REVERSE LOGISTICS CAPABILITY FOR SUSTAINABLE DEVELOPMENT IN THE PHARMACEUTICAL INDUSTRY: A CONCEPTUAL FRAMEWORK FROM A LOGISTICS MANAGEMENT PERSPECTIVE

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ABSTRACT

The purpose of this paper is to present a conceptual framework of reverse logistics capability in the pharmaceutical industry. Today, sustainability is becoming increasingly important for all companies, across all industries including the pharmaceutical industry. In addition, reverse logistics plays a vital role in recycled material flows and waste management in supporting sustainable development. Based on the Resource-based View, this study identified the five key reverse logistics capabilities, including technology, innovation, customisation, responsiveness and flexible operations, which may support waste management in the pharmaceutical industry from a logistics management perspective. This may provide some directions for both researchers and managers to further develop reverse logistics capability in order to optimise waste management in the different industries. The article contributes to the logistics management literature.

Keywords: reverse logistics capability, reverse logistics, logistics management, sustainability, pharmaceutical industry

1. INTRODUCTION

Reverse logistics (RL) is "the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal" (Rogers and Tibben-Lembke, 1999, p. 2). There are three main purpose of RL including reuse, remanufacturing and recycling from a sustainability perspective (Eltayeb et al., 2011). More precisely, RL is the process of moving goods from their typical final destination for the purpose of capturing value, or for proper disposal (Khor et al., 2016). Today, remanufacturing and refurbishing activities are included in RL. In addition, RL includes processing returned merchandise due to damage, seasonal inventory, restock, salvage, recalls, and excess inventory. The return process also includes different programs, such as recycling programs, hazardous material programs, obsolete equipment disposition, waste management

and asset recovery. Moreover, RL is one of the five basic categories of green supply chain initiatives (Eltayeb et al., 2011). Further, Morgan et al. (2018) suggest that developing a sustainable RL capability is a key success factor for improved performance for the firms engaging in sustainable SCM. Thus, it is important to improve RL to support sustainable development.

The pharmaceutical supply chain is a complex system, which encompasses multiple stakeholders, including raw material suppliers, manufacturers, distributors / wholesalers, hospital / Pharmacy stores and patients. Apart from the three types of flows in a supply chain - physical goods flow, information flow, and financial flow (Flynn et al., 2016) - a supply chain involves the downstream flows consisting of raw materials, subassemblies, and finished goods, while upstream flows consist of products that are returned or waste (Rai et al., 2006). Figure 1 indicates a typical pharmaceutical supply chain.

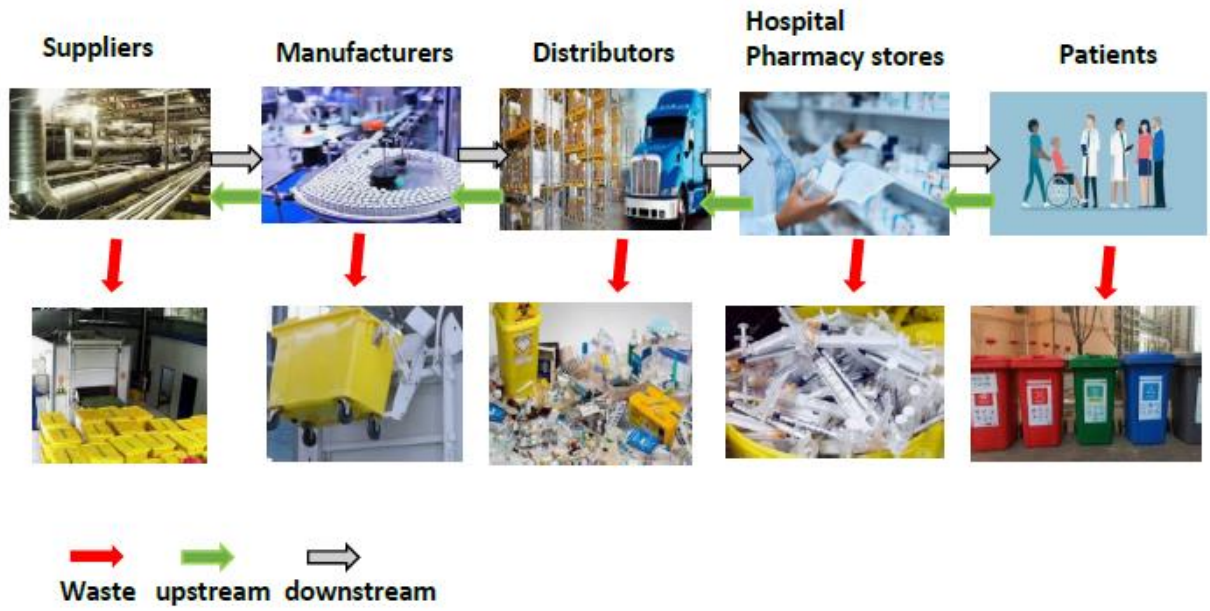

Figure 1. Logistics flow in the pharmaceutical industry

In this paper, based on the Resource-based View (RBV), we attempt to investigate the key attributes of RL capability for sustainable development in order to improve RL in the pharmaceutical industry, which is defined as a complex of processes, operations and organisations involved in the discovery, development and manufacture of drugs and medications (Shah, 2004). Furthermore, sustainability is becoming more important for all companies, across all industries (Chen et al., 2017). In this study, RL involves upstream logistics flow and waste flow. Despite pharmaceutical supply chains always requiring superior forward logistics performance to supply medicines and equipment for patients, the absence of RL means sustainability cannot be assured. RL plays a central role in recycled material flows and waste management to support sustainable development in terms of the logistics flow in the pharmaceutical industry. There are very few studies conducted on the RL in the pharmaceutical industry from logistics management's perspective. It is important to investigate RL capability in order to support sustainable development in the pharmaceutical industry. Thus, the research question is formulated as follows:

RQ: What are the key RL capabilities that the logistics service providers need to better serve their customers' RL in the pharmaceutical industry?

In logistics management literature, most studies focus on the forward logistics in the pharmaceutical supply chain. Although some researchers attempt to explain the reverse flows

within the pharmaceutical supply chain from different perspectives (Viegas et al., 2019), due to the complexity of pharmaceutical industry, the concept of RL within it is still not clear. RL is closely related to waste management (Eltayeb et al., 2011). Thus, this study boldly attempts to develop RL capability in terms of fruitful forward logistics capability studies, in order to enable sustainable development in the pharmaceutical industry from a logistics management perspective. A conceptual framework of the RL capability is established, and the five key factors are discussed from a hospital's perspective.

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The remainder of the paper is organised as follows: the next section is a theoretical background. Section 3 present a conceptualisation of RL capability. The last section discusses the key RL capability in the pharmaceutical industry and draws conclusion.

2. THEORITICAL BACKGROUND

In this section, we examined relevant literature from the previous studies. To offer a better understanding of RL from a logistics management perspective, the literature review includes the following: 1. logistics management; 2. RL; 3. Logistics capability. Then the subsequent section presents the conceptualisation of RL capability.

2.1 Logistics Management

The Oxford English Dictionary defines logistics as 'the branch of military science having to do with procuring, maintaining and transporting materiel, personnel and facilities.' Originally logistics was a military term: in the 18th century, Antoine-Henri Jomini (1779–1869) a French military thinker and writer, in his *Summary of the Art of War* (1838), defined logistics as the practical art of moving armies (Leighton, 2012). The military definition of logistics encompasses supply items (food, fuel, spare parts) as well as personnel (Coyle et al., 2008).

There are many definitions of logistics management in literature, for example, (i) managing a channel of the supply chain which adds the value of time and place utility (Christopher, 1998); (ii) that part of the supply chain management that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements (Lambert and Cooper, 2000, p. 67); (iii) the management of the flow of the goods, information and other resources in a repair cycle between the point of origin and the point of consumption in order to meet the requirements of the customer (Cowles, 2012, p. 3).

Four subdivisions of logistics - business, military, event, and service logistics - are identified by Coyle et al. (2008) as having some common characteristics and requirements, such as forecasting, scheduling and transportation. A general definition of logistics management is:

The process of anticipating customer needs and wants; acquiring the capital, materials, people, technologies, and information necessary to meet those needs and wants; optimising the goods or service-producing network to fulfil customer requests; and utilising the network to

fulfil customer requests in a timely manner. (Coyle et al., 2008, p. 36)

With increasingly globalised supply chain operations making more and more complex the supply of materials to businesses and the shipping out of products, logistics became a business concept in the 1950s. In business it is defined as 'having the right item in the right quantity at the right time at the right place for the right price in the right condition to the right customer' (Cowles, 2012, p. 5). Usually, from a focal company's perspective, a logistic delivery has two different stages: inbound logistics and outbound logistics, which together cover the flow of materials from point of origin to point of consumption. Logistics companies may perform both inbound and outbound deliveries and integrate the supply chain (Jayaram and Tan, 2010).

2.2 Reverse Logistics

RL has long been discussed in logistics literature. Modern RL is considered a part of Green Supply Chain Management (GSCM) (Eltayeb et al., 2011). Although the green supply chain was later used by many scholars with various names, such as reverse supply chain (Prahinski and Kocabasoglu, 2006), sustainable supply chains (Seuring and Müller, 2008), closed-loop supply chain (Govindan et al., 2015), circular economy (Franco, 2017), and circular supply chain (Geissdoerfer et al., 2018), the meaning itself has not changed much. In literature, GSCM is defined as: GSCM = Green Purchasing + Green Manufacturing / Materials Management + Green Distribution / Marketing + RL (Hervani et al., 2005). Green supply chain management can reduce waste, minimise pollution, save energy, conserve natural resources, and reduce carbon emissions (Sundarakani et al., 2010). Rogers and Tibben- Lembke (2001) define RL as the reverse flow of goods from the point of consumption to the point of origin. Modern RL has been given new meaning including "green", "circular", "waste reduction", "sustainability" (Franco, 2017; Khor et al., 2016).

RL is the process of returning the products and materials from the point of consumption to the forward supply chain (Amin and Zhang, 2012). The three main drivers that motivate companies to adopt RL are identified as: economic, corporate citizenship, and legislation (Breen and Xie, 2015), and the three main purposes of RL are reuse, remanufacturing and recycling (Eltayeb et al., 2011). RevLog (the European working group on RL) described RL as "the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal." More precisely, RL is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal (Khor et al., 2016).

The pharmaceutical supply chain may include upstream suppliers and manufacturers and downstream supply chain stakeholders, i.e. hospitals, pharmacists, and patients (Wang and Jie, 2019). Today, remanufacturing and refurbishing activities are included in RL (Govindan et al., 2015). In addition, RL includes processing returned merchandise due to damage, quality control, restock, salvage, recalls, and excess inventory. The return process also includes different programs, such as recycling programs, hazardous material programs, obsolete equipment disposition, and asset recovery. Moreover, RL is one of the five basic categories of green supply chain initiatives (Eltayeb et al., 2011).

Rubio et al. (2008) analyse the main characteristics of articles on RL published in the production and operations management field from 1995-2005; they cover three fundamental areas of research on RL including: 1. management of the recovery and distribution of end-of-life products; 2. production planning and inventory management; 3. supply chain management issues in RL. Wang et al. (2017) provide a bibliometric analysis of RL research from 1992 to 2015. This study found that RL research started with a focus on costs and specific solutions to operational problems, and has increasingly emphasised strategic issues. On the operational side, research has already demonstrated that operational RL includes multiple processes,

including source reduction, product returns, reuse, recycle, disposal, repair, remanufacturing and resale. On the strategic side, researchers have moved beyond minimising cost and improving efficiency as the sole objective of RL, in order to study RL value, network design, and RL's interfaces with other management areas.

Many RL studies have been published in the literature. Turrisi et al. (2013) studied the impact of RL on supply chain management. Hazen et al. (2014) suggest information systems play a substantial role in managing RL processes. Guo et al. (2017) studied supply chain contracts in RL. Morgan Tyler et al. (2016) found the positive moderating influence of an IT competency on the relationship between collaboration and a RL competency. Dev et al. (2020) attempt to model RL in Industry 4.0 technological real-time information scenarios. Very few RL researchers addressed the RL uncertainty. RL is now closely related to "sustainability", "waste reduction", "green" and "recycling"(Wang et al., 2017). RL is viewed as a part of logistics and supply chains. It is essential to understand that the operational process of RL is different from forward logistics and involves the implementation of material disposition management rules (Govindan et al., 2012). In addition, the prime objective of RL is to enable the product to get its maximum value even at the end of its market life. There are various types of activities involved during the process of RL for the purpose of achieving its objective. These include packaging, repair, refurbishment, restoring, recycling, transportation and disposal. In this study, we focus on transportation in the courier industry.

2.3 Logistics Capability

According to the literature, some authors consider logistics capability an important ability of control, responding to unexpected events or supply chain disruptions, which are likely to be caused by supply chain uncertainty and risk (Gligor and Holcomb, 2012; Peck, 2006; Serhiy and Mary, 2009). Serhiy and Mary (2009) suggest logistics capabilities could be grouped using exploratory factor analysis, measuring specific capabilities and exploring their loadings on factors such as connectedness, coherence and control. Lai (2004) suggests that those logistics service providers with better service capability are in a better position to satisfy the needs of customers for various services, and achieve better service performance. Logistics capability can make major contributions to the achievement of superior performance and sustained competitive advantage (Jay Joong-Kun et al., 2008). Other researchers have found that logistics capability is also related to firm performance (Jay Joong-Kun et al., 2008; Lai, 2004; Xu Liang and Wang Keyi, 2010; Xue, 2013; Zulkiffli, 2009); the four key capabilities of delivery speed, reliability, responsiveness, and low cost distribution are significantly related to performance and are noted as critical components of sustained competitive advantage (Morash, 1997). The capabilities of third-party logistics (3PL) providers can affect their operational and financial performance (Liu and Lyons, 2011).

Table 1 illustrates the main factors of logistics capability in the framework: technology, innovation, customisation, responsiveness, and flexible operations. Notably, logistics capability can be categorised in terms of different perspectives and industries. This study focuses on reverse logistics in the pharmaceutical industry. Technology has become an important trend in the logistics and supply chain (Wang et al., 2021). We considered both technology and innovation to be key factors of logistics capability to facilitate logistics operations in the modern supply chain. Customer service has long been discussed in logistics and supply chain management: it plays a vital role to communicate with customers and external parties. In the pharmaceutical industry, we divided customer service further into customisation and responsiveness, which are important logistics capabilities to deliver superior customer services, respond to both internal and external change / uncertainties, and resolve problems. Flexible operations are an important factor of the logistics capability in both forward and reverse logistics (Wang, 2016).

Table 1 Factors of logistics capability in this study

Logistics capability	Attributes	Previous studies
Technology	Logistics Information System Advanced problem notification Advanced shipment notification Tracking and tracing Integrated information system Advanced technology Web-based order handling Advanced packaging technology	Morash (2001), , Daniel and Fredrik (2011) , Hayes et al. (1988); Jay Joong-Kun et al. (2008); Kim (2006); Morash and Lynch (2002); Wang et al. (2021)
Innovation	Innovative service Innovative solutions Process improvement Standardisation of operations Simplification of operations	Lai et al. (2004), Zhao et al. (2001), Lu and Yang (2010), Morash (2001), , Daniel and Fredrik (2011) , Hayes et al. (1988); Jay Joong-Kun et al. (2008); Kim (2006); Morash and Lynch (2002); Wang et al. (2020)
Customisation	Customer service flexibility Value-added services Logistics service differentiation Order flexibility Pre-sale customer service Customisation during logistics	Morash (2001), Fawcett and Cooper (1998), Lu and Yang (2010), Jay Joong-Kun et al. (2008), Kim (2006), Morash and Lynch (2002), Zhao et al. (2001)
Responsiveness	Responsiveness to key customers Responsiveness to target market Post-sale customer service Customer problem solving	Morash (2001), Fawcett and Cooper (1998), Lu and Yang (2010), Jay Joong-Kun et al. (2008), Kim (2006),Wang (2016)
Flexible operations	Delivery reliability Expedited delivery On-time delivery Flexible operation Widespread distribution coverage Global distribution coverage Physical supply flexibility Purchasing flexibility Delivery time flexibility Volume flexibility Location flexibility Reverse logistics timing	Morash (2001), Hayes et al. (1988), Fawcett and Stanley (1997), Lu and Yang (2010), Morash and Lynch (2002), Day (1994), Zhang et al. (2005), Jay Joong-Kun et al. (2008), Wang et al. (2015)

Apart from these categorised capabilities, there are other definitions of logistics capabilities. Wangmin (2002) defines logistics capability as comprising static capability, such as logistics facility, logistics process and logistics delivery; further, dynamic capability includes agile capability, matching capability and integration capability. Xu Liang and Wang Keyi (2010) analysed the influence of chain store logistics capability based on static capability and dynamic capability, on the quality of logistics service, and found that logistics capability can improve it. Other authors, including Liang and Shankun (2012); Protogerou et al. (2011) and Sandberg and Abrahamsson (2011), suggest that logistics capability comprises operations, or functional capability and dynamic capability. Xu Liang et al. (2010) use a different term, 'static capability', to address operational capability in chain store logistics capability systems. As logistics capability is positively related to firm performance (Jay Joong-Kun et al., 2008; Lai, 2004; Xu Liang and Wang Keyi, 2010; Xue, 2013; Zulkiffli, 2009), it also affects financial

performance (Liu and Lyons, 2011). Moreover, it can directly influence the entire supply chain's agility (Gligor and Holcomb, 2012). Lai (2004) suggests that logistics service providers with a better service capability are in a better position to satisfy the various needs of customers and, therefore, achieve better service performance. Logistics capability, thus, can make major contributions towards the achievement of superior performance and sustained competitive advantage (Jay Joong-Kun et al., 2008) and there is a close relationship between logistics capability and performance.

3. CONCEPTUALISATION OF RL CAPABILITY

Based on RBV, capability is the ability to make use of a resource to perform some task or activity; a resource is anything tangible or intangible owned or acquired by a firm (Hafeez et al., 2002). Logistics capabilities play a distinctive role in the integrative strategic process because of the expected benefits of improving firm efficiency and effectiveness leading to long-term firm profitability and survival (Mentzer et al., 2004). The distinction of logistics capability between separate companies is based on the nature of their business, customers and services. It is, therefore, difficult to define logistics capability without a specific context, but for the purposes of this study it is defined as logistics and transport service providers' ability to conduct and coordinate RL-related activities and utilise related resources and skills to mainly satisfy customers' real needs in the pharmaceutical industry.

Jack et al. (2010) empirically examined whether RL capabilities can enable retailers to enhance their return policies and improve their overall cost position. Vlachos (2016) examined six RL capabilities: logistics information management, closed-loop capability, supply chain integration, supply chain coordination, conformity capability, and institutional incentives. Morgan et al. (2018) investigated RL capability as mediating the performance benefits associated with resource commitments to sustainable SCM.

In this study, five logistics capabilities dimensions have been identified and developed for the RL operations in the pharmaceutical industry (Huang and Huang, 2012; Kim, 2006; Lu and Yang, 2010; Morash, 1997). They are technology, innovation capability, customisation capability, responsiveness capability, and flexible operation capability.

3.1 Technology

We are currently experiencing the fourth industrial revolution; it is also known as Industry 4.0, an important trend of integrating transformative technologies for managing interconnected systems including production, services, logistics and supply chain (Lee et al., 2015). The emerging technologies, such as blockchain, IoT, AI, big data, drone, etc., significantly change business operations and have shown benefits and advantages for improving business performance (Gilchrist, 2016). In addition, the technology plays a central role in a modern logistics and supply chain. For example, it enables traceability; based on the literature review, pharmaceutical products require that traceability in their RL (Layti et al., 2020). In a pharmaceutical supply chain, one of the important considerations is the quality of safety (Wang and Jie, 2019). The traceability allows stakeholders to monitor and control the RL in the pharmaceutical industry. Thus, it is important to embrace the technology in the RL operation. In this study, technology is viewed as an important RL capability to facilitate the RL operations in the pharmaceutical industry.

3.2 Innovation

Many researchers viewed innovation capability as one of the important logistics capabilities (Fawcett and Stanley, 1997; Morash, 1997; Wang et al., 2020). It is the firm's ability to transform knowledge and ideas into new products, processes and systems for the benefit of the firm (Lawson and Samson, 2001; Yang, 2012). Due to the complexity of the pharmaceutical supply chain (Breen and Xie, 2015), and the rapidly changing and uncertain

business environment, with the Covid-19 pandemic and the China-US trade war, for example, enterprises and stakeholders, such as those in the pharmaceutical industry, are being challenged, and innovation is an important tool for them to manage the challenges, uncertainties and problems, and to keep their competitive advantage (Lin, 2006). Notably, some researchers found innovation can be used for reducing supply chain uncertainty and risk (Daniel and Fredrik, 2011; Lin, 2013). Dani (2010) emphasises that building an innovative culture, innovative processes and innovation capability are key to managing and mitigating supply chain risks. In addition, innovation has positive effects on logistics service (Wagner and Sutter, 2012) and is critical for strengthening the LSP–customer relationship, generating customer loyalty, achieving competitive advantage and improving the performance of logistics service firms (Flint et al., 2005; Wagner and Sutter, 2012). Lin (2013) suggests that logistics service providers ought to pay more attention to innovation capability, to provide better services for their customers. Thus, innovation is considered as an important RL capability in the pharmaceutical industry.

3.3 Customisation

Customisation is often discussed as an important capability in production (Gunasekaran et al., 2019). But it also plays a vital role in the RL operation. As this study investigates the RL capability from logistics management's perspective, the RL operation is different from forward logistics. Each organisation may have different return requirements and policies, especially in the pharmaceutical industry; for example, hospital pharmacists are important stakeholders, and they often need to manage biomedical waste. RL in the pharmaceutical industry must consider these stakeholders' needs and wants, with the first step of medical waste management including appropriate practices for segregation of waste at the site of generation. According to national and international regulations, all the biomedical waste generated should be disposed of in accordance with approved policy. Thus, it is important to offer a customised RL service for the stakeholders in the pharmaceutical industry. We propose that customisation is an important RL capability in the pharmaceutical industry.

3.4 Responsiveness (Customer Response) Capability

Responsiveness is an important capability to manage customers' requests. As discussed, the RL capability focuses on the customers' wants and needs. In forward logistics capability literature, Morash (1997) identifies responsiveness as one of the four key logistics capabilities, and Chopra and Sodhi (2004) suggest it is one of the mitigation approaches in supply chain risk management. Customer service is one of the important business functions in logistics companies. Moreover, it is one of the important logistics capabilities frequently discussed in previous research (Fawcett & Cooper, 1998; Kim, 2006; Lu & Yang, 2010; Morash & Lynch, 2002; Zhao et al. 2001). Zhao et al. (2001) found customer-focused capabilities were significantly related to performance. Customer response capability in this research represents the customer service and responsiveness capability (Lu and Yang, 2010). In the pharmaceutical industry, various stakeholders - i.e., hospital, clinic, drugstore - have different return items that may include cytotoxic waste, cytostatic waste, pharmaceutical stock which is out of date, pharmaceutical stock which is no longer required, controlled drugs destruction kits, recalled pharmaceutical stock, PPE waste, and other all waste associated with pharmaceutical (Viegas et al., 2019; Wang and Jie, 2019). From logistics management's perspective, it is important to consider all the returns items from different customers. Therefore, customer service is a major function for response and management of the RL operations in the pharmaceutical industry. The RL capability must include this capability. In this study, we called this type of RL capability 'responsiveness' or 'customer response capability'.

3.5 Flexible Operation Capability

Flexibility is a well-known logistics capability; this has been widely accepted by researchers. Flexibility reflects an organisation's ability to effectively adapt or respond to change (Mark and Martin, 2007; Naim et al., 2010; Prater et al., 2001; Vickery et al., 1999). In this study, we named flexibility as 'flexible operation capability', which is closely associated with responsiveness or customer response capability; this also can be considered as an internal operation capability to flexibly manage reverse operations in the pharmaceutical industry. A typical response to change and uncertainty is to build flexibility into the supply chain (Prater et al., 2001). Flexible operation capability is an important element of RL capability, to offer alternative options to provide insurance against unexpected change. Often, international pharmaceutical firms are involved in the pharmaceutical industry, and this may increase the supply chain uncertainty and risks. Flexibility is also one of the risk mitigating strategies in supply chains (Jüttner et al., 2003). According to previous studies, one of the most essential trends increasing 3PL providers' flexibility is their transitioning from local or regional to national or international businesses (Jay Joong-Kun et al., 2008). Thus, flexible operation capability is an important RL capability.

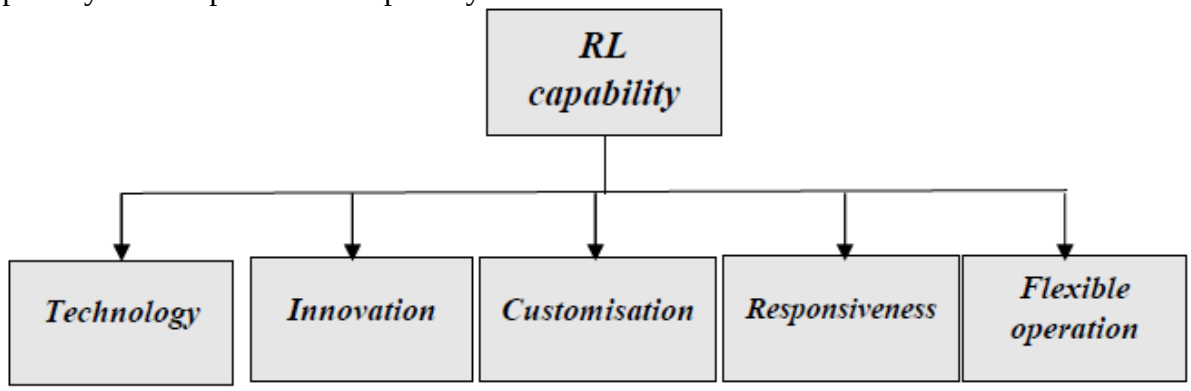

Figure 2. Key RL capabilities

4. DISCUSSION AND CONCLUSION

This conceptual paper presents an RL capability for sustainable development in the pharmaceutical industry. In this study, RL involves waste flow and upstream flow in the pharmaceutical industry and, thus, RL plays a vital role in recycled material flows and waste management in supporting sustainable development. We attempt to focus on a major stakeholder, i.e. hospitals (Figure 3), and use it as an example to draw attention to RL capability in the pharmaceutical industry. In order to make this academic research more relevant for practitioners, this study investigates RL capability from logistics management's perspective. The paper offers a taxonomy of RL capability: there are five types of RL capabilities including technology, innovation capability, customisation capability, responsiveness capability, and flexible operation capability. The results have been reviewed and validated by several academics and practitioners from the healthcare sector.

Modern RL is now closely related to "sustainability", "waste reduction", "green" and "Recycling" (Eltayeb et al., 2011). However, RL should be still considered as a part of logistics and supply chains in the pharmaceutical industry. It is essential to note that the operational process of RL is entirely different from forward logistics and involves the implementation of material disposition management rules (Govindan et al., 2012). In addition, the prime objective of RL is to enable the product to get its maximum value even at the end of its market life. There are various types of activities involved during the process of RL for the purpose of achieving its objective.

Figure 3 indicates three types of flows, being return inbound, return outbound, and

waste disposal. The modern logistics and transportation companies can offer RL delivery services to deliver most returned products and waste in the pharmaceutical industry. Technology is viewed as an important factor to facilitate the delivery information and improve the supply chain integration (Wang et al., 2021). Innovation capability provides alternative resolutions for logistics companies to manage the risks and solve the problems (Wang et al., 2020). RL often requires dedicated delivery services to pick up returns / waste, and the customisation capability is important for logistics companies to better meet the different customers' requirements. Furthermore, the responsiveness capability is a customer response capability to communicate and collaborate with other parties to manage the RL. The flexible operation capability allows logistics companies to adjust and / or reconfigure their own operations / existing routine service and add flexibility into their RL services.

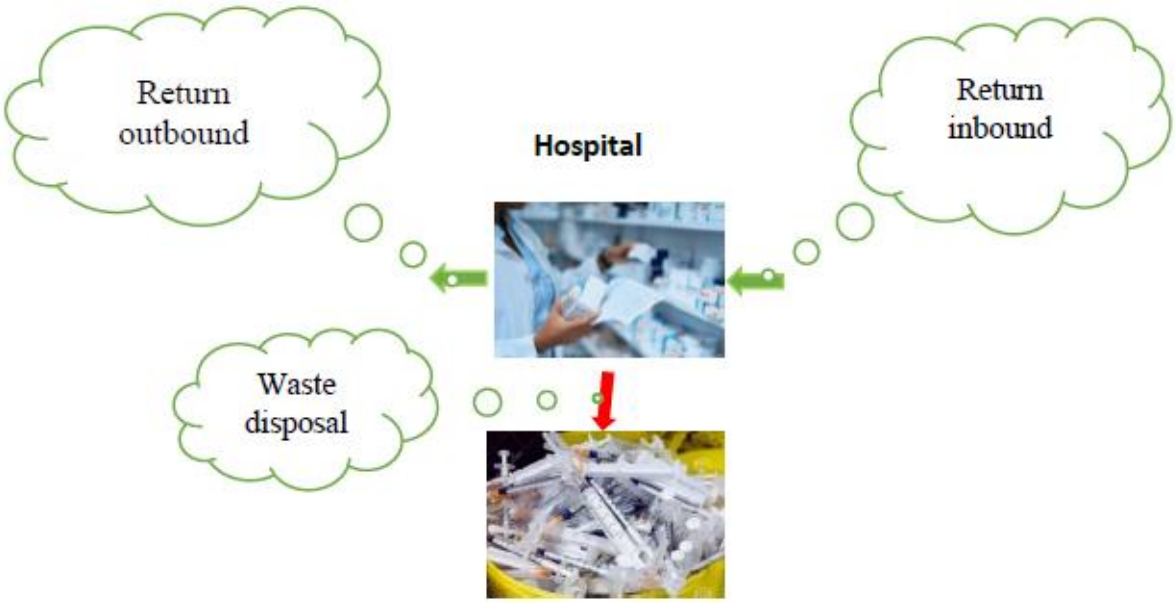

Figure 3. RL from a hospital's perspective

The capabilities can be either functional or dynamic; both reflect a firm's capacity to perform a particular activity or function, but functional capabilities help the firm to perform basic activities while dynamic capabilities refer to the transformation and reconfiguration of functional capabilities (Protogerou et al., 2011). In this study, RL capability includes both functional and dynamic capabilities. Technology, innovation and customisation capability can be viewed as dynamic capabilities; responsiveness and flexible operation capability can be considered as functional capabilities. For example, the innovation capability may improve responsiveness by implementing new business processes. Protogerou et al. (2011) identify functional competences that influence firm performance directly and argue that dynamic capabilities' impact on performance is fully mediated by functional competences.

The study has several limitations. The conceptual model of RL logistics has not been empirically examined in the industry. This study investigates RL from a logistics management perspective in the pharmaceutical industry, and some factors may not be fully observed and discussed in this conceptual paper. Having said that, the results may be validated and generalised by future research for different industries.

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