

PUBLIC BIKE-SHARING: KEY ISSUES AND CHALLENGES IN SUPPLY CHAIN INTEGRATION

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ABSTRACT

In this paper we discuss key issues and challenges in integrating supply chains for the healthy development of public bike-sharing (PBS) systems. We present a framework that helps companies and public sector to focus on urbanisation/urban regeneration and its impacts on PBS, its design and operations. We argue that PBS as an emerging industry with unique opportunities for new products and services requests and encourages research and innovations in the sustainable development of its supply chain.

KEYWORDS: public bike-sharing (PBS), urban supply chain, integration

INTRODUCTION

Community bike-sharing involves an individual checking out a bicycle from one of several public locations, usually called a docked station and returning it at another location (Zhang et al, 2014). The principle of public bike-sharing (PBS) is to provide an alternative or complementary form of public transport to cover short journeys within city limits. PBS began in the 1960s when 50 “free bikes” were scattered around Amsterdam. Then it evolved through vintages of technologies and generations of rise and fall (DeMaio, 2009). Over the past two decades the number of PBS schemes has increased tenfold making it a fast emerging new industry. More than 800 cities around the world are currently hosting advanced PBS programs.

Just as mass public transport have changed the development of city suburbs, PBS schemes are now shaping city centres in many subtle ways (Economist, 2013). New developments see much cheaper “dockless” bikes in Berlin, which can be found by mobile phones. The introduction of electric bikes in Barcelona promises for longer or steeper journeys. As United States conferences in 2013 where and when policymakers concluded: “communities that have invested in pedestrian and bicycle projects have benefited from improved quality of life, healthier population, greater local real-estate values, more local travel choices, and the

reduced air pollution”(Economist, *ibid*). PBS represents the fundamental desire of human-being for freedom, mobility and connectivity. It re-boosts city’s social and commercial activities, improves access to urban utilities and services, and promotes innovations and practice towards a “smart city”. It opens opportunities for cities for cleaner production and greener consumption. It reduces the impacts of fossil-based transportation, aging city infrastructure and population, and an increasing chronic and sedentary disease.

As PBS schemes continue to evolve and mushroom at a speed, research needs to catch up to grasp the impacts, potentials, opportunities and challenges of this fast emerging industry. Driven by environmental, social, economic, and political agenda, the rapid development and implementation of PBS schemes provide huge opportunities for new products and services as well as new jobs for growing urban populations. All these create a strong need for knowledge sharing in order to conceptualise, justify, emerge and regulate PBS as a new type of smart and green traffic systems. PBS as a new urban service system together with its innovations is underlined by the customer complex need for seamless mobility and connectivity, sustainable city and community development and digitally-smart technologies (BBC, 2014). In spite of its green features and social benefits no convincing research to date has been published in order to guide the future investigation and healthy development of the sharing business. In particular we ask: what are the key issues and challenges in creating and delivering a bike-sharing service? All these need to be investigated from the perspective of supply chain management.

LITERATURE REVIEW

Research and innovation in supply chain (SC) has taken place mostly in the context of globalisation and predominantly from OEM (original equipment manufacturer) perspectives. Comparatively urban-oriented SC received little attention. Cities and towns should no longer be treated as a dot in a SC network. A comprehensive urban SC operations system, its design and management are emerging. There is a need to look at ‘local’ SC as a collaborative business model which integrates context and process elements. We see sustainable urban SC as a socio-technical system that consists of a cluster of elements, including technology, infrastructure, regulation, user practice and market, maintenance, cultural meaning, supply networks. These elements are interlocked in transforming changes, delivering innovation and contributing to sustainable development of cities and local communities. A central framework is urgently needed to guide SC research from instrument-focused to integration- and to eco-oriented.

Logistics design and transportation solution/optimisation presents another challenge to sustainable urban supply chain management. Vehicles and information system such as driver-less cars provide increasing demand on data-mining and dynamic simulations, for example. The design and evolution of a transport system and logistics technology provide rich experience and data to experiment and test concepts of technology sustainability such as triple bottom lines, foot print, carbon exchange scheme, docking heritage, etc. Multi-modal traffic research should focus on between ports and end users (so called last mile problems). Creating sustainable “glocal” supply chain logistics, for stakeholders of both direct and indirect, to ultimately reduce traffic-intensity, congestion and green house emission. What future cities hold for green logistics and supply chain for PBS?

Furthermore, urban infrastructure and built environment contextualise the development of PBS which results in a changing physical and mobile system. Road conditions and fuel supply, for example, may trigger the issue of regulations and government policies. What are the risks in SC management that are associated with congestions and securities? How technology advancement (e.g. multiple sensors and big data) and demographic changes (e.g. new house, mobility and sustainability programmes) affect the urban operations of a SC system? What bottlenecks exist and hide that affect effective delivery of PBS or cause a logistic failure? Are there any back-up solutions/systems in place? How local people and business are connected? How robust, resilient or vulnerable an urban supply network can be? These are the issues that need resolutions and management strategies.

The PBS literature also reveals challenges in value chain and business model innovation. Tools and relationships need to be devised to explore the potential of commercial value (or driving forces). Consumer behaviour and how it affects the effective delivery of PBS services. It is also worth to explore the meaning and impact of a possible social and ideological move from cleaner production to greener consumption (by using examples of CPSS – complex product and service systems - and reverse logistics). There have evidenced that companies consciously motivate non-direct stakeholders in contributing to the innovative SC. Given the fact that green benefits are difficult to measure research and innovations regarding SROI (Social return of investment), negotiating and contracting are in great needs. The development of these strategies will help to map out the key influences and factors that drive and shape the development and evolution of urban SC systems.

RESEARCH DESIGN

This paper is our first step in building a new investigation into the impact of smart supply chain initiatives on citizen mobility services provision. We present a guiding framework to explore the feasibility, vulnerability, adaptability and acceptability of long run bike sharing models. The nature and scope of “*sharing-based*” operations systems are discussed together with a solution suggested to the “*real-world*” problems that are unique in developing and running a bike-sharing system. Essentially a desk-based research it used discursive methods (Fairclough, 2010) and case studies (Yin, 2011) to data analyses. has been inspired by exchanging ideas with managing directors, project managers and transportation experts, and aided with MBA/MSc coursework on bike-sharing business cases. Our findings are designed to enhance the development of a conceptual framework and research questions. This will measure and enable more sophisticated theoretical modelling, of long run urban improvements in mobility operations, through the design and implementation of smart bike-sharing systems.

FINDINGS AND DISCUSSIONS

A framework for sustainably supplying bike-sharing is emerging. Key issues and gaps in the (re-)design, implementation, operations and maintenance of the system are identified. Integrating bike-sharing supply chain faces unique challenges in the effective delivery of services, resource constraints, mobility efficiency and consumer behaviour. Digitised infrastructures in particular are presenting new ways and challenges to sharing products or services in more customer-centric and environmentally-friendly manners. The framework is useful to assess the supply chain strategies, how they change in order to move from cleaner production to greener consumption. There exists a need to investigate the way to motivate non-direct stakeholders in contributing to innovative supply chains, through their SROI (Social return of investment), negotiating and contracting strategies.

CONCLUSION

The research represents a novel approach to sustainable service innovation by developing SCM thinking within the unique context of smart cities. Our originality is the framework we develop on the dimensions of a sharing service system as a resource based approach to optimizing citizen mobility. The major limitation of our analysis is that it is exploratory and based on a limited secondary data. However and since we purposively engaged with bike sharing suppliers and city bike users, our research will be of relevance to both public and private managers across the world in urban sharing-based business.

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