Closed-loop supply chain management: From conceptual to an action oriented framework on core acquisition

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Abstract

Closed-Loop Supply Chain (CLSC) focuses on acquiring the cores/product returns from consumers, recovering their residual value, and remarketing them. Extant literature on core acquisition management suggests that researchers have not considered behavioral aspect of consumers. On the other hand, marketing literature suggests that researchers neglected technical issues related to core acquisition in a CLSC while discussing consumers’ disposition behaviors. We propose a conceptual framework that extends the existing CLSC setting by introducing consumers’ disposition behavior. We develop eleven research propositions based on which we design a survey. The survey was sent to decision making executives of different remanufacturing industries to solicit their perception. Participants were also asked to make paired comparisons using the Analytic Hierarchy Process (AHP), based on which an action oriented framework is developed. Firms that have CLSC operation can use our framework to ensure enhanced quality product returns which in turn increase profitability. Finally, possible future extensions are discussed.

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1. Introduction

Closed-loop supply chain (CLSC) requires firms to be involved in product reconstruction after collecting cores (we will use cores, used products, and product returns interchangeably) from consumers. Product reconstruction demands supply chain partners to be engaged in recycling, refurbishing/reconditioning, and remanufacturing of products offered to the marketplace (Pearce, 2009; Subramoniam et al., 2009; Gaur et al., 2017). Overall, 130,000 companies across the U.S. are engaged in product reconstruction, generating annual sales exceeding $300B (Pearce, 2009; Gaur et al., 2017). Fig. 1 depicts major components and activities of CLSC as given in Sahyouni et al. (2007).

In recycling, cores are broken down to part level, which are then used in the manufacturing of new products. On the other hand, remanufacturing is a value recovery process in which worn-out or obsolete components are restored as well as upgraded components are added in order to bring the product to quality of new product. Finally, refurbishing requires rebuilding or replacing of major components/parts, resulting in a product with a lower performance specification and more limited warranty relative to the equivalent new product (Gaur et al., 2017).

As shown in Fig. 1, reverse logistics activities start with acquisition of cores. Therefore, core acquisition becomes one of the most critical steps in managing CLSC. However, core acquisition is also one of the major barriers for successful product reconstruction (Seitz, 2007; Kannan et al., 2014), due to uncertainties associated with timing, quantity, and quality of cores (Guide and Van Wassenhove, 2001). One of the strategies to reduce such uncertainties is offering financial incentives to consumers for returning cores. Caterpillar Inc. ensures quality and quantity of the cores by adopting deposit-refund policy (Wei et al., 2015). Moreover, CLSC literature suggests that consumers are usually not motivated to return their products back to firms, in case of lack of incentives and information of firm’s take-back policy (Morana and Seuring, 2007).

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However, marketing literature suggests that consumers have different disposition behavior. Jacoby et al. (1977) argue that people dispose their belongings in three different ways: i) storing the product; ii) temporary disposition (e.g. renting); and iii) permanent disposition. Consumers dispose the products because of several factors that include emotional, social, design and functionality of the product (Cox et al., 2013). Coulter and Ligas (2003) extend the idea of consumer disposition behavior by categorizing the consumers into two broad classes: i) Packrats; and ii) Purgers. Packrats are those consumers, who, from the behavioral point of view, are keen on storing the products and from the psychological point of view, face difficulties in discarding their belongings. On the other hand, Purgers are those consumers, who from the behavioral aspect, continuously explore the other options available to them related to substitute products and psychologically are quite willing to discard their belongings.

The marketing researchers, however, have not considered challenges faced by firms in core acquisition management while discussing consumers’ disposition behaviors. On the other hand, CLSC literature does not discuss behavioral aspect of consumers while discussing core acquisition management. Therefore, the key objectives of this study are to: i) propose a conceptual framework, with a set of propositions to enhance acquisition of higher quality cores, by introducing consumers’ disposition behavior in existing CLSC setting, and ii) prioritize and rank the factors based on an industry survey and Analytical Hierarchical Process (AHP). This integration will help supply chain managers with improved decision making for CLSC management, particularly core acquisition. As remaining components of reverse supply chain rely on cores, it is expected that our framework will enhance the efficiency of supply chain. To best of our knowledge, our study is first to establish a link between CLSC and consumers’ disposition practices literature.

2. Literature review

Our study benefits from core acquisition management and consumer disposition behavior literature. First, we discuss few key papers, from both streams of literature, in the following sections for development of propositions. Next, we provide summary, major themes of few other key papers from both streams of literature and focus of this article in Table 1.

2.1. Core acquisition management

Acquisition of cores is one of the most important parts of CLSC as all other activities depend on it (Kannan et al., 2015). However, it is very challenging to acquire cores due to associated uncertainties. Guide and Srivastava (1997) note that remanufacturing is much more complex than new manufacturing because of uncertainty associated with timing, quality, and quantity of cores. Guide and Van Wassenhove (2001) opine that there are mainly two core acquisition systems: i) waste stream, and ii) market driven system. In the waste stream systems, the firms collect cores out of legislative compulsion. On the other hand, market driven systems encourage users to return product by providing incentives. Guide et al. (2005) argue that firms that produce short life-cycle products should recognize returns as a value stream rather than a waste stream. Atasu et al. (2010) define three groups of consumers: i) newness conscious consumers (those who always buy new products); ii) functionally oriented consumers (those who buy the product based on its functionality); and iii) green consumers (those who do not discount the value of the remanufactured product).

Diabat and Kannan (2011) show that acquisition and reusing the cores are main drivers of green supply chain management (GSCM). Pokharel and Liang (2012) develop a model to determine optimal acquisition price and quantity of cores based on the quality. Kannan et al. (2015) discuss the importance of core acquisition in planning...
of reverse logistics activities. Yang et al. (2015) show that quality distributions govern acquisition policies under uncertainty. Jena and Sarmah (2015) find that perceived benefit and social awareness positively influence consumers’ return intentions, however, it is negatively influenced by perceived risk.

The major themes discussed in the product acquisition literature are: i) timing, quality, quantity, and acquisition price of cores; ii) financial incentives offered to consumers; and iii) convenience and other consumers related issues. However, it is discussed that consumers are more likely to return the cores if they are provided information on take-back policy and take-back offers. For example, Caterpillar Inc. receives, on an average, 93–95% of the returns after useful life (Caterpillar Sustainability Report, 2011). These findings on take back policy and financial incentives led us to the following propositions.

P1. Information of firm’s take-back policy has a positive impact to increase the volume of product returns.

P2. Information of firm’s take-back offers (financial incentives) positively impact to increase the volume of product returns.

P3. Currency value of financial incentives is positively related to increase in volume of product returns.

2.2. Disposition

Consumer disposition could broadly be defined as, a consumer’s attempt to get rid of a product that has outlived its purpose. Jacoby et al. (1977) suggest that consumers dispose the products in three ways: i) storing the product; ii) temporary disposition; and iii) permanent disposition. They further argue that the factors that influence the disposition decisions are: i) psychological characteristics of the consumers (e.g. personality, attitudes, emotions, perceptions); ii) factors intrinsic to the product (condition, age, size, design, technology, durability, reliability); and iii) situational factors (e.g. finances, storage space, urgency, fashion change, functional use).

Coulter and Ligas (2003) propose that those consumers, who, from the behavioral point of view, are keen on storing the products and from the psychological point of view, face difficulties in discarding their belongings, should be called “Packrats”. On the other hand, those consumers, who, from the behavioral aspect, continuously explores the other options available to them related to substitute products and psychologically are quite willing to discard their belongings, were to be called “Purgers”. Lastovicka and Fernandez (2005) show how a shared sense of oneself plays an instrumental role in disposition. Cox et al. (2013) explore the factors that influence consumers’ purchase and disposal decisions. The findings of the study suggest that reasons of premature disposal include emotional, social, design and functionality of the product.

The main reasons why consumers dispose the products include product features, situational factors, and psychological factors. However, an individual’s personality determines the likelihood of disposing the product (Coulter and Ligas, 2003). The following proposition exposes this thought process for further validation.

P4. Purgers are more likely to dispose their product than Packrats.

We want to integrate both streams of literature and propose a conceptual framework that focuses on increase in quantity of good quality cores. Focus of the article is highlighted in last column of Table 1.

3. The conceptual framework

Our proposed conceptual framework is presented in this section (see Fig. 2). The proposed framework is effective only for B2C (Business-To-Consumer) setting. Our framework establishes link between existing CLSC setting and consumers’ disposition behaviors. More specifically, our framework elaborates and establishes the link between forward and reverse supply chains. In Fig. 1, it is implicitly assumed that final consumers return back the cores to the firm for value recovery. It does not probe into consumer related issues. Our framework attempts to explain the process of core acquisition using consumer disposition behavior.

First, firms should identify those consumers who are willing to dispose-off their products. The identification can be done using point-of-sale survey or post purchase survey or online survey. For instance, firms can identify whether a particular consumer is of Purger or Packrat type and design separate strategies for them. For example, the firm’s consumer relationship management (CRM) department for product acquisition should try to persuade Purgers to return back the cores by informing them about positive impact of product reconstruction on environment and society at large. The CRM should also inform consumers (both Purgers and Packrats) about its take-back policy and take-back offers (financial incentives/discount) through different media and media vehicles. The media include audio, video, and print, while media vehicles include emails, phones, social media, mobile applications, visual and print advertisements, etc. The information about take-back policy and financial incentives will act as stimuli for those consumers who want to return back the cores (Guide and Van Wassenhove, 2001; Morana and Seuring, 2007). The firms can also explain impact of product life-cycle (PLC) on financial incentive. For example, if the useful life of a product is 10 years then consumers may get higher amount (provided quality is good) as a financial incentive in case they return the product back before 10 years than those consumers who return back after 10 years. It should also motivate consumers as they will receive higher amount than expected if they return back before product’s useful life.

It may happen that consumers may want to return back the cores, but don’t do that due to convenience (geographical distance) constraint. A firm can overcome such constraint by opening multiple collection centers. The firm can collaborate with its retailers for collection of cores (Savaskan et al., 2004). This strategy will not only foster trust among retailers, but also save significant cost associated with opening of new facilities. The firm should educate its retailers about the quality of cores that is acceptable. It will also reduce the transportation cost of those products that cannot be reconstructed (Realf et al., 2004). The other option is to organize collection drives/camps in various areas that are in consumers’ proximity. These drives should be conducted by those employees who can test the quality of the product and evaluate the price which is to be paid to the consumers. The above-mentioned two measures will not only increase the number but also improve the quality of cores.

The other aspect of the framework is consumer disposition behavior. As discussed earlier, consumers’ disposition behavior is affected by several factors (Jacoby et al., 1977). For example, consumers may want to dispose their old product due to either one or combination of following reasons: i) psychological characteristics of consumer; ii) factors related to product; iii) situational factors; and iv) culture or value system. Psychological characteristics of consumers include their personality, attitude, perception, emotions, and learning. For instance, literature on personality indicates that consideration of future consequences (CFC) is theoretical construct which determines extent to which people consider distant versus immediate consequences of potential behaviors (Strathman et al., 1994; Gupta et al., 2012). Strathman et al. (1994) argue that individuals with low CFC focus more on immediate needs, whereas, individuals with high CFC consider future implications as guides for their actions. The authors also find that prediction on health and environment behaviors by CFC is better than other personality related constructs. Hence, we propose the
Table 1
Summary, major themes of key papers and focus of the article.

<table>
<thead>
<tr>
<th>Stream</th>
<th>No.</th>
<th>Author(s)</th>
<th>Main Findings</th>
<th>Major themes</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLSC - Core acquisition literature</td>
<td>1</td>
<td>Guide (2000)</td>
<td>There are ample incentive systems used by US remanufacturing firms to receive better quality returns.</td>
<td>Timing, quality, quantity, and acquisition price of cores;</td>
<td>We want to integrate two streams of literature and propose a conceptual framework that focuses on increase in quality of good quality cores.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Klausner &amp; Hendrickson (2000); Morana &amp; Seuring (2007)</td>
<td>Information about firm’s take back policy, and buy-back policy can also have positive impact on collection of cores.</td>
<td>Financial incentives offered to consumers; and</td>
<td></td>
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<td></td>
<td>3</td>
<td>Savaskan et al. (2004)</td>
<td>The preferred agent to collect the cores is retailer followed by manufacturer, and third party, respectively.</td>
<td>Convenience and other consumer related issues.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Ostlin et al. (2008)</td>
<td>Close relationships with consumers increase firm’s collection of cores.</td>
<td>Consumer are more likely to return the cores if they are provided information on take-back policy and take-back offers.</td>
<td></td>
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<td></td>
<td>5</td>
<td>Srivastava (2008)</td>
<td>Consumers also consider convenience (geographical distance) before returning the cores.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>6</td>
<td>Ozik and Basligil (2012)</td>
<td>The volume of cores and corresponding quality conditions should be considered in the design of a CLSC network in order to increase profitability.</td>
<td></td>
<td></td>
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<td></td>
<td>7</td>
<td>Kannan et al. (2014)</td>
<td>Acquisition of cores is one of the major barriers in implementation of GSCM practices in Indian industries.</td>
<td></td>
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<td></td>
<td>8</td>
<td>Pei et al. (2014)</td>
<td>Return policy of internet retailers has positive influence on consumers’ perception of the return policy fairness and purchase intention.</td>
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<td></td>
<td>9</td>
<td>Shaharudin et al. (2015b)</td>
<td>Major internal barriers to core acquisition and recovery management are financial and resource constraints.</td>
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<td></td>
<td>10</td>
<td>Shaharudin et al. (2015a)</td>
<td>Key drivers to adopt core management include desire to serve consumers, regulatory compliance, sales expansion in secondary market, protect the environment, and comply with ISO 14001 norms.</td>
<td></td>
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<tr>
<td>Consumer disposition behavior literature</td>
<td>1</td>
<td>Burke et al. (1978)</td>
<td>Packrats are slightly older individuals who had a tendency not to permanently dispose products; Trashers are younger people who had a tendency to throw away things.</td>
<td>Why consumers dispose the products include product features, situational factors, and psychological factors.</td>
<td>however, an individual’s personality determines the likelihood of disposing the product.</td>
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<td></td>
<td>2</td>
<td>DeBell and Dardis (1979)</td>
<td>Despite advances in manufacturing that improve durability and efficiency of appliances; such improvements do not alter consumer behavior towards discarding products.</td>
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<td>3</td>
<td>Hanson (1980)</td>
<td>Disposition behavior of the consumers could be divided into four stages: i) problem recognition; ii) search/evaluation; iii) disposition; and iv) post disposition outcomes.</td>
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<td></td>
<td>4</td>
<td>Harrell and McConochia (1992)</td>
<td>Planner disposers are those people who dispose the products in a pre-planned and systematic manner, whereas Spontaneous disposers are those people who have no pre-planned way of disposing, and decide on the spot how to dispose the product.</td>
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<td></td>
<td>5</td>
<td>Cooper (2004)</td>
<td>Personal characteristics of the consumers play an important role in the disposition decisions related to the household products.</td>
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<td></td>
<td>6</td>
<td>Paden and Stell (2005)</td>
<td>Retailers should consider building good relationship with consumer and facilitate the disposition process.</td>
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<td></td>
<td>7</td>
<td>Thomas and Sharp (2013)</td>
<td>Social pressure, personal and social norms, government initiatives could result in consumers engaged in recycling behavior.</td>
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<tr>
<td></td>
<td>8</td>
<td>Türe (2014)</td>
<td>Consumers dispose products as gifts, sacrifices in order to form new relations or maintain old connections.</td>
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<td></td>
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<tr>
<td></td>
<td>9</td>
<td>Lee et al. (2015)</td>
<td>Consumers perceive financial loss and emotional loss while disposing the products.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Echegaray (2015)</td>
<td>Brazilian consumers are neglecting product durability and replacing the products frequently.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

following:

**P5:** Consumers who are high in CFC are more likely to return back the cores to firm than other personality oriented consumers.

Product related factors include size, age (PLC), functionality, value, and other quality related reasons. It may happen that some consumers may want to dispose the product early stage of PLC and some do it later stage of PLC (Gaur et al., 2017). In other cases, consumer may want to dispose because a technological upgraded version is available in the market. Situational factors include financial urgency, storage issue, legal issues, etc. for instance, some consumer may want to dispose the product because they have some financial urgency. Some consumers do not want to return the cores because of its complex design or structure. For example, if the product is bulky or unclean then consumer may be reluctant to return it. These findings led us to our next proposition.

**P6:** Simple or clean product design/structure can result in increased product returns.

Finally, culture or value system can also affect consumers’ disposition decision. Culture is defined as collective programming of the mind which distinguishes the members of one category of
people from those of another (Hofstede, 1984). These values direct one's feeling of good and evil and indirectly affect one's perception and behavior towards everything. For example, if local culture/society encourages use of reconstructed products then consumers may have positive attitude towards them (Gaur et al., 2015). We believe that, if local culture promotes product reconstruction then it is highly likely that consumers would return back the better quality cores in huge quantity. Therefore, we postulate the following based on discussed findings.

P7: If local culture promotes product reconstruction then it is highly likely that consumers would return back the better quality cores in huge quantity.

Further, the authors had prior industry experience working with the returns process for multinational companies and that motivated the addition of the following propositions.

P8: Proper product documentation on how to use the product can result in less initial returns from consumers, especially for high tech products.

P9: Ease of the returns process such as provided returns packaging, free shipping etc. can result in increased returns.

P10: Ease of the payment process of financial incentives such as quick response is positively related to increase in volume of product returns.

Firms can also collaborate with NGOs (Non-Government Organizations) to make consumers aware about positive impact of product reconstruction. Such collaboration could also convert collection drives into social events where consumers actively participate in whole collection process. Next, firms should provide all necessary support to retailers in case they want retailers to become their collection agents as suggested by Savaskan et al. (2004). As the retailers are the key point of contact with consumers, they should be provided with adequate information about firms’ take-back policies and financial incentives offered. They should also be provided with online or field help in determining the take-back price of cores. Also, if they are aware of the process of product reconstruction then it could serve as an additional advantage. These findings led us to the following proposition.

P11: Proximity of consumers to collection centers/collection drives will increase the volume of product returns.

Supply chain managers can increase the quantity of improved quality product returns by having a good understanding of consumers' disposition behavior. Needless to say that final consumer is the only link between forward and reverse supply chains. Hence, supply chain managers must pay utmost attention towards consumers.

In the next step of our study, a survey is conducted with industry experts to understand the importance, rank and prioritize the key factors that drive consumer returns behavior using the AHP.

4. Analytical hierarchy process and survey development

Analytical Hierarchical Process (Saaty, 1980) is used to do pairwise comparisons of the factors under consideration, based upon the judgments of the experts from the remanufacturing industry. We use AHP as a tool to prioritize the strategic factors that drive consumer disposition behavior and help companies develop a framework to induce the consumer to return the product, if all efforts to satisfy the consumer with the product have failed.

This phase of research involves the validation and prioritization of the already established strategic factors from literature review and experience of the authors, who had direct hands on as well as consulting experience with leading Fortune 500 companies in the remanufacturing industry. Hence, a sample size of highly qualified remanufacturing participants was deemed acceptable for determining a meaningful outcome (Korhonen and Voutilainen, 2006). A response rate of 35% from 23 potential participants is achieved. The participants included General Managers, Vice Presidents, and Directors of major tier1 companies such as Delphi, Wabco and majority of them participated in the Remanufacturing Industries Council. The experience in the remanufacturing field for the participating executives ranged from 2 to 35 years with an average of 18.5 years in a decision making capacity.

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The survey participants were asked to make paired comparisons of the various strategic factors. Pair-wise comparisons using the AHP are considered to be the most effective way to achieve better judgment because only two attributes are compared at a time (Saaty, 1980). We employ the one to nine judgment scale recommended in the literature (Saaty, 2008). In this way, a score of one indicates that the two options under comparison have equal importance, while a score of nine indicates an overwhelming dominance of the component under consideration (row component) over the comparison component (column component) in a pair-wise comparison matrix.

In addition to the pair-wise comparison, a supplement questionnaire was used in the survey to evaluate the importance of the strategic factors with questions such as:

1. Does availability of information on the firm’s take-back policy increase the volume of product returns from consumers?

Also the participants were asked to identify any additional factors we might have missed that they deemed important to consider. Ease of the crediting process, lean returns process, competition between Original equipment manufacturer (OEM) and core brokers, core returns criteria, and legal requirements in China and India were identified as key missing factors. Since, the focus of this manuscript is on the disposition behavior of the consumers, therefore, the authors believe that the already established strategic factors take into account most of the misses identified factors from survey participants. For example, ease of crediting process and returns process etc. are already included in the survey questionnaire since the participant expressed the concern before the survey was e-mailed out. Core returns criteria is a part of the currency value of the financial incentive question in the survey. Legal requirements, the authors believe is a miss and is incorporated in the action oriented framework.

5. Survey results and AHP analysis

As in Subramonium et al. (2010), we also assume that if at least 50% of the survey respondents consider the factor important in increasing the product returns, then the factor can be included in action oriented framework. Our survey results indicate that all identified factors are important to the respondents in increasing the volume of cores. All the respondents agree that ease of return process results in increased product returns, whereas, 87.5% of the respondents consider information on take-back policy, information on take-back financial incentives, environmentally conscious consumer, and consumer disposition behavior to be important factors. While, 75% of the respondents claim that proximity to collection centers, and proper product documents as important factors. Around 63% of the respondents believe that currency value of financial incentives, ease of payment process, national culture, and product structure/product design are important factors.

Next, we asked our respondents to do pair-wise comparisons of the factors in order to prioritize them. AHP considers a set of evaluation criteria, and a weight is generated based on experts’ pairwise comparisons of the attributes. The higher the weight, the more important is the corresponding attribute. AHP is based on reciprocal axiom, for example, if factor 1 is more important than factor 2 and is rated 5, then factor 2 must be less important than factor 1 and would be rated 1/5. The essence of AHP is to construct a matrix with the use of pair-wise comparisons performed for all factors. The resulting pair-wise comparison matrix is shown in Table 2.

Kannan et al. (2014); Haq and Kannan (2006) describe the following steps to check the consistency of pair-wise comparison matrix.

1. Calculate the eigen vector and \( \lambda_{max} \) for each matrix of order n.
2. Compute the Consistency Index (CI) of each matrix of order n by following formulae:

\[
CI = (\lambda_{\text{max}} - n)/(n - 1)
\]  

The Consistency Ratio (CR) is then calculated, with the use of Random Inconsistency (RI), as follows:

\[
CR = CI / RI
\]

The values of all key parameters, in our case, are as follows:

- Eigen vector: 0.056, 0.109, 0.057, 0.104, 0.089, 0.061, 0.118, 0.076, 0.043, 0.194, 0.088.
- Maximum eigen value \( \lambda_{\text{max}} \) = 12.89; CI = 0.189; RI (for n = 11) = 1.51; CR = 0.125.

As suggested by Wedley (1993), a CR of less than 0.20 is considered tolerable for big sized matrices. In our case, the CR value is less than 0.20; therefore, we can conclude that there is a required consistency in the judgments of experts. Eigen vectors are used to rank to strategic product acquisition factors provided in Table 3. We discuss the significance of each factor in the following section.

6. Action oriented framework, discussion and managerial implications

The survey results indicate that all the factors considered in the study are important to decision makers. The factors can be classified into internal and external factors. Overall there are eight internal factors and three external factors out of total eleven factors. Internal factors are those which company has direct control on. The internal factors are: ease of return process, number of collection centers, information on take-back offers, ease of payment process, product structure/design, currency value of financial incentive, information on take-back policy, and product documentation. External factors are those on which company doesn’t have direct control. The external factors are: environmental conscious consumers, consumers’ disposition behavior, and national culture.

However, our AHP analysis shows that ease of return process is ranked first by experts followed by other factors. The overall ranks are provided in Table 2. Based on rankings provided by experts, we have developed an action oriented framework (see Fig. 3) in order to achieve the overall goal of increasing volume of cores. First of all, a company should fulfill all legal requirements which without which it will not be able to do business. Thereafter, our action oriented framework provides a check list and actions associated with each factor. For example, the ranked first factor is ease of return process, so a company needs to check whether that it has got proper ease of return process. If yes, then it should check on other factors, if no, then company’s operations managers should devise an efficient return process. Similarly, we provide actions related to each factor. As mentioned above, these factors are classified as internal and external factors. So, a company should make sure that all internal factors, as it has got direct control over them, are in line in order to achieve overall goal. For external factors, the company needs to devise some strategies which will help company to achieve its goal. We separately discuss the strategies/actions related to internal and external factors in following sections.

6.1. Strategies required for internal factors

Ease of return is one of the main drivers of product return flow characteristics (Dekker et al., 2013). Ease of return process includes offering packaging, and free shipping. Consumers feel motivated to
return the cores if company has clearly provided steps involved in return process. For example, who should consumers call if they want to return the product, who and when company’s personnel come to pick up the product, who will send consumers the acknowledgement, when will consumers receive financial incentive, to name a few. Next, a company should also make sure that it has got enough number of collection centers. Proximity to collection centers is one of the main factors consumers evaluate before returning the product (Srivastava, 2008). If the collection center is not within the consumers’ convenience limits, then they might be reluctant to return it. Therefore, the company needs to open multiple collection centers so as to receive as many returns. Another easy approach is to provide returns boxes and packing slips for consumers to put it back in their own mail boxes to be returned at no cost to the consumer. This approach takes away the nearness to the collection center and increases the ease of returns process. But in certain industries such as the telecom industry, where the authors had direct responsibility in managing the central returns policies expect the consumers to return the serviced part (which is not intentionally damaged beyond repair) within 30–60 days to receive the core charge back. Consumers tend to forget to return the product after a certain period of time. Again, the policy is intended more for B2C consumers and need to be fine-tuned for B2B consumers, which is not a focus area for this manuscript.

A company should also ensure that information on its take-back financial incentives and take-back policy is available to consumers. It has been noted that lack of information results in low return rate of cores (Morana and Seuring, 2007). The company’s marketing managers should devise a strategy that ensures availability of information among consumers. Other than information on financial incentives, currency values of financial incentives and ease of payment are also important factors consumers consider for returning the cores. There are various ways of communicating the

Another approach, not yet fully implemented by companies yet is to provide detailed documentation on what constitutes a proper return in the company website with detailed photographs, and policies. Companies should be careful not to make the returns process too rigid resulting in lower return rates. Automotive dealerships, for instance have seen success in return rates if their policies expect the consumers to return the serviced part (which is not intentionally damaged beyond repair) within 30–60 days to receive the core charge back. Consumers tend to forget to return the product after a certain period of time. Again, the policy is intended more for B2C consumers and need to be fine-tuned for B2B consumers, which is not a focus area for this manuscript.

A company should also ensure that information on its take-back financial incentives and take-back policy is available to consumers. It has been noted that lack of information results in low return rate of cores (Morana and Seuring, 2007). The company’s marketing managers should devise a strategy that ensures availability of information among consumers. Other than information on financial incentives, currency values of financial incentives and ease of payment are also important factors consumers consider for returning the cores. There are various ways of communicating the

Table 2
Pair-wise comparison average.

<table>
<thead>
<tr>
<th></th>
<th>Information on take back policy</th>
<th>Information on take back finance incentive</th>
<th>Currency value of incentive</th>
<th>Ease of payment process</th>
<th>Environmentally conscious consumer</th>
<th>National culture</th>
<th>Proximity of product collection centers</th>
<th>Consumer disposition behavior</th>
<th>Proper product documentation</th>
<th>Ease of return</th>
<th>Product structure or design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>1.00</td>
<td>0.53</td>
<td>1.60</td>
<td>0.21</td>
<td>0.50</td>
<td>1.00</td>
<td>1.33</td>
<td>0.42</td>
<td>2.67</td>
<td>0.17</td>
<td>0.80</td>
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<tr>
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<td>1.00</td>
<td>1.00</td>
<td>1.13</td>
<td>0.67</td>
<td>1.13</td>
<td>1.88</td>
<td>1.38</td>
<td>0.75</td>
<td>1.50</td>
<td>1.60</td>
<td>2.67</td>
</tr>
<tr>
<td>Information on take back finance incentive</td>
<td>0.63</td>
<td>0.89</td>
<td>1.00</td>
<td>1.00</td>
<td>2.00</td>
<td>0.89</td>
<td>0.13</td>
<td>0.50</td>
<td>0.47</td>
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<td>0.89</td>
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<td>0.50</td>
<td>0.53</td>
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<td>1.60</td>
<td>0.36</td>
<td>0.75</td>
<td>8.00</td>
<td>0.80</td>
<td>0.80</td>
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<tr>
<td>Ease of payment process</td>
<td>2.00</td>
<td>0.89</td>
<td>0.50</td>
<td>0.53</td>
<td>1.00</td>
<td>1.60</td>
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<td>0.75</td>
<td>8.00</td>
<td>0.80</td>
<td>0.80</td>
</tr>
<tr>
<td>Environmentally conscious consumer</td>
<td>1.00</td>
<td>0.53</td>
<td>1.13</td>
<td>0.89</td>
<td>0.63</td>
<td>1.00</td>
<td>0.67</td>
<td>0.62</td>
<td>2.67</td>
<td>0.22</td>
<td>1.33</td>
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<tr>
<td>National culture</td>
<td>0.75</td>
<td>0.73</td>
<td>8.00</td>
<td>0.89</td>
<td>2.75</td>
<td>1.50</td>
<td>1.00</td>
<td>1.63</td>
<td>4.00</td>
<td>0.67</td>
<td>0.38</td>
</tr>
<tr>
<td>Proximity of product collection centers</td>
<td>2.38</td>
<td>1.33</td>
<td>2.00</td>
<td>0.50</td>
<td>1.33</td>
<td>1.63</td>
<td>0.62</td>
<td>1.00</td>
<td>1.00</td>
<td>0.29</td>
<td>0.57</td>
</tr>
<tr>
<td>Consumer disposition behavior</td>
<td>0.37</td>
<td>0.67</td>
<td>2.13</td>
<td>0.62</td>
<td>0.13</td>
<td>0.38</td>
<td>0.25</td>
<td>1.00</td>
<td>1.00</td>
<td>0.23</td>
<td>0.50</td>
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<tr>
<td>Proper product documentation</td>
<td>5.88</td>
<td>0.63</td>
<td>5.13</td>
<td>2.50</td>
<td>1.25</td>
<td>4.50</td>
<td>1.50</td>
<td>3.50</td>
<td>4.38</td>
<td>1.00</td>
<td>3.63</td>
</tr>
<tr>
<td>Ease of return</td>
<td>1.25</td>
<td>0.38</td>
<td>1.13</td>
<td>1.33</td>
<td>1.25</td>
<td>0.75</td>
<td>2.67</td>
<td>1.75</td>
<td>2.00</td>
<td>0.28</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Table 3
Product acquisition factors ranked based on AHP weighting factor.

<table>
<thead>
<tr>
<th>Strategic product acquisition factors</th>
<th>Relative weight for the different factors</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of return</td>
<td>0.194</td>
<td>1</td>
</tr>
<tr>
<td>Proximity of product collection centers</td>
<td>0.118</td>
<td>2</td>
</tr>
<tr>
<td>Info on take back finance incentive</td>
<td>0.110</td>
<td>3</td>
</tr>
<tr>
<td>Ease of payment process</td>
<td>0.105</td>
<td>4</td>
</tr>
<tr>
<td>Environmentally conscious consumer</td>
<td>0.090</td>
<td>5</td>
</tr>
<tr>
<td>Product structure/design</td>
<td>0.088</td>
<td>6</td>
</tr>
<tr>
<td>Consumer disposition behavior</td>
<td>0.076</td>
<td>7</td>
</tr>
<tr>
<td>National culture</td>
<td>0.062</td>
<td>8</td>
</tr>
<tr>
<td>Currency value of incentive</td>
<td>0.057</td>
<td>9</td>
</tr>
<tr>
<td>Info on take back policy</td>
<td>0.056</td>
<td>10</td>
</tr>
<tr>
<td>Proper product documentation</td>
<td>0.043</td>
<td>11</td>
</tr>
</tbody>
</table>
returns information or policy to the end consumer. Simple one-page documentation with the product can be an easy, effective way. Another valuable source of information can be the company web site, with the new generation consumers relying on the internet for all information. Appropriate value of financial incentive and proper payment process can increase the volume of product returns (Caterpillar Sustainability Report, 2011). An appropriate value of financial incentive can be obtained by cost-benefit analysis.

The account and finance managers should also make sure that consumers do not face problems in payment process.

Finally, the product related factors such as product design, product documentation should also be aligned to overall goal. The product engineers should make sure that the product is simple and clean. Also, proper product documentation should be ensured by packaging department. Proper product documentation may result in less commercial returns, hence, company can focus on end-of-

Fig. 3. Action oriented framework.
use and end-of-life returns.

6.2. Strategies required for external factors

As company does not have direct control over external factors, it can devise some strategies that help in achieving the overall goal. For example, the company should conduct point-of-sale survey, post purchase survey or online survey to identify consumers’ disposition behavior as well as their environmental consciousness. After the identification is done, the company can target PURGERS and environmentally conscious consumers to increase the product returns. Quick return policies, ease of returns process discussed earlier can also be attractive for the consumers. It can also devise some strategies (e.g. exchange offer or free pick-up offer) for Packracks and those consumers who are not environmentally conscious. These consumers also need to see more value through financial incentives, awareness etc. to motivate a return.

Local culture can also help companies to increase volume of product returns. If local culture of a particular society motivates consumers to return the cores, then company does not need to put much effort. But, if local culture of a society does not necessarily motivate consumers, a company should educate consumers about product reconstruction and its effects on environment. The company can join hands with some local NGO to promote such activities. In that way, it will not only achieve its goal but also build its image among local consumers.

7. Conclusion and scope for future research

The framework presented in this paper integrates literature of CLSC and consumer disposition behavior. More specifically, it extends the CLSC activities by introducing consumers’ disposition behavior which is lacking in existing setting. The framework presented here highlights that there are mainly four factors that affect consumers’ disposition behavior: psychological characteristics; product related factors; situational factors; and culture. The literature on CLSC highlights that consumers are not enough motivated by product related factors; situational factors; and culture. The presented here highlights that there are mainly four factors that affect consumers’ disposition behavior: psychological characteristics; product related factors; situational factors; and culture. The literature on CLSC highlights that consumers are not enough motivated by product related factors; situational factors; and culture.

We believe that our framework not only makes a significant theoretical contribution to CLSC and consumer disposition literature, but also is beneficial for those firms that have CLSC operations. For example, the challenge for the remanufacturing industry today is core management, as discussed by Subramoniam et al. (2013). Lack of cores results in inability of the company to make a low cost remanufactured product available for the consumer. The current research provides remanufacturing companies a framework to review their existing returns policies, processes and technology to accelerate, incentivize the returns process, thereby increasing their remanufacturing revenue and profitability along with establishing a strong brand because of green corporate image and corporate social responsibility (CSR). The firms can use our framework to increase the quantity and quality of product returns.

The current research has established a foundation for future research in core returns and how to influence consumers. The authors have identified the following potential opportunities for future research. Firstly, we did not use any statistical technique and hypotheses development in this study; future studies can empirically validate our proposed framework by developing appropriate hypotheses with large sample size. For example, one can empirically validate the role of culture or value system on disposition behavior. Researchers can carry out cross-cultural study on consumers’ disposition behavior as culture is assumed to influence consumers’ behavior (Hofstede, 1984). Next, one can also empirically find out whether CFC is more likely to return back the cores to firms than other personality types. Another extension could be to empirically understand the impact of awareness of firms’ take-back policies and financial incentives on product returns by consumers. Second, our study is valid only for B2B setting. Future studies can develop a comprehensive model that covers both B2B and B2C settings. Multiple case studies approach (Pagell and Wu, 2009) could be an appropriate method to understand the difference between these two different settings.

References


Further reading


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