way to approach digitisation of current procurement processes and identify new business processes that needed to be developed in order to execute to GMC's supply chain strategy.

### **Stage 1: Internal Business Process Re-design**

Business process re-design (BPR) played a critical role in GMC's e-business effort. Because of the technological change required, GMC was forced to review the orchestration of accomplishing its business objectives, that is, its business processes. In many cases, this forced view uncovered existing process inefficiencies, requiring GMC to change the way business was performed in order to streamline its supply chain operations. The results were positive and twofold:

- (i) existing and efficient processes were made more efficient due to digitisation, and
- (ii) existing, inefficient processes were re-designed and digitized, reaping additional value.

### **Stage 2: External Coordination**

Supplier Enablement – New business processes were created to enrol, test and ultimately enable key GMC suppliers. This process was a concert of working relationships between GMC, QTX and Mincom. GMC and QTX performed supplier enrolment workshops around the world for the sole purpose of communicating the reciprocal value of e-business to GMC and its suppliers – on a global, regional and local level. Once enrolled, the joint team collectively enabled the suppliers through QTX.

## **e-Business Change Management**

At the management level e-business has at its core a massive change management effort requiring an arsenal of change management tools and techniques (Scheer and Habermann, 2000, Kalakota and Robinson, 1999).

### **Stage 1: Shared vision**

GMC relied on proven change management techniques – namely a change acceleration process Model (CAP). The CAP model requires a significant amount of communication and action around; creating a shared need, shaping the vision, mobilizing commitment, measuring success and making change last.

### **Stage 2: Change coordination**

Additionally, action was required by GMC's management team to lead the change and in many cases to change systems and structures in order to support the e-business effort.

## **People**

People, both internal and external to GMC were, and continue to be, the heart of GMC's e-supply chain effort. Communication across multiple sites and throughout the organization (top-down, bottom-up and outward focused) was critical to achieve buy-in, address change management issues and ensure the best solution was optimally implemented. To support the effort, performance incentives were established to motivate employees to reach milestones. GMC also created consensus-building, cross-functional teams to ensure everyone stayed informed and synchronised, and that all knew what the value to their part of the organization would be as a result of the implementation.

### **Stage 1: Teams - The GMC teams and their contributions are listed below:**

- (i) GMC Executive Management – One of the most critical groups of stakeholders to GMC's e-business effort. GMC's executive management team, both at the corporate and operating level believed in the long term value, efficiency and cost out savings of e-business. It was because of this belief that they made QTX implementation an imperative at the operating level and incorporated it into performance development plans for those involved.
- (ii) GMC Site Level Teams – The site teams on the ground that were responsible for e-business execution were equally critical to GMC's success. GMC's effort gained traction in the early days of QTX through hard work and commitment to achieving the strategy. The traction was achieved through constant and consistent communication of the change and related value of e-business. Overall, communication was multidirectional - upwards, downwards and outwards. This site-based hard work paid off, as the effort had a cumulative effect of success breeding success. To date GMC has over 800 suppliers that utilize the QTX marketplace to send and receive digital transactions.



- (iii) Global Project Management Organization (PMO) – GMC Executive Management created a small team whose sole purpose was to develop and implement the e-business strategy at GMC. This small team developed the strategy, established virtual teams, developed work plans, secured funding, prepared communication plans, assisted in supplier enrolment and overall project execution. The Site Teams and PMO worked closely together during GMC's execution phase.
- (iv) QTX Seconded – Another critical success factor was QTX seconded supplier enrolment. GMC seconded key internal employees to work on behalf of QTX to enrol suppliers at all levels. Armed with industry experience, information and senior supplier contacts these key individuals contributed greatly to the overall effort. The seconded GMC employees have since been re-absorbed back into the GMC organization and continue to have a significant impact on GMC's e-Business Program.

#### Stage 2: Preferred Suppliers

GMC's preferred suppliers were, and continue to be, the cornerstone to GMC's ability to execute to its e-business strategy. Without the suppliers' participation, the effort would fail quickly. From inception, GMC's more progressive suppliers saw the immediate value of streamlining the business relationship through digitized processes. These suppliers joined QTX immediately. Other GMC suppliers were less clear on QTX and its value proposition, which required additional explanation and a longer enrolment process. Ultimately an overwhelming majority of GMC's preferred suppliers have recognized the long-term value, have joined QTX and are transacting in key regions around the world.

#### Stage 3: Partners

GMC local suppliers were instrumental in GMC's success as they provide important goods and services required to operate the mines. As part of GMC's Social License to Operate and its commitment to being a good corporate citizen, enablement of these local suppliers was a high priority. The local supplier network of forward thinking people contributed significantly to GMC's effort.

The QTX Organization – GMC developed a very positive and close working relationship with QTX at the onset of its e-business Program at both the regional and corporate levels. Because QTX is a globally distributed company – operating on 6 continents – they were able to provide quality people to support GMC's global implementation. The QTX team have been an integral part of GMC's success from a supplier enrolment/training effort as well as listening to GMC's business requirements and developing the digitized solutions that deliver value. A good example of this close working relationship is the development of the QTX "Procure to Pay" (P2P) digital document suite. GMC, QTX and Mincom participated in a two week requirements workshop to develop this industry based solution that digitizes and streamlines the entire transactional process.

Mincom – GMC determined that from a technical architecture perspective, outsourcing the middleware systems and solutions made the most economic sense. GMC awarded the business to Mincom, GMC's preferred supplier for its ERP systems. Mincom Axis (GMC's middle ware) played an important role in GMC's ability to connect to QTX globally.

#### Reporting Level

Another critical success factor that was instrumental to GMC's success was establishing and reporting to an objective set of performance metrics. GMC used the same internal performance measures in both e-business and traditional business operations. Table 4 identifies the generic measures for outcomes and performance gains and the relationships between them, within the federated planning model. They canvass the measures at the level of employee performance.

#### Performance Outcomes

In the GMC global operations GMC[1] sends close to 100% of its orders for goods through QTX. In addition, GMC has directly integrated with a few of its key suppliers that have a high volume of transactions with GMC. These suppliers have expressly stated that their operating costs have been reduced as expensive reconciliation processes have been eliminated through the streamline effect of e-business implementation. These key suppliers now have the ability to accept or reject purchase order information at a line item level. This functionality has reduced price, quantity and availability errors at the inception of the business process, significantly reducing downstream errors and reconciliation. Additionally, this has eliminated the re-keying of fax orders/order confirmations, including related errors and reconciliation, thereby reducing supplier manpower - or providing the supplier the ability to re-deploy manpower to value added activity

Other significant benefits were found to include:

- (i) Enhanced order accuracy.
- (ii) Increased inventory turnover rate from 1.7 to 2.0.
- (iii) Improved inventory forecast accuracy, driving service levels up 3% to 5%.
- (iv) Improved supply chain visibility and reduction of lead times
- (v) Reduction in order tracking and related errors > 60%

The site teams used these benefit metrics as a scorecard to assist in developing key performance indicators (KPIs) and continue to report on a monthly basis. These KPIs provide GMC with the ability to diagnose its e-business effort and take corrective action where required. Also, they form part of the change management effort.

## CONCLUSIONS

This study of GMC's e-business adoption within the mining industries B2B e-marketplace phenomena was based on the application of two interdependent research frameworks of e-business transformation and federated planning. The e-business transformation model in Tables 1 and 4 offer a foundational perspective of strategies, planning tactics and performance objectives for e-business implementations. These together form the basis for a "Federated Planning System". This can be viewed as a comprehensive planning approach, in which improvement is measured along the three dimensions: *integration* should be tempered by *differentiation*, for realising B2B *value propositions*.

The federated planning model demonstrates to senior managers what they need to consider during the various stages of e-business transformation and appropriate planning and evaluation approaches. In particular, the model identifies the 'critical' areas when new approaches to planning and change management need to be adopted throughout the organisation. The model focuses on realising the benefits of B2B interaction through the application of different e-business strategies, increasing emphasis on employee empowerment and successful management of alliances within customer and supply chains.

The changing strategic focus across the stages of the federated planning model are classified in Table 4, are viewed as interdependent and supportive of each other. This is especially so in the area of *outcomes and performances objectives* where *efficiency* through employee self-service and *effectiveness* through empowerment in customer care is used to support *value adding* activities for sustained competitive advantage. Value includes complementary benefits realized for all network partners across the virtual supply chain.

The combined framework can act as a comprehensive tool, for assisting managers in diagnosing the key facilitators and inhibitors of successful stages of e-business development. It is not seen as a prognostic tool. The case analyses confirmed that a successful project is found to have facilitators in all components of the e-business transformation framework. By taking a more holistic approach, executives can turn these stages of a company's transformation into the drivers of e-business excellence. So the central task for senior managers lies in understanding what drives operational excellence in the e-business realm, and then committing the necessary resources (structures, training, planning responsibilities) to the development of the drivers. To this end managers should assess the company's operations by looking at both the traditional and e-business measures:

The case showed that a key to success has been a commitment to excellence in three key areas: *People, Process and Technology*. Within this case the change management effort was a major challenge. A critical success factor that was instrumental to GMC's success was establishing and reporting of an objective set of performance metrics. The company used a benefits scorecard to assist in developing performance metrics (KPIs) and continue to report on a monthly basis. The KPIs provided GMC with the ability to diagnose its e-business effort and take corrective action where required.

Finally, change still requires that resources be matched to the business objects and tasks and, further, that planning systems are appropriate to drive organisational change through workplace implementation. In the new business environment organisational business models are more complex, supply chain networks more flexible and agile, training is shifting to self-directed learning, and collaborative planning approaches are needed to achieve greater added value to the community network.

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