MOBILE INTELLIGENCE FOR REPORTING OF SUPPLY CHAIN KPI'S

Helen Rogers, Kulwant Pawar
Nottingham University Business School, University of Nottingham, Jubilee Campus, UK
helen.rogers@nottingham.ac.uk, *kul.pawar@nottingham.ac.uk*

Nicoleta Tipi
University of Huddersfield, Queensgate, Huddersfield, UK
Huddersfield University
n.tipi@hud.ac.uk

Research Paper
Topic area – Supply Chain Performance Assessment

ABSTRACT
A Supply Chain Manager is in the departure lounge at Munich airport waiting for her flight to London to discuss size curves of the latest range of sports shoes with the Retail Manager of the company's flagship London retail store. The SC Manager opens up an application on her smartphone that displays the stock levels for the season's top selling shoes. She immediately sees that the stock turnover for this range is much higher at the London store than at other leading stores across Europe. The London Retail Manager wants to change the range profile to better reflect UK customer sizes and tastes. The SCM Manager has a printed version of last year's size curves (showing how many of each size were shipped and sold to the UK), however, she would like to see what the latest figures are for this quarter. She simply opens the size curve application on her smartphone and calls up the figures she needs.

This kind of scenario is increasingly being played out by executives and managers (many of whom spend very little time in the office) as they travel to meetings remote from their colleagues and the company intranet. It is fair to say that in many cases, retrieval of the information that is required is not as easy as the above situation implies. There are many reasons for this including restrictions on data sharing/retrieval, scattering of data across formats/ databases and insufficient specification by the managers of their requirements.

Mobile intelligence systems utilise devices such as mobile phones and tablet computers (smartphones, iPad, Playbook, etc.) as handheld workstations for users to access and analyse real time information. Essentially they allow managers to access performance information quickly and in an easy to communicate visual way (e.g. bar charts, pie charts etc. see for example Figure 1). Mobile intelligence in a supply chain management reporting context allows users to access supply chain-related information anywhere and make quick, informed decisions. Supply chain specific examples include delivery performance tracking and alerts for low inventory levels. Mobile phone applications ('Apps') can now offer managers more opportunities to connect and share information than, for example, a laptop due to the level of connectivity and network coverage around the world.

Figure 1. Source: Mexon Technology (2011)

There are however some restrictions to mobile reporting. For many businesses, it is neither feasible nor advisable that all performance measurement reports are made available as instant downloads on mobile devices, owing to the volume of data involved and the potential security issues. It is currently unclear as to which SC-related key performance indicators (KPIs) are most suited to mobile business reporting and what features managers are looking for (e.g. viewing charts and reports, monitoring movements in KPIs, alerts, drill down reports, etc.). This research seeks to address this issue.

At this early stage in the research, we present our research approach and reflections from a preliminary interview with a supply chain manager. We conclude with the presentation of a research agenda for further work in this area.

INTRODUCTION AND LITERATURE OVERVIEW

Making analytical tools and performance data accessible on smartphones allows companies to interact with their customers and business partners in real time, thereby improving services and boosting productivity (Fitzgerald, 2010). Although there is a lot of business interest in this area, a preliminary literature review revealed limitations and gaps regarding research into the use of mobile intelligence systems for reporting of supply chain KPIs. This is perhaps not surprising, because although measuring business performance (Kaplan and Norton, 2001; Neely, 2005) and more specifically supply chain performance is a well established field (Bhagwat and Sharma, 2007; Van Weele, 2009), using mobile devices to do this is rather new (Eckerson, 2011; Laskowski, 2011).

In 2009 Cegedin Dentrite released its Customer Relationship Management (CRM) suite; 'Mobile Intelligence' for BlackBerry smartphones (Vecchione, 2009). In this instance the Mobile Intelligence enabled delivery of accurate route planning, customer profiles, daily organisers, and pre- and post-call functionality with the potential to improve productivity and reduce administrative tasks. As reported by the CEO these new mobile applications enable the commercial team to carry only one device to communicate with their key stakeholders, organise their schedule and access key information stored in their Mobile Intelligence CRM system.

Practical impediments however still exist. According to industry analysts and vendors, the mobile applications market is being held back by small screen sizes and limitations in storage, memory and computing power (Brodkin, 2008). In the same article Brodkin mentioned that if a transaction is put on a mobile phone it must have some sense of time-criticality, as most users do not want their smartphone to simply act as a second computer. Airinei and Homocianu (2010) point out that many limitations of the mobile Business Intelligence applications are related to the physical features of the mobile devices and also to the architecture of the mobile operating systems (MOS) they are running on, together with a lack of compatibility with the corresponding operating systems on personal computers. Poor editing facilities were also mentioned. They conclude that all of these issues overcomplicate the idea of having a reliable mobile system useful to remotely connect in order to input data, find-out critical information, take real-time decisions and communicate them effectively.

Additional practical and strategic limitations to mobile BI are highlighted by Ericson (2011) with security, being a major area of concern to users. This is especially true when personal devices are misplaced or lost, as commercially-sensitive information can be involved. Business challenges also arise from the fact that many companies use a 'patchwork' of performance measures, rather than a consistent and integrated performance measurement system. This makes selecting and extracting the business performance reports in a unified and comparable manner for executives to use on their mobile devices, an extremely difficult and often impossible task.

Performance measurement systems are usually used to collect information and provide managers with relevant data to improve their decision making process. They are also known to evaluate, monitor and control operations. There are many benefits reported when performance measurement systems are used, however there are also issues linked to using dedicated measurement systems. The number of measures within organisations is large and in many cases on the increase. It is also the case that within many performance measurement systems obsolete and inconsistent measures exist (Tipi, 2009). This situation arises because when new technological changes are considered within organisations, new performance measures are added or developed to reflect these changes and simply added to current measures (Driva et al., 2000). However, if by adding new measure the whole system in not re-evaluated and the old, obsolete measures are not removed, problems occur that adversely affect the whole performance measurement system whereby the information provided may no longer be accurate.

Measures are also considered in organisations at different levels of aggregation from operational, tactical to strategic level. Using aggregated measures to evaluate and control supply chain systems could create difficulties in identifying the source of the problem for which a change decision is required (Tipi, 2009). It is also the argument where managers have to operate with a very large number of measures, some which could be obsolete or inconsistent. However if any of the obsolete measures are part of an existing aggregated measure, the process of removing measures from a system requires considerable attention from a process modelling point of view.

Therefore challenges such as these related to the use of corporate performance measurement systems need to be addressed, before they can be considered for transference to mobile devices.

There are many possibilities in terms of research directions when one considers the use of mobile intelligence systems as a business tool. This includes data capture (real time operational factors such as RFID, fault reporting, customer feedback and other performance data) and data reporting/retrieval. One could also investigate how new applications could be developed for these devices to make them an integral part of a company's SCM activities. In order for product and system development projects such as these to be successful, a thorough organisational readiness assessment needs to be carried out.

We have chosen to focus on reporting and retrieval and more specifically on the issue of how existing SCM data can be presented in an executive-friendly way (i.e. aggregated, pictorial-based data) on mobile devices. Clearly owing to the screen size there are restrictions in terms of the amount of information that can be displayed at any one time.

OBJECTIVES

Given that the broad aim of this study is to explore how mobile devices can be used to assist with reporting of supply chain-related performance measures, we specifically seek to identify SC managers' preferred form of measurement output while they are on the move (i.e. away from their 'desk') and link this to what can be realistically achieved on mobile devices.

This last aim needs to take into account the physical restrictions presented by the small screen size and limitations to the amount of live data that can be accessed in real time. This research can show how SCM information can be displayed and used on a mobile phone, and it can also demonstrate how businesses should aggregate-disaggregate information and make it available to be used in different formats.

As the term 'supply chain performance measures' can be interpreted in many ways and potentially produce a wide range of KPIs, we will restrict our scope to operational performance measures.

Michael Saucier, President of Transpara (Saucier, 2010) considers that Mobile Business Intelligence should focus on operational data rather than future planning data. If strategic decisions are required, which employ complex data evaluation, managers will need the time, space and computer capabilities to allow for these analyses. He therefore considers that these type of scenarios will not be suitable for mobile phone reporting. He also points out that mobile phones should focus on "here and now" metrics. Developing this theme further, the ideal mobile BI solution should include a combination of multiple data sources to generate a real-time solution, therefore implying that it should not just be a front end version of traditional BI applications.

RESEARCH DESIGN AND METHODOLOGY

The first steps in this project will be to carry out a thorough literature review – taking in not only traditional journal contributions but also technical blogs, online journals and outputs from communities of practice. This use of non-conventional literature sources is required, owing to the newness of the field.

Secondly we will carry out a needs analysis of a sample of supply chain managers to establish the kinds of information they need 'on the move' and in what form (heat maps, bar charts, pie charts, dashboards, etc.).

From a preliminary interview using a set of pilot questions with a 3rd Party Logistics manager in Egypt[1], it was identified that the Balanced Business Scorecard concept was used (Kaplan and Norton, 2001). Four main areas were identified as performance measures; customer satisfaction, operational excellence, human capital and financial performance. Individual measures are considered for each of these categories and they are assessed through a quarterly survey against pre-set KPIs. However a performance measurement system is in place in this case, and as the manager indicated the use of mobile devices in assessing performance measures will not be a workable solution upon applying the concept of Balanced Scorecard as this is currently implemented in their company.

[1] conducted by A.T. El-Said, a Masters student at the University of Huddersfield, UK

The next stage will involve talking to business reporting software vendors to discuss the technical limitations, possibilities and future developments. This in turn could lead to the development of a SCM reporting-related application for mobile devices.

INITIAL CONCLUSIONS AND NEXT STEPS

We believe that this will be one of the first studies of this nature. As such, the research output has the potential to make a positive contribution to both academia and to practitioners.

In line with our initial findings and reflections on the areas of mobile intelligence for reporting of supply chain KPIs, we propose the following research agenda:

1. Ongoing literature review of developments in mobile BI reporting
2. Design, development and launch of a large scale questionnaire (sample size 1000, target response rate >100) to address supply chain specific BI reporting requirements of managers. Responses will be sought from managers across the world, taking in a variety of industries.
3. Gain additional insights from supply chain managers to determine their firms' readiness assessment for mobile BI for SCM. Responses will be sought from online business forums and business networking sites.
4. Gain insights from business reporting software vendors to provide a view on the technical possibilities and limitations of BI reporting using mobile devices.
5. Design and development of an SCM-specific BI reporting application for mobile devices.

REFERENCES

Airinei, D. & Homocianu, D., 2010. The mobile business intelligence challenge. *Economy Informatics,* 10 (1)**,** 5-12.

Bhagwat, R., Sharma, M.K., 2007. Performance measurement of supply chain management: A balanced scorecard approach, Computers & Industrial Engineering, 53, 43-62.

Brodkin, J., 2008. Mobile app coming along - slowly. *Network World,* 25 (18)**,** 26.

Driva H; Pawar KS & Menon U (2000) - Measuring Product Development Performance in Manufacturing Organisations, International Journal of Production Economics, 63 (2000), pp147-159

Eckerson, W., 2011. Business Intelligence Market Evolution, http://www.b-eye-network.com/blogs/eckerson/archives/2011/03/bi_market_evolu.php, (accessed 3 March 2011).

Ericson, J., 2011. Putting Business Intelligence Mobility to Work BI Portal, http://www.biportal.org/BI_news?mode=PostView&bmi=54212, (accessed 14/04/2011).

Fitzgerald, M., 2010. BI goes mobile: Delivering business intelligence apps to employee smartphones can boost customer service. *Computerworld,* 44 (15)**,** 24.

Kaplan, R.S., Norton, D.P., 2001. Transforming the Balanced Scorecard from Performance Measurement to Strategic Management: Part I, American Accounting Association; Accounting Horizons, 15, 1, 87-104.

Laskowski, N., 2011. New Survey Reveals Mobile BI is on the Upswing,

http://searchbusinessanalytics.techtarget.com/news/2240034180/New-survey-reveals-mobile-business-intelligence-is-on-the-upswing, (accessed 1/4/2011).

Marshall, D. McIver, R., Lamming, R., 2007. Influences and outcomes of outsourcing: insights from the telecommunications industry, Journal of Purchasing and Supply Management, 13, 4, 245-260.

Mexon Technology, 2011. http://www.mexontechnology.com/images/iPhone/iPhone_dashboard.png, (accessed 4/04/2011).

Neely, A., 2005. The evolution of performance measurement research. International Journal of Operations & Production Management, 25(12), 1264-1277.

Performance Management Association Portal, 2010. Mobile BI Market Study http://www.performanceportal.org/entry/some-background-our-impendingstudy , (accessed 12/03/2011).

Saucier, M., 2010. 5 mobile BI myths. DashBoard Insight: Turning data into knowledge, available at: http://www.dashboardinsight.com/articles/new-concepts-in-business-intelligence/5-mobile-bi-myths.aspx, (accessed 14/04/2011).

Tipi, N.S., 2009. Modelling performance measures for supply chain systems using discrete event simulation, Proceedings of the 14th International Symposium on Logistics, Istanbul, Turkey 5-8 July, 2009, p34.

Van Weele, A., 2009. Purchasing and Supply Chain Management, Cengage Publishing, Chapter 14.

Vecchione, A., 2009. Cegedim launches mobile intelligence CRM application. Medical Marketing & Media, 44 (11), 16.