Journal of Retailing and Consumer Services 40 (2018) 40–47

Contents lists available at ScienceDirect

Journal of Retailing and Consumer Services

journal homepage: www.elsevier.com/locate/jretconser

Examining price and service competition among retailers in a supply chain under potential demand disruption

Syed Mithun Ali[a], Md. Hafizur Rahman[a], Tasmia Jannat Tumpa[a], Abid Ali Moghul Rifat[a], Sanjoy Kumar Paul[b,*]

[a] Department of Industrial and Production Engineering, Bangladesh University of Engineering and Technology, Dhaka 1000, Bangladesh
[b] UTS Business School, University of Technology Sydney, Australia

ARTICLE INFO

Keywords:
Disruption management
Price competition
Service competition, demand disruptions, supply chain risk

ABSTRACT

Supply chain disruptions management has attracted significant attention among researchers and practitioners. The paper aims to examine the effect of potential market demand disruptions on price and service level for competing retailers. To investigate the effect of potential demand disruptions, we consider both a centralized and a decentralized supply chain structure. To analyze the decentralized supply chain, the Manufacturing Stackelberg (MS) game theoretical approach was undertaken. The analytical results were tested using several numerical analyses. It was shown that price and service level investment decisions are significantly influenced by demand disruptions to retail markets. For example, decentralized decision makers tend to lower wholesale and retail prices under potential demand disruptions, whereas a proactive retailer needs to increase service level with an increased level of possible disruptions. This research may aid managers to analyze disruptions prone market and to make appropriate decision for price and service level. The manufacturer or the retailers will also be able to better determine when to close a market based on the proposed analysis by considering anticipated disruptions. The benefits and usefulness of the proposed approach are explained through a real-life case adopted from a toy supply chain in Bangladesh.

1. Introduction

Firms face ever-increasing competition at the local and international level in sustainably conducting business at a profit (Cardinali and Bellini, 2014; Kuo, 2013; Fornari et al., 2016). Within this dynamic and competitive environment, non-price factors such as after sales service, free gifts are equally if not more important than price factors, irrespective of whether the environment in question exists in a developed or developing countries, firms may struggle in operating business smoothly (Kumar et al., 2017; Murali et al., 2016; Sarkar et al., 2016). Many people have had the real life experience of getting a different quality of service from two retail stores, although they may be adjacent to each other. Also, the same product can be obtained at a different price from different retail stores. Driven by this practical life experience, this research focuses on interactions between retailers related to product price and customer service. Interested readers are directed to read Lu et al. (2011), Li et al. (2012) and Tsay and Agrawal (2004) to gain further insight into service attributes in decision making in supply chains.

Supply chain success largely depends on the consumption of products from downstream supply chain agents, i.e., retailers. Customer loyalty is greatly influenced by retail price and retail services, which ultimately assists firms in building a strong brand image on top of product quality (Yuen and Chan, 2010). As such, fixing the price of products and providing demand-enhancing service, as well as ensuring exemplary after sales service, are considered to be key strategic and tactical decisions (Lu et al. 2011). Moreover, recent supply chain literature emphasizes the inclusion of disruption risk, supply chain risk and uncertainty in strategic decision making (Paul et al., in press, 2016, 2017; Ali and Nakade, 2016). Otherwise, supply chain managers may be prone to decision making under the assumption of smooth business environment (Ali and Nakade, 2014, 2015; Tang, 2007).

A number of articles have examined the issues of price competition (Anderson and Bao, 2010; Yang et al., 2014; Opornsawad et al., 2013; Roy et al., 2015; Wang, 2006; Wang and Sun, 2011; Willart, 2015), or focused on formulating analytical models to deal with price sensitive demand (Sana, 2011a, b, 2012). However, few papers simultaneously consider price and service competition issues. Table 1 gives a recent

* Corresponding author.
E-mail addresses: syed.mithun@gmail.com (S.M. Ali), rizvi00736@gmail.com (Md. H. Rahman), tjtumpa08011@gmail.com (T.J. Tumpa), taskinrifat420@gmail.com (A.A. Moghul Rifat), sanjoy.paul@uts.edu.au (S.K. Paul).

http://dx.doi.org/10.1016/j.jretconser.2017.08.025
Received 14 July 2017; Received in revised form 6 August 2017; Accepted 25 August 2017

Table 1
Research considering price and service competition issues.

Sl. no.	Authors	Competition issues	Disruption-focused	
			Yes	No
1	Farm (2017)	Price		√
2	Gabaix et al. (2016)	Price		√
3	He et al. (2016)	Price	√	
4	Dan et al. (2014)	Price and service		√
5	Giri and Maiti (2014)	Service		√
6	Mahmoodi and Eshghi (2014)	Price		√
7	Wenlong et al. (2013)	Price	√	
8	Li et al. (2012)	Price and Service		√
9	Lin et al. (2011)	Price		√
10	Lowengart and Mizrahi (2001)	Price		√

scenario of price and service competition issues. When dealing with service competition, most studies assume that manufacturers are competing to provide demand-enhancing services and that they are investing in offering services (Zhao et al., 2013). It might therefore be worth exploring when retailers are competing to provide services to customers, as well as how they are bearing the cost involved in providing the services to customers. This paper investigates such insights from the theoretical and practical standpoint.

Disruptions caused by natural and man-made actions introduce shocks into the supply chain systems, and can paralyze the supply chain (Schmitt et al., 2017). In this work, we attempt to examine price and service decisions under a state of probabilistic demand disruption. Much of the research in the literature on demand disruptions is based on coordination and contracts among supply chain partners. However, there remains a dearth of research considering numerical investigations of the impact of demand disruptions on supply chains.

Demand disruption can occur due to loss of major customers, innovative competitors and inaccurate forecasting (Koblen and Lestyánszká Škůrková, 2015). It is obvious and needless to say that demand is the key driver for proper functioning of the supply chain. Therefore, demand disruption significantly influences all agents in the chain (Huang et al., 2006; Wenlong et al., 2013; Xiao and Yu, 2006). Eventually, the original production, purchasing, pricing, and marketing plans must be revised in order to respond to or compensate for the demand disruption.

Cao et al. (2013) proposed a supply chain coordination mechanism with a single manufacturer and numerous retailers by utilizing revenue sharing agreements. Xiao et al. (2007) considered different scenarios to mitigate demand disruptions by considering quantity discounts. Xiao and Qi (2008) developed the coordination mechanism and the effect of cost on this and considered quantity discount schemes.

To the best of our knowledge, price and service competition issues with potential demand disruption are rarely reported in the literature. In addition, it is evident from the literature that little attention is paid to numerical investigations of the product prices and service levels of firms while taking demand disruption into consideration. It may be meaningful to study optimal firm decisions on price and service level investments with consideration for probabilistic demand disruption. This paper aims to fill this research gap in the literature of supply chain risk management.

Markets are becoming more vulnerable due to an increase in the number of man-made and natural disruptions (Peck, 2006). Therefore, research focusing on price and service competition with disruption may benefit decision makers responsible for pricing and fixing service levels for retail stores. The main contributions of our work are summarized as follows.

- We explore the pricing and service mechanisms of multiple competing retailers under both decentralized and centralized supply chain configurations while considering potential demand disruptions at the retail market.
- Unlike most of supply chain literature, which focuses on building conceptual frameworks (Tang and Nurmaya Musa, 2011), or applies supply chain coordination mechanisms (Chen and Xiao, 2009; Xiao et al., 2005), we conduct a numerical investigation to inspect price and service level decisions of the supply chain members in the context of the market to provide management insights into the problem.
- We examine the effect of probability of disruptions on retail demand markets and investigate the extent and pattern of changing the price and service of a supply chain system with regard to disruptions probability.

The remaining sections of this paper are organized as follows. Section 2 presents materials and methods relevant to this research. Section 3 briefly gives the competing retailers model. In Section 4, we provide the solution methodology for fixing price and service level in centralized and decentralized supply chains. Section 5 applies the proposed method to a case supply chain in Bangladesh, and the results are illustrated therein. Finally, Section 6 concludes the research with theoretical and managerial implications.

2. Materials and methods

2.1. Supply chain risk

A supply chain network is comprised of organizations, people, technology, activities, and information. Its function is to add value to raw materials and components, and transforms them into final products for delivery to end users (Hishamuddin, 2013). Thus, the activities performed in a supply chain play a major role in achieving competitive advantage for the stakeholders in the network.

Supply chain risk is classified into operational risk and disruption risk (Tang, 2006; Wakolbinger and Cruz, 2011; Cruz, 2013; Kleindorfer and Saad, 2005). Fig. 1 displays supply chain risk categorization based on the probability of risky events and the impact of such events on business.

Operational risks refer to the risks faced by an organization during normal operations due to the uncertainties of demand, supply, market price, and cost (Heckmann et al., 2015). Table 2 lists some operational risks in supply chains.

Supply chain disruptions can be thought of as catastrophic events (Knemeyer et al., 2009) that can severely degrade supply chain performance (Hoffmann et al., 2013). Supply chain networks are exposed to numerous unpredictable and unforeseen disruptions (Atwater et al., 2014; Blackhurst et al., 2011). Supply chain disruptions can be caused by either natural environment disasters and uncertainties, or by human acts including political instability, quality problems, regional turbulence, and terrorism (Hishamuddin, 2013; Ambulkar et al., 2015; Cao et al., 2013).

Supply chain disruption may reduce the performance of supply chains drastically. For instance, the supply chain disruptions faced by

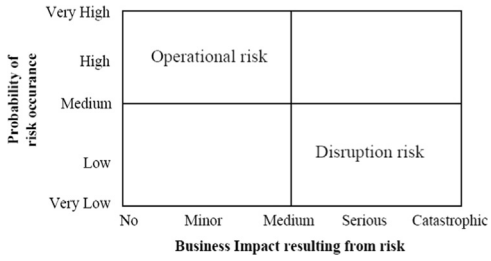

Fig. 1. Categorization of supply chain risk (Brindley, 2017).