



# Investigating stock-outs in Johannesburg's warehouse retail liquor sector

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**Dates:**

Received: 23 Mar. 2017

Accepted: 13 July 2017

Published: 21 Sept. 2017

**How to cite this article:**

Govind, A., Luke, R. & Pisa, N., 2017, 'Investigating stock-outs in Johannesburg's warehouse retail liquor sector', *Journal of Transport and Supply Chain Management* 11(0), a303. <https://doi.org/10.4102/jtscm.v11i0.303>

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**Purpose:** The aim of this exploratory study was to investigate how management practices and processes contribute to stock-outs in the warehouse retail liquor sector in Johannesburg.

**Research design:** A pragmatic research philosophy was used in a multi-case approach to determine the association between business management practices and stock-outs. The unit of analysis of the study is the highest turnover outlets.

**Findings:** The results revealed that retailers base demand forecasting on judgement and naive or simple moving average forecast methods. There is little consideration of variability, lead time or targeted customer service levels when determining optimal inventory levels. Product breakages are common, implying that data inaccuracies and stock-outs are highly probable. Information sharing between the retailers and suppliers is limited and formal collaboration programmes do not exist. The respondents revealed that frequent stock-outs resulted in poor business performance characterised by declining sales, customer retention and competitive advantage.

**Limitations:** Although the sample selected represented a significant portion of the top 50% contributors to the sector's sales, the sample is small and the focus of the study is limited, which decreases the generalisability of the results.

**Practical implications:** Retailers can reduce stock-outs by investing in improvements in demand forecasting, synchronisation through collaboration and training of employees.

**Originality or value:** This study provides empirical evidence of the linkages between poor management practices and processes, stock-outs, customer service and business performance.

## Introduction

Stock-out situations are scenarios where stock or final inventory in a retail outlet is not available on the shelf for a customer to purchase (Aastrup & Kotzab 2009; Grant & Fernie 2008). Customers will do one of the following when faced with a stock-out in a retail store: (1) switch stores to locate the same product, (2) change brands in order to get a similar utility out of the same product, (3) postpone the purchase to a timing when the product becomes available or (4) completely drop the purchase, resulting in a lost sale to the store (Van Woensel et al. 2007). In a survey of customers in three Dutch grocery stores, about 84% of customers in the perishable products sector were found to substitute their product purchase when faced with a stock-out situation owing to the immediacy effect (Van Woensel et al. 2007). The immediacy effect is defined as customer demand for a product for immediate consumption.

Customers may switch to another brand in the short term for a product that is highly substitutable in the same store; thus, the outlet benefits by not losing a sale (Sloot, Verhoef & Franses 2002; Van Woensel et al. 2007). If continuous stock-outs occur, consumers will switch stores permanently, leading to a diminishing customer base, poor customer retention, loss of store loyalty, reduction in sales turnover and diminishing profits in the long run (Van Woensel et al. 2007). Customer retention is a basic building block for a successful retail business in today's competitive landscape (McNaghten & Passino 2011). For a retail business to operate sustainably, they cannot afford losing customers to competitors.

Stock-outs alter customer behaviour and buying patterns and increase demand variability (Van Woensel et al. 2007). Customer behaviour and buying patterns are critical predictors and influencers of sales turnover (Pearson 2011). Stock-outs make the monitoring of customer demand

**Note:** This article is partially based on the authors' article presented and published as part of the Proceedings of the 21st International Symposium on Logistics (ISL 2016), available here: <http://www.isl21.org/wp-content/uploads/2016/09/Final-proceeding-with-abstract-update-OCT-05.pdf>

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patterns difficult as brand switching takes place, which causes increased customer demand variability (Corsten & Gruen 2003). Customer demand variability is defined as a deviation from a supply chain process (Coyle et al. 2012).

Business management levers such as key strategic management processes in the supply chain, store operations, category management and marketing can improve retailers' competitive positions and be sources of sustainable growth (PWC 2012). These levers are the building blocks for a competitive advantage in the retail industry because they influence value through function and cost (Jones & George 2009; PWC 2012). The beer game categorises three management levers: the management of demand variability, supply chain synchronisation and collaboration (communication). Inefficiencies in these levers have been found to be probable causes of stock-outs in retail business (Van Woensel et al. 2007).

The retail industry in South Africa has shown a slow-down of sales growth over the span of a year from 3.9% in 2012 to 2.8% in 2013 because of household consumption spending that had been inhibited (Maswanganyi 2013; Reuters 2013). The reduction in household consumption spending in South Africa was mainly attributed to inflationary pressures arising from higher electricity and fuel prices (Chisadza et al. 2013). Many retail businesses in South Africa are facing the phenomena of stock-outs which are resulting in enormous amounts of lost sales because of customers' demand not being matched with supply (Pearson 2011). According to Pearson (2011), the problem of stock-outs for all South African retail businesses has been consistent over the past 10 years and has not improved. Furthermore, Pearson (2011) highlighted that the problem of retail stock-outs can amount to a loss of 4% of the annual sales turnover for an average retail business in South Africa. This lost sales turnover in the retail sector has several short-term and long-term consequences for a business's profitability and survival. In the liquor retail sector, the problems are exacerbated by inflationary pressures, consolidation of outlets (creating barriers to entry to the market and market positioning problems) and the high level of unlicensed liquor outlets, because of complex licensing requirements (PWC 2012). These pressures, especially for unlicensed outlets, make forecasting in the sector particularly difficult – unlicensed outlets are often raided by police, reducing demand in an area for a while, only to resume a few months later, thereby impacting demand forecasting. As there are approximately 120 000 unlicensed liquor outlets in the country, this can significantly impact demand. Poor demand forecasting and stock-outs in the sector are confirmed by observation by one of the researchers, in his position as demand planner for the largest beer manufacturer in Africa.

By extension, it is conceivable that new insights might be gained by considering that an association exists between business management levers in the form of supply chain management practices and processes and stock-outs. The aim of this exploratory study is to investigate business management practices that contribute to stock-outs in warehouse retail liquor businesses in Johannesburg. In addressing these

questions, this article makes two contributions. This study extends the existing literature by synthesising earlier research areas, namely supply chain management practices and stock-outs, to illustrate the effects of supply chain management practices on stock-outs. In addition, this exploratory research offers empirical evidence of such a phenomenon from the warehouse retail liquor businesses in Johannesburg. The remainder of this article is organised as follows: the 'Literature review' section provides the theoretical background of the study; in particular, it describes the beer game and the bullwhip effect. The 'Research method' section describes the research methods employed in the study. The 'Results and discussion' section discusses the findings of this exploratory study, while the 'Conclusions and recommendations' section concludes the article.

## Literature review

Supply chain synchronisation is the integration of operations to achieve a mutual goal between supply chain entities (Simatupang, Sandroto & Lubis 2004). A lack of synchronisation of this process flow results in variability in the supply chain (Corsten & Gruen 2003; Sahay & Mohan 2003; Van Woensel et al. 2007). Variability is a deviation from the integrated activities of the supply chain process flow (Anupindi et al. 2012; Croxton et al. 2002). Variability occurs when there is non-synchronisation of process flows mainly because of lack of communication and poor inventory management decisions (Corsten & Gruen 2003; Sahay & Mohan 2003; Van Woensel et al. 2007). High levels of variability experienced in process flows for products, information and finances are correlated to either stock-outs or over supply in the retail industry (Aastrup & Kotzab 2009; Corsten & Gruen 2003; Miranda & Jegasothy 2008; Pramatarari & Miliotis 2008). Variability in a supply chain process causes uncertainty and creates unpredictable process flows and non-synchronisation of product flows, information exchange and finances in the supply chain (Anupindi et al. 2012).

A collaborative arrangement between suppliers and retailers is necessary to attain synchronisation and agility in the supply chain. 'Agility' refers to suppliers' ability or flexibility to react to retailers' needs. This is facilitated by the sharing of stock or sales information between the retailer and the suppliers through formal collaboration programmes (Sahay 2003). Collaboration with suppliers is crucial to creating the synergies that are required to reduce variability in the supply chain (Pawlak & Malyszczek 2008; Sahay 2003). The lack of strategic relationships and collaboration with suppliers leads to increased variability and stock-outs at the retail outlets. Stock-out situations have a negative effect on working capital for a business (Wisner, Tan & Leong 2012). Stock-outs and the associated low inventory levels result in lost sales as products are not available when the customer wants to make a purchase. Continued stock-out situations lead to customer dissatisfaction, loss of customer loyalty and, consequently, a decline in profit margins, and competitive advantage (Atrill & McLaney 2008).

To explore the dynamic nature of stock-outs in the supply chain, two broad streams of research are particularly informative: the beer game and the bullwhip effect. The former explores the extent to which variability, synchronisation and collaboration characterise business management processes and practices and the impact of these factors on business performance. The latter provides the basis for understanding demand variability. Combined, these two streams of research provide an understanding of the association between business management processes and practices and stock-outs.

### The beer game

A retail organisation can be faced with stock-outs if there is a lack of synchronisation of customer demand signals from one supply chain entity to the next in the process flow (Goodwin & Franklin 1994). The lack of communication of demand signals can be explained using the beer game simulation. The concept of the beer game was originally developed in the 1960s by Massachusetts Institute of Technology's Sloan School of Management students, as an experiment to illustrate supply chain communication and lack of synchronisation of demand signals. The beer game simulation illustrates the process of entities of a supply chain receiving and processing information and products. It comprises four participants with the following positions: manufacturer, distributor, wholesaler and retailer. Two rules are applied in the game. Firstly, there should be no collaboration or communication between positions when orders or demand signals are transmitted from downstream to upstream. Secondly, there is a two-period lead time for ordering and signalling between each supply chain entity.

To illustrate the concept, a customer places an order of 100 cases with the retailer, but the retailer has only 80 cases in stock. This implies that there is a shortage in supply of 20 cases. The retailer will only receive the additional 20 cases of stock from its wholesaler in two periods' time. Therefore, in the current period, the retailer has 80 cases in stock and a stock-out of 20 cases. The lack of synchronisation between retailer and wholesaler can be simulated further upstream in the supply chain process. A similar occurrence could take place with the wholesaler and the distributor, thus illustrating the concept of poor matching of demand for goods with the supply of goods (Croxtan et al. 2002; Lee, Padmanabhan & Whang 1997).

This poor matching of demand and supply leads to back ordering, in order to fulfil the original demand deficit of 20 cases. According to Lee et al. (1997), this back ordering is termed demand forecasting updating or demand signal processing, where the retailer experiences a surge in demand and signals to the upstream supply chain entity to increase the next order to be larger than normal. This larger than normal size is termed batch ordering (Lee et al. 1997). Batch ordering is triggered to cover future demand signals from customers that cannot be fulfilled with the retailer's current available stock (Rungtusanatham et al. 2007). Throughout the

beer game, supply chain entities are exposed to batch ordering and adjust ordering patterns in an attempt to match demand with supply. These attempts to adjust ordering patterns are known as reactive decisions in the form of operating policy formulation (Goodwin & Franklin 1994). The existence of operating policies illustrates managerial inefficiencies in customer demand signalling, synchronisation, collaboration and inventory stocking policies (Lee et al. 1997). The operating policies (that participants of the supply chain process flow establish in the beer game) result in the bullwhip effect which increases variability in the supply chain. Ultimately, the beer game illustrates the effect of poor synchronisation and communication in a supply chain process.

The beer game highlights that demand forecasting, safety stock modelling and inventory replenishment policies are critical inventory management processes and practices that influence synchronisation and the management of variability in an organisation (Goodwin & Franklin 1994). Poor demand forecast methods from the retailer cause a bullwhip effect through the supply chain. In addition, poor communication among supply chain entities leads to poor inventory buffering, which results in stock-outs. Batch ordering is a result of poor inventory replenishment ordering. Effective inventory management is dependent on the application of effective demand forecasting techniques (Croxtan et al. 2002; Goodwin & Franklin 1994). Customer service levels can be ensured by buffering inventory through safety stock modelling and applying the economic order quantity principle of inventory management (Jeffery, Butler & Malone 2008). These methodologies achieve optimisation of inventory management to fulfil customer demand and reduce the probability of a stock-out (Croxtan et al. 2002; Goodwin & Franklin 1994; Jeffery et al. 2008).

### Bullwhip effect

Supply chain variability can also be characterised as the bullwhip effect (Lee et al. 1997). This was originally conceptualised by Forrester (1961) who showed that 'small changes in retail sales can lead to larger swings in factory production' owing to the internal characteristics of the system. The bullwhip effect is defined as amplified customer order variability in the supply chain, as orders move up the supply chain. Increased orders through the supply chain are caused by each entity ordering for their own gain. Each entity in the supply chain may increase the order volume to earn quantity discounts, thus distorting the initial customer order information (Lee et al. 1997; S. Parsonsons, pers. comm., 25 September 2013). The impact of the bullwhip effect is the transfer of distorted information to each supply chain entity resulting in decreased efficiencies. This distorted information exchange results in excessive inventory or stock-outs and subsequent poor customer service.

Variability occurs when incorrect or inaccurate customer demand data are communicated throughout the supply chain, resulting in incorrect management decisions (Bon & Leng 2009). A lack of customer demand data occurs when

supply chain entities in the process flow do not receive information in time or do not receive it at all for critical business decision-making processes (Lee et al. 1997; Pawlak & Malyszczek 2008). Therefore, understanding the effects this has on entities in the supply chain is crucial in managing business processes which could enhance process flow synchronisation (Flidner 2003; Ghosh & Fedorowicz 2008).

In categorising customer demand variability, the bullwhip effect is caused by the following factors: demand forecast updating, order batching, price fluctuations, rationing and shortage gaming (Kalchschmidt, Verganti & Zotteri 2006; Lee et al. 1997). According to Lee et al. (1997), shortage gaming is the act of a customer anticipating the business to be out of stock which causes an earlier purchase to gain stock. Coyle et al. (2012), Kalchschmidt et al. (2006) and Lee et al. (1997) found that customer demand is clustered according to types of products and patterns of customer demand purchases. Lee et al. have described variability in the supply chain as a lack of synchronisation driven from customer demand signals. Hence, understanding these products and customers is essential to creating synchronisation in the supply chain.

## Research method

### Case selection

Johannesburg was selected because it is the main economic hub of South Africa. The focus of this study was formal trade warehouse retail outlets that sell to other retailers as well as end-users (consumers). Formal trade is a category of the alcohol beverage industry in South Africa, where these businesses operate by keeping stock in their warehouses and trade to formal and informal customers daily (Herrick & Parnell 2013). The population of the warehouse retail liquor outlets in Johannesburg comprises approximately 917 outlets, which is 14.8% of the total outlets selling alcoholic beverages in Johannesburg. Because of the large size of the population (917 outlets), it was stratified according to sales volume turnover per month. The highest turnover strata were selected for further analysis because these strata would typically be more prone to stock-outs. This is because of the higher frequency of store ordering and replenishment required to fulfil the high-volume turnover (Corsten & Gruen 2003). Fifty per cent of the 917 outlets' volume turnover was derived from approximately 70 outlets, indicating that there were a large number of outlets with low volume turnover. The target population of 70 high sales volumes outlets was further stratified according to the extent of homogeneity of the population group. The homogeneity of the population group was based on a similar trading and operating format to customers in the formal trade (R. Alborough, pers. comm., 20 September 2013; C. Kubeka, pers. comm., 02 July 2013; S. Parsonsons, pers. comm., 25 September 2013). Resultantly, 35% or 25 outlets of the high-volume outlets were targeted.

## Research design

A pragmatic research philosophy was used in a multi-case approach to determine the association between business management processes and practices and stock-outs. The pragmatic approach sanctions the utilisation of both quantitative and qualitative methods (Onwuegbuzie & Leech 2005; Onwuegbuzie & Teddlie 2003). Therefore, a concurrent mixed methods approach was used to collect both quantitative data and qualitative data. Quantitative data on measurable variables, for example, the frequency of stocks, were collected. The inclusion of quantitative data also helps to compensate for some of the shortcomings of qualitative data, namely that it cannot be generalised (Onwuegbuzie & Leech 2005). In addition, qualitative data on the non-measurable variables were collected using open-ended questions in order to obtain a deeper understanding of the phenomenon and to answer the research questions from the cases. Case-based approaches have been shown to contribute to the advancement of theory by providing in-depth insights and understanding of complex areas of management practice (Yin 2014). In addition, interviews were used to obtain rich descriptions from the alcohol retailers. In order to improve the generalisability of our findings, five general methodological phases were employed. Firstly, three research questions were formulated; secondly, a questionnaire was developed; thirdly, field data were gathered; fourthly, interviews were transcribed and analysis performed using coding schemes and cross-case comparisons; and, finally, findings were disseminated to improve validity.

## Data sources and collection

Data were collected during interviews using semi-structured questionnaires. The responses were scaled on Likert and category scaling systems in order to drive a clear answer when questions are rated (Zikmund 2003). The interviews were conducted with managers in the areas of procurement, sales and supply chain management from the different firms in the sample. The data were collected over an 8-month period between March and October. This is assumed to be a reasonable period of time for an indication of stock-out causes. The assumption is based on a management interview with an alcohol beverage manufacturer in South Africa who revealed that the 8 months are indicative of typical sales patterns of retail outlets (C. Kubeka, pers. comm., 02 July 2013).

## Results and discussion

The total sample size interviewed for the case study was 25 retailers; however, 22 responses were considered valid for the analysis. The other three questionnaires were discarded from the analysis as these were incomplete or invalid. Management processes and practices were analysed to determine whether inefficiencies were present and whether those inefficiencies resulted in stock-outs in the retail outlets. In the beer game, critical outcomes of the simulation were revealed about a supply chain that relates back to management processes and practices which then impact stock-outs at retail businesses. Based on the conceptual framework and the literature review,

findings were separated into three areas: variability, synchronisation and communication.

## Variability

The beer game illustrates that poor customer demand signalling can create the bullwhip effect through the supply chain. The bullwhip effect results in increased variability, from retailer level through to supplier, as incorrect information is passed through the supply chain by every entity. Demand forecasting methodologies, customer demand patterns tracking or forecast tracking and inventory management have been shown to influence demand variability and to be primary reasons for stock-outs. These were investigated in this study and the following results were deduced.

## Forecasting methodologies

In order to determine the forecasting methodologies employed by the retail outlets, the respondents were asked to identify the methods used in their business. Each of the possible forecasting methods indicates the level of sophistication. The key finding was that customer demand forecasting was mostly based on judgement, naïve or simple moving average forecast methods (see Figure 1). These forecasting methods are limited and less reliable in forecasting customer demand in different situations. There was a general lack of use of sophisticated demand forecasting techniques. Of the respondents, 50% did not use statistical software to forecast customer demand. Only 9% of the respondents recorded high adherence to the use of statistical software to forecast customer demand, as shown in Figure 1.

Of the respondents, 73% used judgement or intuition to determine inventory orders. This could be attributed to the number of years of experience in the business, making informed customer demand forecasting decisions based on prior knowledge, as suggested by Nakano and Oji (2012). The study found that 75% of respondents indicated that the business was family owned and had been operating for 10 years or more. Of these respondents, 36% had more than

20 years of experience, and in all these cases respondents indicated that the business was family owned and operated. This is consistent with the literature that indicates that forecasting customer demand using the judgemental approach requires prior knowledge. The use of simple forecasting methods implies a high probability of sending poor customer demand signals to suppliers when placing an inventory order (Coyle et al. 2012; Wisner et al. 2012). As a result, stock-outs would be highly probable. This is consistent with the beer game, as poor order signals through the supply chain results in poor matching of demand with supply.

Respondents indicated that trends and seasonality had not factored into demand forecasting techniques. Hence, this indicates that failing to implement more sophisticated forecasting techniques during seasonal customer demand patterns may result in stock-outs.

Eighty-three per cent of respondents rated 'no' to 'low' adherence to cause and effect modelling as a forecasting technique. This implies that customer demand events are a probable cause of stock-outs. Events such as changing weather patterns, sporting events, music festivals and long weekends were cited as customer demand events that cause stock-outs because of difficulty in predicting customer demand. Cause and effect modelling is a supporting tool for a business that can determine a relationship with customer demand through regression analysis (Frank et al. 2003; Wisner et al. 2012). This indicates that failing to implement modelling techniques for customer demand events and considering local issues may result in stock-outs.

## Customer demand patterns tracking or forecast tracking

The poor forecasting methods result in a lack of understanding of customer demand for the retailer and lead to poor inventory planning. There appeared to be tracking of customer demand data on excel spread sheets and computerised systems (capturing electronic point of sale data). Forty-one and twenty-seven per cent of respondents indicated 'medium' and 'high' adherence, respectively, to

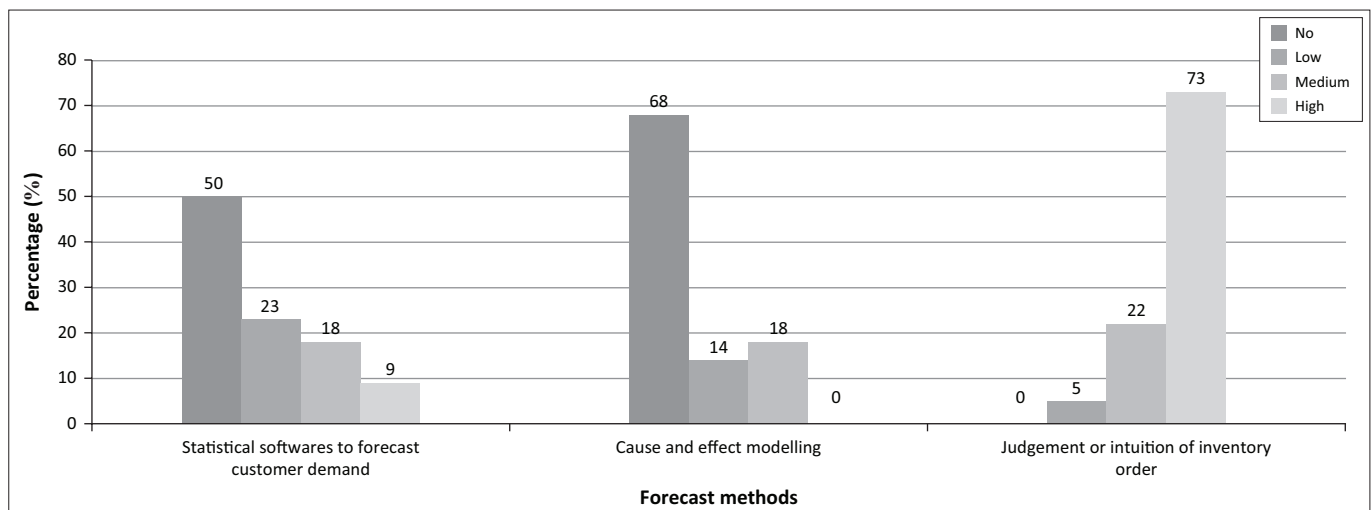


FIGURE 1: Forecast methods used (respondents' rating in %).

tracking of customer demand data on excel spread sheets. However, there was low adherence to the application of data analysis or forecast tracking methodologies. By tracking forecast errors, businesses would be able to switch to different forecasting techniques to reduce variability. Sixty-eight per cent of respondents captured electronic point of sales data, while 32% did not do so. Respondents indicated that data were used for naïve or simple moving customer demand forecasting when ordering products from suppliers. The data contained historical customer sales and stock information using last period customer sales to determine the forecast for the next period. The store ordering procedures were based on this methodology.

Forty-six per cent of respondents recorded no and low adherence (14% and 32%, respectively) to safety stock modelling (see Figure 2). Respondents indicated that all inventory in the retail outlets was determined based on a standard stock cover measure. There appeared to be no customer demand variability factored into the safety stock modelling techniques implemented by respondents. The primary reason for this was a poor understanding of customer demand. According to Jeffery et al. (2008), stock cover is a ratio of closing stock to customer demand, which can be expressed in days or weeks. Respondents indicated that a stock cover of between 1 and 2 weeks was kept as safety stock for all product lines at all times.

Respondents indicated that they had implemented a simpler version of lead time, customer demand variability and customer service levels based on a computerised stock system. This computerised stock system considers previous week customer demand and current levels of stock, which calculates stock cover ratio expressed in weeks. Respondents further indicated that 2 weeks' stock cover based on this computerised system was their safety stock policy. The method does not take trend and seasonality into account, which may increase customer demand variability. The

increased customer demand variability, according to the literature by Lee et al. (1997), may lead to stock-outs.

### Customer demand predictability

Respondents were asked to rate the level of predictability of customer demand patterns on a four-point scale, from 1 being low predictability to 4 being high predictability. Figure 3 illustrates customer demand predictability across different conditions is fairly low. Although customer demand tracking data are recorded, advanced data modelling or analysis is poor, as shown in Figure 1. There appears to be an association between the lack of analysing customer demand data and the low level of customer demand predictability in the outlets. The same needs of customers under the variable in the questionnaire titled homogeneous customers were rated fairly high in terms of customer demand predictability which was expected as repeated buying patterns are easier to track and predict. Ninety-six per cent (64% and 32%, respectively) of respondents rated heterogeneous customers, that is, different needs of customers, to have 'no' or 'low' impact on customer demand predictability. Heterogeneous customer demand patterns were further divided into customer behaviour categories.

Thirty-two per cent of respondents indicated that promotional activity has no impact on predictability of customer demand, while 41% indicated it as having a low impact. These occasions also resulted in stock-outs. The seasonality category was reviewed in the questionnaire in terms of seasons of the year that are prone to increased purchasing, the seasons being Christmas and Easter or summer and winter in South Africa. Sixty-eight per cent of respondents rated seasonal customer demand to have low predictability on customer demand. The literature indicates that it is unlikely to accurately predict customer demand during seasonal periods without using appropriate forecasting methods. Likewise, it appears that poor customer demand forecasting methodologies are implemented, which results in

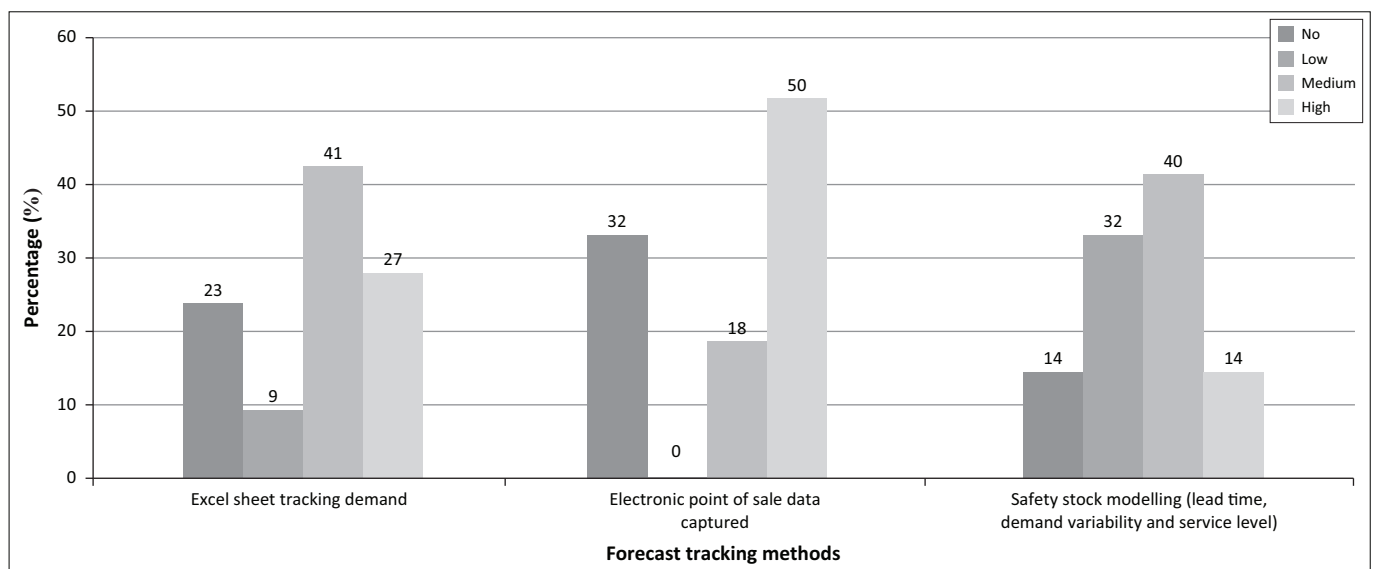


FIGURE 2: Forecast tracking methods (respondents' rating in %).

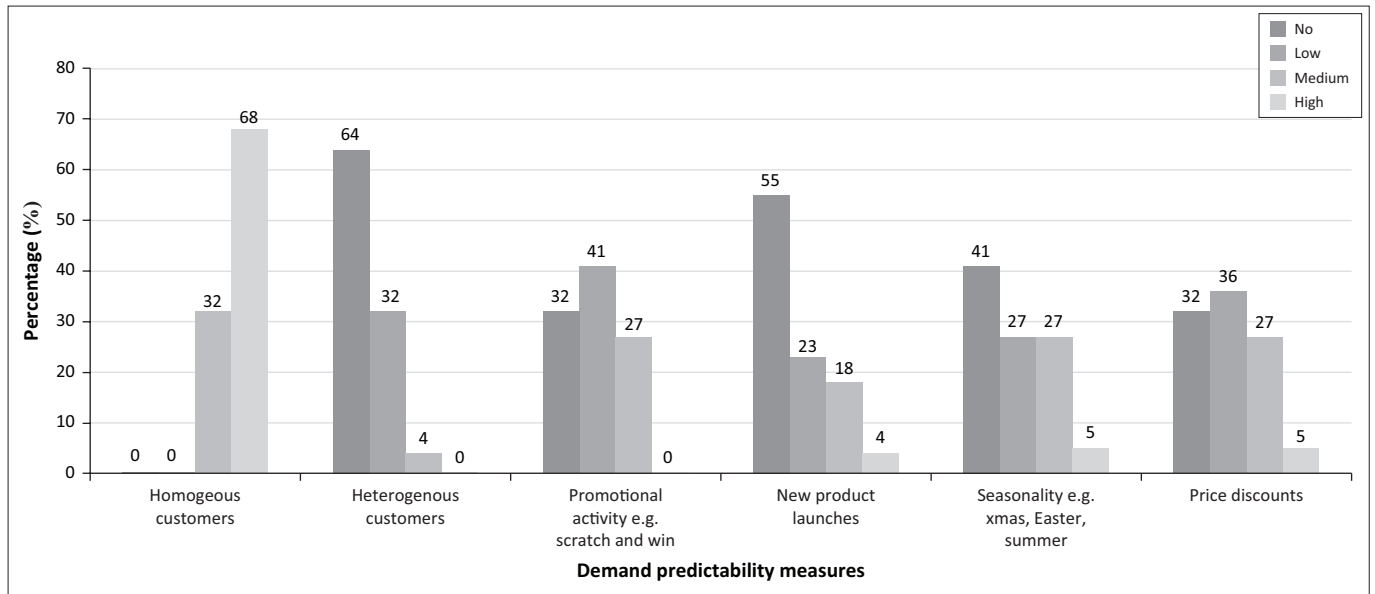


FIGURE 3: Customer demand predictability (respondents' rating in %).

stock-outs. This is confirmed by the chosen inventory management techniques, which tend to be judgement or intuitive methods of forecasting (see Figure 1).

Brand loyalty was reviewed in the questionnaire in terms of new products entering the market. Brand loyalty occurs when customers maintain a long-term relationship with a specific brand and do not switch to other brands easily. The entry of new products in the market adds complexity in demand variability and increases the probability of stock-outs (Salmi & Holmström 2004). Seventy-eight per cent of respondents indicated new products entering into the market had low predictability, which suggests a probable cause of stock-outs. Customer demand forecasting methodologies are limited to judgement or intuition which could also be a contributing factor in understanding and analysing the customer demand data.

## Synchronisation

Synchronisation is defined as matching demand with supply throughout the supply chain. In the beer game, synchronisation was a critical activity in the supply chain for each entity to fulfil their function based on an initial input, which was an order signal from a customer. The order signal was the starting point of the supply chain and therefore each entity had an onus to fulfil an order on time and in full from upstream to the downstream customer. Store shelving, store ordering and forecasting are the critical factors to supply chain synchronisation (Corsten & Gruen 2003). Respondents were asked to rate on a four-point Likert scale the adherence to retail operations process modelling, from 1 which is poor adherence to 4 which is high adherence. The retail operations process modelling is based on three criteria cited as reasons for stock-outs in retail, as indicated in the literature. The three criteria were product item data accuracy, ordering and inventory accuracy and store and shelf replenishment.

## Product item data accuracy

Respondents were asked to rate weekly stock count process, classification and documentation of stock received and updating price information in their store, from 1 being low to 4 being high adherence. Figure 4 illustrates that over 75% of respondents rated medium to high adherence to the stock count process, updating price information and classification and documentation of stock received. The medium to high adherence of these processes removes the probability of data inaccuracy, which assists in reducing stock-outs in the store.

**Ordering and inventory accuracy:** Figure 4 illustrates weekly ordering or purchasing processes, with 1 being low and 4 being high adherence. Eighty-six per cent of respondents rated high adherence to the ordering process suggesting that if ordering processes are in place in the outlets in most instances, then it reduces the probability of stock-outs. This conflicts with earlier findings that indicated the lack of understanding customer demand during seasonal, promotional, new products into the market, and price discounts. This conflict suggest that if there are periods where customer demand is difficult to predict, the usual retail store ordering process would be inadequate in those times, thus resulting in stock-outs.

**Store and shelf replenishment:** Respondents were requested to rate, on a scale from 1 to 4, daily merchandising of shelves and handling of products to avoid breakages in stores. A score of 1 represented poor adherence, while a score of 4 represented high adherence to this process. Figure 4 illustrates that over 80% of respondents rated high adherence to daily merchandising of shelves. The high adherence to this process plays an important role in the final purchase decision for a consumer in terms of stock availability (Baird & Rosenblum 2010). Over 60% of respondents rated handling of products to avoid breakages as low.

## Communication

In the beer game simulation, no communication is allowed between each supply chain entity. By design, this results in each entity forecasting customer demand individually. The lack of communication leads to overstocking or stock-outs and poor synchronisation and increased variability throughout the supply chain. To test whether collaborative arrangement exists between retailers and suppliers, respondents were asked to rate their communication with suppliers regarding order placing interaction, information sharing and collaboration programmes.

### Order placing interaction

Respondents were asked to rate, on a scale of 1 to 4, the ease of placing an order with a supplier by communication with a sales representative or call centre. Ninety-five per cent of respondents rated this as being of a medium- to high-quality standard (see Figure 5). These results suggest that communication is relatively good, as cooperation is present if

orders placed by a retailer are filled, according to specifications, by the supplier. Communication of orders, therefore, did not present a risk of stock-outs.

**Information sharing:** Respondents were asked to rate, on a four-point scale, the level of information sharing using electronic point of sale or inventory data with suppliers. Figure 5 illustrates that 59% of respondents rated a poor- to low-quality standard of data sharing. Respondents also indicated that sales and inventory data were not shared with suppliers, as there was a lack of trust and that data or information was strictly for the owners only. The literature indicates that trust and commitment between supplier and retailer are critical factors for the success of a collaborative arrangement (Ghosh & Fedorowicz 2008). Based on the responses, it is indicative that there is a lack of trust, and hence collaborative arrangements are absent, which will affect the agility of suppliers in reacting to the needs of the retailer.

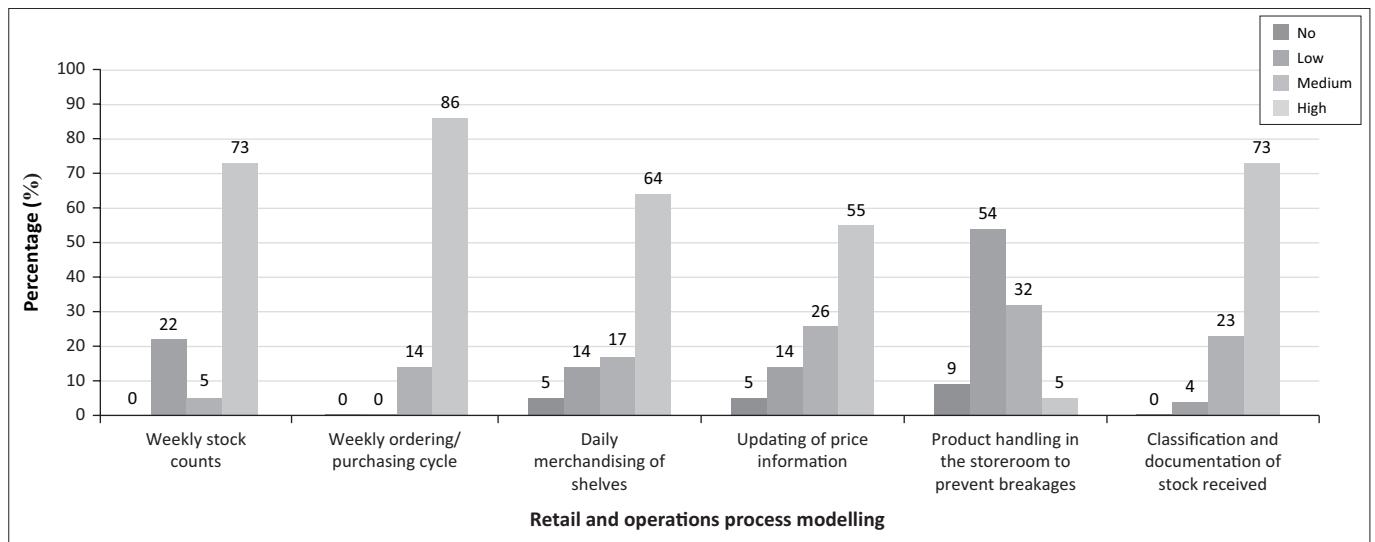


FIGURE 4: Retail and operations process modelling (respondents' rating in %).

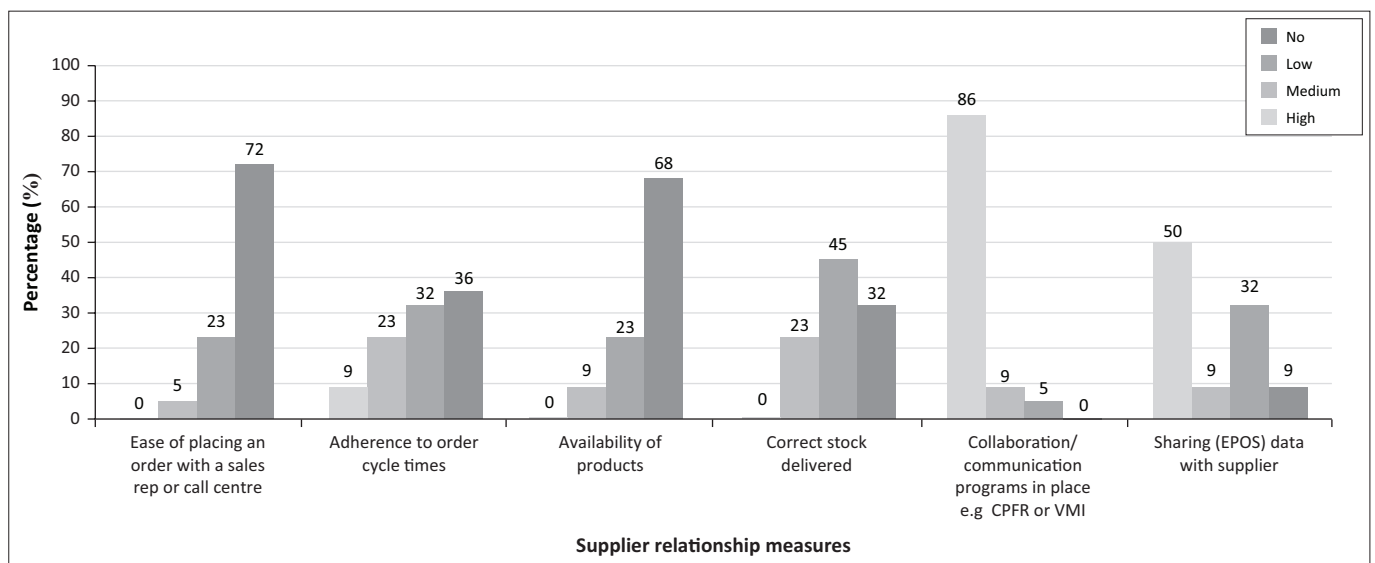


FIGURE 5: Supplier relationship (respondents' rating in %).



**Collaboration programmes:** Respondents were asked to rate, on a four-point quality standard scale, collaboration programmes in place with suppliers, that is, collaborative planning, forecasting and replenishment (CPFR) or vendor-managed inventory (VMI). Figure 5 illustrates that more than 86% of respondents rated a poor- to low-quality standard of collaboration. These results suggest that the lack of collaboration to create synchronisation could result in stock-outs at the retail level. CPFR programmes enable retailers to leverage synergies with their suppliers. Achieving this requires sharing information on customer demand with suppliers to improve visibility and synchronisation. Information sharing allows a supplier or retailer to be more agile or flexible in responding to changing customer demand. These collaboration programmes also assist the retailer and supplier in experiencing a long-term economically sustainable partnership.

### The impacts of inefficient business processes and practices on business performance

Respondents were asked to rate, on a four-point scale, what customers are likely to do when faced with a stock-out in their retail outlet. Figure 6 illustrates that 82% (medium to high adherence) of customers would tend to purchase a competitor product during a stock-out. This is not consistent with the finding by Van Woensel et al. (2007) who indicated that the immediacy effect causes consumers to shop elsewhere. The product offering in this study is a category that is non-perishable or has a longer shelf-life product and customers do not appear to have the immediacy effect suggested in the literature. Respondents indicated that customers would tend to shop at the next closest store stocking their brand. This correlates with the effect of brand loyalty and the customer behaviour on purchasing patterns (Corsten & Gruen 2003; Peckham 1963; Sloot et al. 2002; Van Woensel et al. 2007). This implies that stock-outs will negatively affect sales and competitive advantage in the alcohol retail industry.

To a lesser extent, respondents indicated that there was store loyalty from customers. Forty-five per cent of respondents indicated that customers would postpone the purchase until the product was available. In addition, respondents indicated that customer retention decreased when customers were faced with stock-outs. In terms of the likelihood of customers purchasing another brand when faced with a stock-out, 59% of the respondents agreed with this statement. This is contradictory to the brand loyalty theory. This appears to be in the favour of the retailer; however, the literature indicates that if a consumer is faced with continuous stock-outs in a store they will eventually become less store-loyal. Fifty-five per cent of respondents agreed that, when faced with stock-out, customers would not return to the store for future purchases.

### Conclusion and recommendations

The aim of this study was to investigate the impact of business management practices and processes on demand variability and stock-out situations in warehouse retail liquor outlets in Johannesburg. Twenty-two high sales volume warehouse retail outlets were surveyed. Based on the conceptual framework and the literature review, there were three groups of findings: variability, synchronisation and communication. Demand forecasting methodologies, forecast tracking and inventory management techniques used by the retail outlets were investigated to determine the association between demand variability and stock-outs.

The results revealed that the retailers based customer demand forecasting on judgement, naïve or simple moving average forecast methods. As a result, during periods of new products entering into the market, promotional activity and seasonal peaks, customer demand was difficult to predict. This highlights that skills or capabilities for advanced data modelling were limited. The use of poor forecasting methods resulted in the transfer of inaccurate customer demand

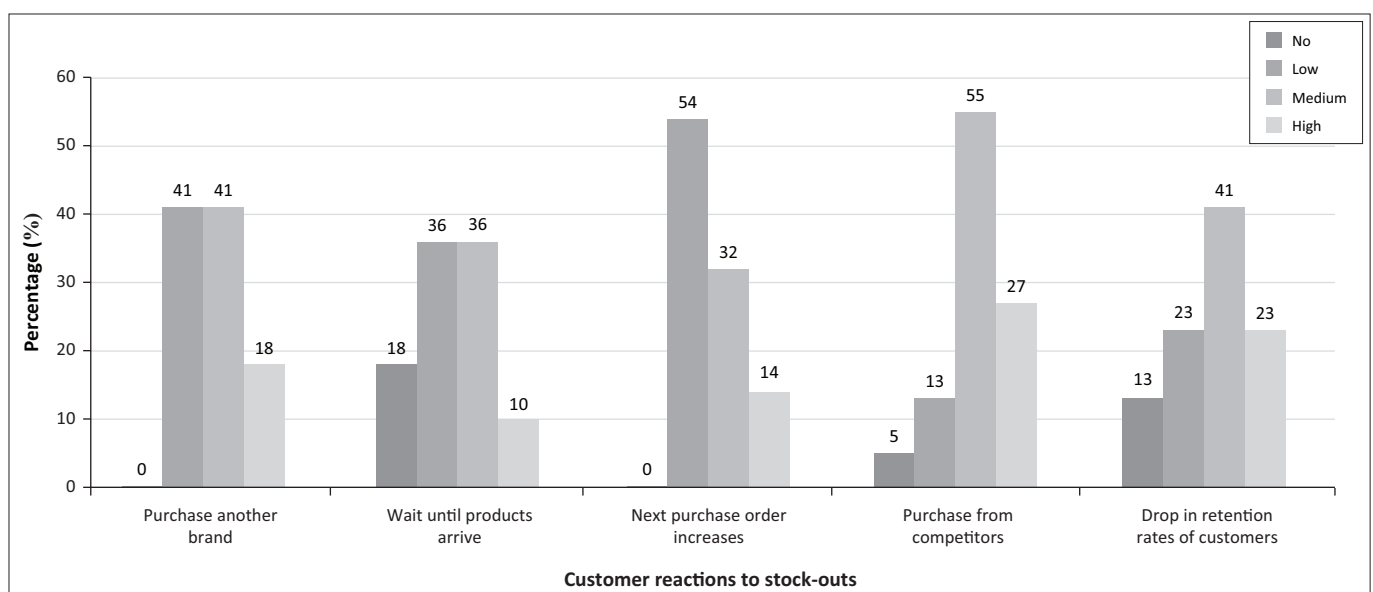


FIGURE 6: Customer reactions to stock-outs (respondents' rating in %).

signals to suppliers and stock-outs. This is consistent with the beer game, as poor order signals through the supply chain results in poor matching demand of with supply. The respondents indicated that they usually tracked customer demand data by using excel spread sheets and computerised systems. There was, however, no evidence of data analysis or use of forecast tracking methodologies. Respondents indicated that they based inventory decisions on simple rules and standards set by management. There was no consideration of advanced data modelling, including variability, lead time or a targeted customer service level, to achieve optimal inventory levels. Instead, safety stock modelling usually involved holding a 2-week stock cover for all products throughout the year, which is prone to stock-outs, particularly during periods of unexpectedly high demand.

It was apparent from the study that organisations adhered to store operations regarding shelving and merchandising and these were therefore not a hindrance for the retailer in fulfilling customer demand. However, product breakages were common, implying that product data inaccuracies and stock-outs were highly probable, suggesting limited employee capabilities regarding product handling. Respondents reported a lack of stock or sales information sharing between the retailers and suppliers, with no formal collaboration programmes in place. This indicates that suppliers lack the flexibility to react to the retailers' requirements. The results revealed that stock-outs had a medium to high negative impact on business performance. The respondents revealed that frequent stock-outs resulted in a decline in sales, customer retention and competitive advantage.

One of the limitations of this study is that results were based on the opinions and behaviours of respondents and may thus present a level of bias, particularly by respondents describing adequate competencies when interviewed. A key recommendation is that, in cases where retail outlets experience stock-outs as a result of trends and seasonality, management should consider other methods of forecasting customer demand. It is also recommended that strategic partnerships be established with suppliers through the sharing of sales and stock information to improve synchronisation. Synchronisation will facilitate supplier flexibility to react quickly to retailers' needs and ensure the maintenance of customer service quality.

A further limitation is the small sample size. Although the sample selected represented a significant portion of the top 50% contributors to the sector's sales, the sample was small and the study was exploratory. It is recommended that the study should be expanded across all 917 warehouse retail liquor outlets, as well as other outlets, to determine the extent of the problem. It is expected that this may show a larger problem than reported in this study, as sophistication in forecasting and ordering techniques is expected to be lower in smaller outlets. It is, however, worth noting that the small sample size implies that the results are not generalisable to the population. Respondents could consider using simpler methods for forecasting, such as triple exponential smoothing,

also known as the Holt–Winters method to forecast basic seasonal demand.

The research study implemented a model of assessment of business management processes and practices that cause stock-outs based on attribute, opinion and behavioural data variables. Future research can implement this model in other fast moving consumer goods (FMCG) industrial sub-sectors. Further research investigating in the field of retail stock-outs could quantify the real value of a stock-out in businesses. The above research opportunities can be explored as a case study approach or a generalisation across many businesses in FMCG industries.

In conclusion, this study has demonstrated that three focus areas, namely, demand forecasting methods, collaboration with suppliers, and training of employees, will assist in closing the gap of poor management processes and practices and reduce stock-outs for retail liquor outlets in Johannesburg.

## Acknowledgements

### Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

### Authors' contributions

All three authors contributed equally to the writing of this article.

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