



## How should you stabilise your supply chains?

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### ABSTRACT

This case based research paper examines the stabilisation strategies used within seven supply chains and presents a framework to help practitioners stabilise their chains. The findings show that organisations should first select a cushioning strategy and then reduce demand uncertainty to lower the level of cushion held. However, they need to recognise that other organisations within the supply chain are making similar decisions and the whole supply chain needs to be stabilised. Despite this, businesses seem to only share information about their demand uncertainty-reducing mechanisms and not their cushioning strategies. This means that companies often make decisions in isolation of each other, which can then destabilise the chain.

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## 1. Introduction

To compete in increasingly uncertain and competitive markets, many companies choose to focus on their area of core competence and outsource other goods and services (Lowson et al., 2000), which often results in organisations managing ever more complex and varied supply chains (Preiss et al., 1996). A key strategic decision for businesses is how best to stabilise their supply chains and cushion them from market instability. Authors such as Newman et al. (1993) and Hopp and Spearman (1995) suggest using a combination of mechanisms such as inventory, order backlog and capacity. However, others believe there is a gap between theory and practice in supply chain management (Storey et al., 2006) and further management tools are required to help businesses develop strategies (Mills et al., 1998) and become more competitive (Menda and Dilts, 1997).

This research seeks to examine the practical implications of stabilising supply chains to examine the gap between theory and practice. The paper explores the mechanisms for stabilising delivery systems, choosing between alternative mechanisms and current research on stabilising supply chains. The case study research methodology is then outlined explaining how companies were selected and how data was collected and analysed. The findings from each case study are described and the various cushioning strategies reviewed. This discussion leads to the development of the stability managerial framework and theoretical propositions about where alternative mechanisms are most appropriate and how supply chains can be stabilised.

### 1.1. Stabilisation strategies

Reducing delivery system variation and uncertainty helps organisations maximise their profit and cash flow (Deming, 1982; Ohno, 1988; Womack and Jones, 1996; Adler et al., 1999; Dyer, 2000). There are a number of different strategies to cope with variability that make sense in different business conditions (Hopp and Spearman, 1995). Authors such as Newman et al. (1993) and Caputo (1996) suggest using inventory, order backlog and capacity to cushion an operation from variability in its markets. Rather than cushioning the delivery system, other authors suggest methods for reducing demand uncertainty (e.g. Lee, 1998; Van Hoek, 1998; Disney, 2008; Germain et al., 2008). Equally, other authors suggest companies make their delivery systems more responsive by postponing product differentiation by separating the 'efficiency' and 'market mediation' phases of their delivery systems (e.g. Olhager, 1994; Gattorna and Walters, 1996; Feitzinger and Lee, 1997; Fisher et al., 1997; Lee, 1998). This approach is often referred to as 'postponement', 'demand chains', 'lean supply' or 'agile supply' (e.g. Naylor et al., 1999; Mason-Jones et al., 2000; Christopher and Towill, 2001; Lee, 2002; Hsu and Wang, 2004; de Treville et al., 2004; Yang et al., 2004; Swafford et al., 2008).

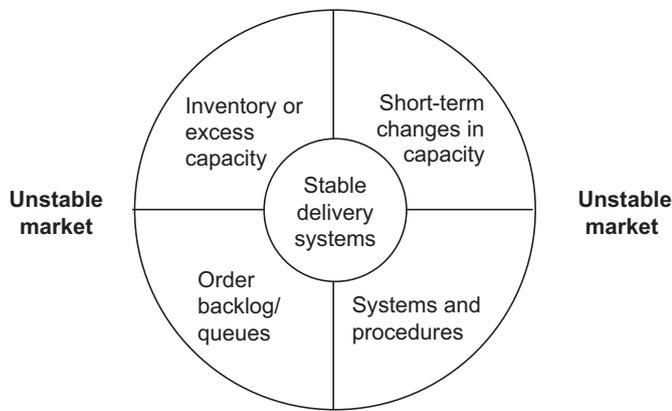
Although a number of stabilising mechanisms are identified in the literature, few authors consider how they should be used together. Lovejoy (1998) proposes the 'operations management triangle' where capacity, inventory and uncertainty<sup>1</sup> (or

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<sup>1</sup> Lovejoy (1998) refers to this as 'variability'. However, he then suggests that having more information will make demand less variable. However, this may not always be the case as demand may still be variable, but the organisation will be able to advanced knowledge of this variations and be able to predict them



**Fig. 1.** Mechanisms for cushioning the delivery system from market instability proposed by Hill (2005).

information) are substituted for one another to maintain supply lead-time, which Lovejoy (1998) refers to as customer service. For example, holding excess capacity allows variable demand to be met with lower levels of inventory or reduced lead-time. If there is no excess capacity then inventory must be held to meet uncertain demand or supply lead-time will increase. Equally, reducing both excess capacity and inventory will increase supply lead-time. However, if demand is more certain then inventory or excess capacity can be reduced without supply lead-time increasing. Hill (2005) develops this further by suggesting organisations cushion using one or a combination of inventory/excess capacity, short-term changes in capacity, order-backlog/queues and systems/procedures as shown in Fig. 1. However, the frameworks suggested by Lovejoy (1998) and Hill (2005) both only include mechanisms to cushion the delivery system and do not consider how organisations could reduce demand uncertainty.

### 1.2. Choosing between alternative stabilisation strategies

Alternative stabilisation mechanisms have been used to meet varying market and business conditions during the last century. During the two decades after World War II, global demand exceeded capacity and businesses used inventory to help maximise utilisation and output. In the 1960s, an alternative approach emerged from Japan where high material costs and limited physical space created pressure to reduce inventory. Smaller order quantities started to be made through reduced process set-up times (Ohno, 1988), reduced process variation and holding excess process capacity (Shingo, 1981). Lowering inventory exposed problems, leading to process refinement and waste reduction (Ohno, 1988) that, in many instances, led to higher quality conformance, shorter lead times and lower costs. The benefits of the 'lean' approach, as it became known, were widely reported by authors such as Schonberger (1982, 1986) and Womack et al. (1990) and have since been widely adopted. However, the 'lean' approach is more suitable to high volume, more certain markets whereas many businesses find customers hold less inventory, outsource more processes and demand shorter lead-times (Fisher et al., 1997; Lee, 2002, Ferdows and Lewis, 2004). It is, therefore, important that companies understand the characteristics and benefits of alternative cushioning mechanisms before selecting ones that suit their market, delivery system and supply chain configurations.

(footnote continued)

making demand more certain. Therefore, for the purpose of this study we will refer to it as 'demand certainty', rather than 'demand variability'. This is consistent with other authors such as Krajewski et al. (2005).

### 1.3. Stabilising supply chains

Supply chain management is an emergent field of practice and an emerging academic domain (Storey et al., 2006, Burgess et al., 2006). Although case studies such as BMW, Compaq, Dell and Zara (Ferdows and Lewis, 2004; Gunasekaran and Ngai, 2005) challenge existing management practice, there is little empirical research into supply chain stabilisation. Research to-date has examined the impact on supply chain stabilisation of factors such as

- **Pricing**—Hamister and Suresh (2008)
- **Demand forecasting**—Chen et al. (2000) and Saeed (2008)
- **Scheduling**—Kadipasaoglu and Sridharan (1995), Harrison (1996), Zhao et al. (2001), Bogataj et al. (2005), Meixell (2005), Sahin et al. (2008), and Childerhouse et al. (2009)
- **Production techniques**—Bivin (2008)
- **Order review intervals**—Waller et al. (2008)
- **Inventory management**—Ganeshan et al. (2001), Irvine and Schuh (2005), Bertsimas and Thiele (2006), Villegas and Smith (2006), Olsen and Parker (2008), and Sipahi and Ilker Delice (2010)
- **Replenishment policy**—Son and Sheu (2008)
- **Relationships**—Lai et al. (2005) and Kehoe et al. (2007)
- **Information sharing**—Lee et al. (1997), van Donselaar et al. (2000), Sahin and Robinson (2005), Geary et al. (2006), Hartland et al. (2007), Chu and Leon (2008), Kin Chan et al. (2008), Chan and Chan (2009), and Jain et al. (2009).

Some authors have looked at supply chain stabilisation within the context of 'inventory theory' or 'supply chain dynamics'. However, most of the extant research examines only one of these factors in isolation, without considering the overall stabilisation strategy. Only Fisher et al. (1997) and Krajewski et al. (2005) have started to compare alternative supply chain stability strategies. Fisher et al. (1997) argued 'functional products' require 'efficient supply chains', whereas 'innovative products' require 'responsive supply chains'. Each type of chain requires a different mix of inventory, order backlog and capacity to hedge against demand uncertainty. However, it is not clear how these mechanisms should be used or where they should be placed within the chain. Krajewski et al. (2005) conclude that firms can either 'reduce uncertainty' by using restrictive supply contracts, infrequent schedule revisions and high form postponement; or 'cope with uncertainty' by having flexible supply contracts, frequent schedule revisions and low form postponement. The perspectives of these two sets of authors provide a useful starting point for investigating the alternative strategies for managing supply chain instability.

## 2. Methodology

The empirical research presented here builds on the work of Fisher et al. (1997) and Krajewski et al. (2005) and is guided by the Lovejoy (1998) and Hill (2005) cushioning frameworks. It explores the practical implications of managing supply chain stability by investigating four questions:

1. How do companies select supply chains stabilisation mechanisms?
2. How are these mechanisms used to support alternative market and business conditions?
3. How do companies work together to stabilise the whole supply chain?
4. Why do supply chains become destabilised?

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