

The new role of Procurement in a circular economy system

Fabio Pollice, Antonio Batocchio

University of Campinas, Department of Manufacturing and Materials Engineering , Campinas, Brazil
pollice.fabio@gmail.com, batocchi@fem.unicamp.br

Abstract

This paper explores the new role of Procurement and Supply Management (PSM) in a circular economy framework. Traditional procurement strategies are focused on a “take-make-disposal” approach, aligned to the current linear economy agenda. However, circular economy principles are becoming more important every day, impacting the well established procurement way of working. PSM models are required to evolve into this new environment, supporting the business in broader and more strategic activities than today’s norm. To tackle the challenges of the Circular Economy, a value chain orientation won’t be enough. This is not about improving reverse logistics or sustainable sources. This is about partnering with designers and developers to have materials that can be reused, repaired and remake for several loops ahead. And develop strategic suppliers that can provide and manage these material chains over time. A new mindset will be needed for the PSM teams, new performance measurement systems, new skills and competencies. This paper details these new requirements and presents the outcomes of a case study done in a global consumer goods company that is moving from a traditional buying approach to this circular procurement mindset.

Keywords: *Circular procurement; Circular economy; Sustainable procurement; Circular supply chain; Sustainable Supply chains.*

1. Introduction

In today’s business environment, companies that apply the traditional “take-make-disposal” economy are increasing their exposure to higher raw material prices and constantly supply constraints and disruptions. These linear supply chains are being replaced by more circular and closed-loop supply chains, with new business models everywhere.

One of these new models is the Circular Economy. It is a synthesis of ideas coming from a series of schools of thought (such as cradle to cradle, natural capitalism and performance economy) and by design, provides an environment that is restorative and regenerative.

Few principles define the Circular Economy. Waste doesn’t exist. The system designs out waste. Everything is to be reused, repaired and remake.

The principles of circular economy are presented in section 2 of this paper.

Two main flows are the basis of the Circular Economy: biological nutrients, designed to enter the biosphere safely and build natural capital and technical nutrients, which are designed to circulate at high quality without entering the biosphere (McDonough and Braungart, 2002).

To operate in this new environment, Supply Chains will need to be redesigned to speed up their change from linear to circular industrial systems. Also, Purchasing and Supply Management (PSM) organizations will have a crucial role in this big change.

In the last 40 years, PSM has moved from a transactional role in materials and services management towards a more strategic role, aligned to long-term business requirements.

This evolutionary process can be represented by Maturity models, which reflect the fact that PSM is becoming more mature as a business function and more integrated in the context of strategic plans.

In section 3 the PSM maturity model developed by van Weele and Rozemeijer is presented and explored. It considers 6 stages of evolution: transactional orientation, commercial orientation, purchasing coordination, process orientation, supply chain orientation and value chain orientation. The first three are more focused on the function itself and the last three define a cross functional approach.

To tackle the challenges of the Circular Economy a value chain orientation maybe won't be enough. Circular Procurement principles have to be totally integrated to current PSM strategies and tools.

The principles of circular procurement are detailed in the section 4 of the paper, and the ultimate concepts are shared, based on European experiences.

In section 5, a practical experience with a consumer goods company is presented, considering the pathway this company procurement team has taken to tackle the challenge of circularity.

Finally, the main conclusions are discussed in the last part of the article, and a proposal for a next step in the maturity model is proposed.

2. Circular Economy principles

Since industrial revolution, the linear models of manufacturing and consumption in which goods are manufactured from raw materials, sold, used and then discarded as waste, have been the dominant business model in our planet (Ellen MacArthur Foundation, 2013).

This traditional "take-make-disposal" economy is increasing companies' exposure to higher raw material prices and constantly supply constraints and disruptions. These linear supply chains are being replaced by alternative models of production, distribution and consumption, based on reusing resources and regenerating natural capital, with innovative business models everywhere.

One of these new models is the Circular Economy. It is a synthesis of ideas coming from a series of schools of thought such as cradle to cradle (McDonough and Braungart, 2002), natural capitalism (Hawken et al, 1999), biomimicry (Benyus, 1997) and performance economy

The Ellen MacArthur Foundation defines Circular Economy as “an industrial system that is restorative and generative by intention and design” (Ellen MacArthur Foundation, 2013). The concept of “end-of-life” is replaced with restoration. There is the use of renewable energy and the elimination of toxic chemicals due to constant reuse of parts and goods. Waste is also eliminated through the superior design of materials, products and systems, in new business models.

Other detailed definition is presented by Geissdoefer et al (2017). For them, Circular Economy is a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing and recycling”.

Through these lens, it becomes more visible that to manage all these complex loops in a high efficient mode, it requires innovative business models, rethinking the way value is created in the organizations and therefore, a more circular supply chain.

3. Procurement Maturity Model

Procurement and Supply Management have evolved dramatically in the last few decades.

Until mid-1970, Purchasing area had a passive role in the organizations, more administrative than strategic (Ansoff, 1968). Challenges on supply and raw material costs ignited a deep transformational process in many companies. Supply Chain Management has change to a more strategic area at company level and Purchasing and Supply Management (PSM) have also followed this trend and became a more strategic partner to the business, contributing to the total business performance.

This evolutionary process of PSM can be represented by Maturity models, which reflects the fact that PSM is becoming more mature as a business function and more integrated in the context of strategic plans. Maturity models help establishing these parameters along the several stages of maturity that each organization faces, until reaching a certain end stage of excellence. Several authors developed conceptual models to reflect PSM evolution as summarized in figure 1 and they describe in some extend the level of professionalism the PSM organization has achieved and its impact in the business they serve. Greater the PSM maturity, better the performance of the firm.

Purchasing maturity is often considered as a broad, aggregated concept, considering elements from business strategy, organizational structure, supplier relationships, internal processes and systems (van Weele, 2014) and complete value chain integration in the end stages.

Author	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Reck and Long (1988)	Passive	Independent	Supportive	Integrative	----	----
Syson (1989)	Transactional	Commercial	Strategic	----	----	----
Bhote (1989)	Confrontation	Arms length	Goal congruence	Full partnership		----
Freeman and Cavinato (1990)	<i>Buying</i> (at low prices)	<i>Purchasing</i>	<i>Procurement</i>	Supply acquisition	Facilitate networks	----
Cammish and Keough (1991)	Serve the factory	Lowest unit cost	Coordinated purchasing	Strategic procurement	---	----
Van Weele (1992)	Operational and administrative orientation	Commercial orientation	Logistic orientation	Strategic orientation	---	----
Burt and Doyle (1993)	Reactive	Mechanical	Proactive	Strategic supply management	---	----
Keough (1993)	Serve the factory	Lowest unit price	Coordinated purchasing	Cross functional purchasing	World class supply management	----
Monczka and Trent (1995)	Manufacturing support	Price buying	Consolidation	Integrated strategic sourcing and supply chain management	---	----
Chadwick and Rajogopal (1995)	Clerical	Commercial	Supportive	Strategic	---	----
Van Weele et al (1998)	Transactional orientation	Commercial orientation	Coordinated purchasing	Process orientation	Supply chain orientation	Value chain orientation

Figure 2: adapted from Rozemeijer (2000)

Purchasing maturity is often considered as a broad, aggregated concept, considering elements from business strategy, organizational structure, supplier relationships, internal processes and systems (van Weele, 2014) and complete value chain integration in the end stages.

The PSM maturity model developed by van Weele and Rozemeijer provides a comprehensive understanding of the impacts of PSM in any company. It considers 6 stages: transactional orientation, commercial orientation, purchasing coordination, process orientation, supply chain orientation and value chain orientation. The first three are more focused on the function itself and the last three define a cross functional approach. (van Weele et al, 1998; Rozemeijer, 2000; van Weele, 2014).

When a firm is positioned in the advanced stages of a maturity model, there must be benefits to the whole enterprise and the business performance is to be amplified.

It is fundamental that PSM strategies are aligned to the firm business strategies. It is also critical to evaluate the existing gap between the current maturity level the PSM organization has against the final stage that will attend the future demands from the company side.

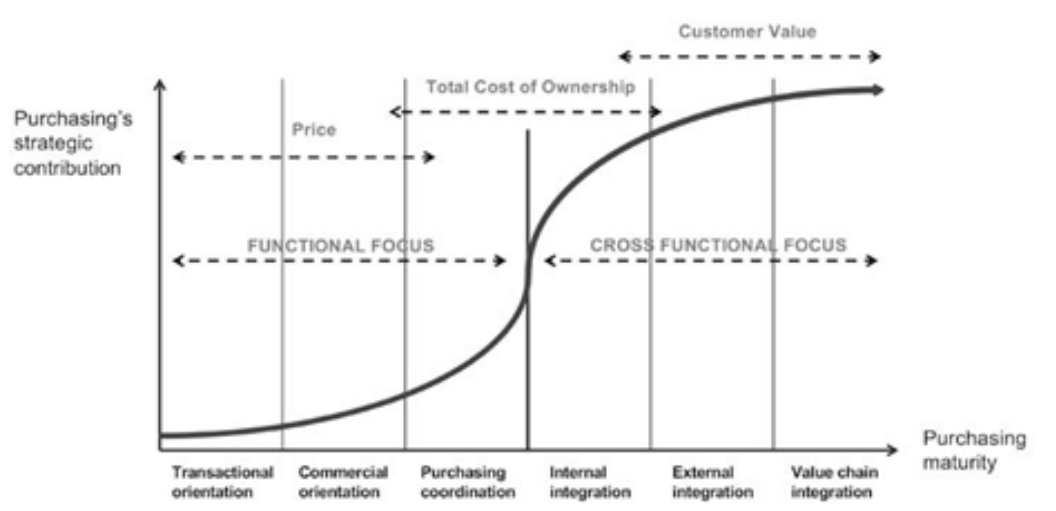


Figure 3: maturity model based on Rozemeijer (2009) and van Weele (2014)

The lowest level of maturity is about transactional orientation. Purchasing is defined as a passive operation where purchasing professionals are focused on administrative tasks. In this first stage, the fundamental activity of Purchasing and Supply Management lies in the search of suppliers that meet the required specifications and to ensure that the factory did not stop for lack of raw materials or components.

In step 2, commercial orientation, there is a more elaborate approach to commercial details, with bid techniques for competition among suppliers, comparing commercial proposals, and use of pre-qualified suppliers. There are an emphasis on low unit prices and the impact of these savings in the company results. PSM starts to become an area of expertise. These specialized buyers are organized into different product groups and focused on negotiating good contracts.

Step 3 considers that the buying company has tight control over the purchasing volumes, number of suppliers and items purchased. Sourcing strategies begins to be integral part of the PSM activities, aiming to capture the benefits of internal coordination and synergies. Besides price and costs, the role of Purchasing and Supply Management is recognized as an important contributor to the quality of products purchased.

These three initial stages have in common a functional approach, in which Purchasing and Supply Management works with relative independence or isolation (Axelsson, Rozemeijer and Wynstra, 2006). In sequence, steps 4-6 are characterized by a radical change in the purchasing organization, which becomes much more process oriented.

Step 4 is focused on solving problems between functions, in order to reduce the total cost, not just the unit cost of purchasing the component. Purchasing and Supply Management becomes more process-oriented and seeks to organize the PSM function around the internal customers. The strategic importance of Purchasing and Supply Management are finally recognized, and the area becomes involved in core / non-core strategic issues and also make or buy decisions

Stage 5 is characterized by extension of the activities with focus on supply chain and in working with supply partners in the development of new products and production planning. PSM focuses on the effects that supply chain has on other areas and company resources.

The final stage focuses on delivering value to the customers and end users. The goal is to design the most efficient and effective value chain possible to serve the end-customer. Suppliers are required to contribute towards the growth of company revenues (top line), by generating new business opportunities, in addition to contributing to the company's profitability (bottom line). The strategy of Purchasing and Supply Management is diluted in the overall business strategy and both upstream as downstream chains are integrated by information systems. There is an entrepreneurial culture.

The more advanced stages of maturity model demand indicators that go beyond the management of traditional performance measures such cost, delivery, quality and inventory. It is an approach oriented to reducing total cost and its efforts will add value not only to the buyer firm but also to their partners.

In the end stages of the maturity model, pure measures should become less relevant, such as cost savings in raw materials (savings) and their impact on operating margin. Greater relevance should be given to aspects of purchasing and supply management in the value creation through the generation of new businesses, support the development of new products together with strategic suppliers, and optimization of working capital, by reducing lead times, improving payment terms from suppliers and optimization of investment in assets (Pollice and Fleury, 2010).

4. Circular procurement

Circular Procurement is a relatively new concept and there is no agreed definition on it. Several definitions have been used as presented in table 1, and there is no doubt that Procurement plays a key role in the acceleration of the Circular Economy.

A good foundation lies on the concepts and practices already defined to support sustainable procurement initiatives. From initial focus on resource reduction, product reuse and recycling (Carter & Carter 1998; Carter & Dresner 2001; Carter & Ellram 1998; Min & Galle 1997), it expanded to reverse logistics (Carter & Ellram 1998) and to a wider approach that looked to the concepts of corporate sustainability and corporate social responsibility (CSR).

Sustainable procurement practices integrate requirements, specifications and criteria that are compatible and in favour of the protection of the environment, of social progress and in support of economic development, namely by seeking resource efficiency, improving the quality of products and services and ultimately optimizing costs (UNEP, 2014). Sustainable procurement is also key to address suppliers' capabilities to achieve these new requirements throughout the supply chain.

The concept of Circular Economy has become one of the most recent proposals to address environmental sustainability (Murray et al., 2015). As described by Witjes and Lozano (2016),

this is done through addressing economic growth, while at the same time considering the shortage of raw materials supply and energy as well as the growth on new business models. In this context within Supply Chain Management, no better area can play a pivotal role in the transition to a Circular economy than PSM (Weetman, 2017).

Leading countries in Circular Economy implementations have developed Public Procurement (PP) initiatives faster than the industry and provided relevant insights for industry rollout.

Reference	Description	Focus
Van Geet, 2014	Circular Procurement – Circular Economy + Public Procurement	Reuse Recycle Repair Refurbish Remanufacture Retrieve
Green Deal, Circular Procurement, 2013	Circular procurement stimulates and creates demand for goods that contribute to the circular economy	Promoting a circular economy.
MVO Nederlands, 2015	The procurer ensures that the products are produced in accordance with the principles of the circular economy and will be further processed after use, i.e. are repairable and can be broken down into components and/or materials at the end of their life cycle, which can be reused	Recyclability and reuse of materials
New Foresight, 2014	The purchasing of products or services that follow the principles of the circular economy: there are no negative side effects of production, waste does not exist, a product or its elements are completely compostable or reused, and toxic materials are eliminated. Energy for production is from renewable sources	Maximum closed loops
Philips, 2016	Circular procurement is about making choices early on in the creation process, so that materials and components are suitable, at end-of-life, for repair, refurbishment or reuse	Selection of components and cooperation in supply chain
Circular Public Procurement in the Nordic Countries, 2017	The procurement of competitively priced products, services or systems that lead to extend lifespan, value retention and/or remarkably improved and non-risk cycling of biological or technical materials, compared to other solutions for a similar purpose on the market	Value creation, social wellbeing and environmental improvement through close and safe material loops
European Commission, 2017	Circular procurement can be defined as the process by which public authorities purchase works, goods or services that seek to contribute to closed energy and material loops within supply chains, whilst minimizing, and in the best case avoiding, negative environmental impacts and waste creation across their whole life-cycle	Circular procurement models: system level, supplier level and product. Circular procurement hierarchy: reduce, reuse, recycle and recover.

Figure 4: Circular Procurement definitions. Adapted from Circular PP in the Nordic Countries (2017)

From the previous definitions, common challenges can be found:

- Design of products that enable dismantling.
- Increase of cycling of products and raw materials.
- Minimisation of value destruction and maximum use of renewable resources.
- Promotion of new business models.
- Elimination of hazardous chemicals and harmful substances
- Increased service intensity of goods and services.

With the objective of integrating circularity in the procurement and tendering process, a road map was developed by MVO Nederland and PIANOo. Following the steps in this roadmap,

procurement teams can take decisions on a high level, as well as take concrete steps on a practical level to implement a closed-loop sourcing process.

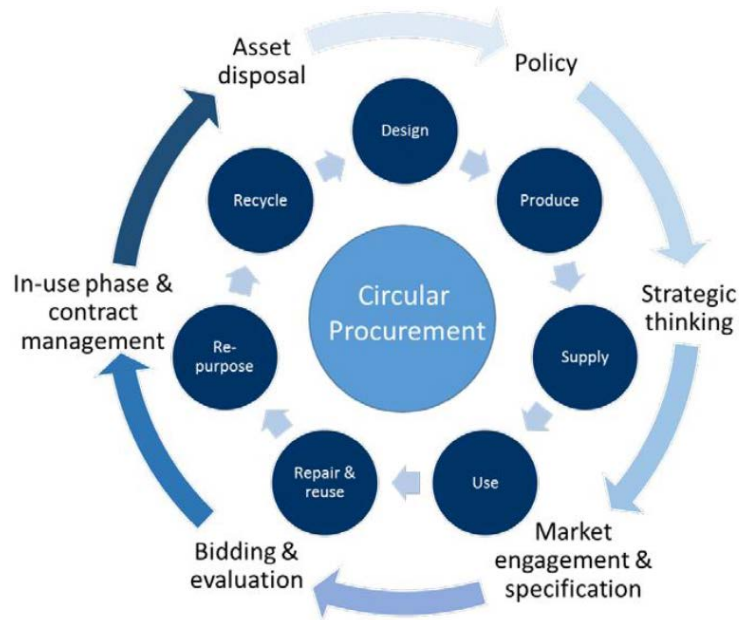


Figure 5: circular procurement tendering process activities

No doubt this road map provides a structured way to include circular economy principles in a tender. However, the tendering process is a very business integrated process within industry. It has a multidisciplinary scope. And tenders are only a part of the PSM activities on sourcing strategies development and implementation. A complete integration of the circularity concepts in the procurement processes is required to make circular procurement the new norm.

Circular economy approach can create new value for the organization (Weetman, 2017). There are savings associated with a circular economy system by reusing resources inputs to the maximum degree. It is fundamental to increase the rate at which their products are collected and reused, or components/materials are recuperated (Ellen MacArthur Foundation, 2013).

Buyers will need to design their sourcing strategies in a much broader way, looking ahead of the current linear system. This is not about improving reverse logistics, waste management or sustainable and green sources. This is about partnering with designers and developers to have materials that can be reused, repaired and remake for several loops ahead, including production and consumption. Develop strategic suppliers and customers that can provide and manage these material chains over time. A brand-new skill for buyers is required: they will have to develop the market for a circular demand. Circular supply needs circular demand. So, buyers will become sellers as well.

This is a big change in the way buyers are trained to have a high delivery performance. From step 3 onwards in the maturity model presented, buyers are expected to deliver higher savings developing sourcing strategies based on their bargain power because of volume leverage and supply risk management. As PSM moves into internal integration becoming a real partner to the business, or to an external integration, bringing suppliers expertise to innovation process, success is measured considering total cost approach or supplier contribution to the new product development.

At stage 6, value chain integration includes delivering value to end-customer as well and suppliers are expected to contribute to top line results generating new business models' opportunities. However, all these advanced stages are still linked to "traditional linear make-take-disposal" mindset.

These circular procurement practices will need to be incorporated to the day-by-day activities of the PSM teams. There is no agreement in terms of organizational structure to support that. It can be a separated team that deals with circular procurement practices or it can be totally integrated to any PSM activity within the Procurement function, with impact in the way PSM is integrated to the value network.

Circular procurement provides a different thinking to attend different business needs:

- Consider service instead of products. Business that are product-oriented are transitioning to a service -oriented model, but the success of this transition also implies that product-service-systems are designed to be circular (Michellini et al, 2017).
- Focus on product design, its use phase and end of life (considering waste hierarchy as reduce, reuse, recycle, and recover).
- Engaging with suppliers and the wider market to establish a dialogue and to identify circular solution.

One of the key drivers of Circular Procurement is the market dialogue. Market engagement allows for the exploration and promotion of new business concepts. It is a new collaborative business model. Suppliers can identify the potential and feasibility of new supply models including a shift on technical specifications to link to circular economy principles (European Commission, 2017).

Next section will present a real case in which market dialogue was led by Procurement and followed by other functions such as Marketing and R&D.

5. Circular Procurement in practice in a FMCG company

The case study was done in one of the leading global fast-moving goods company. This company is committed to move to a more circular business model and is one of the sponsor of Ellen MacArthur Foundation.

Several external commitments were made mainly related to the use of plastic: decrease weight of the packaging, increase use of recycled plastics and increase recyclability of the packaging.

This company is also a leader in the sustainability agenda, with strong commitment and achievements in terms of buying raw material from sustainable sources, suppliers that proved not using child or slavery labour, zero waste to landfill in its manufacturing operations across the globe, use of renewable energy or bringing products to market with a lower carbon footprint. A very positive environment to grow circular economy practices.

PSM organization is well established, positioned at stage 5 of the maturity model. So very integrated to the business, managing cost savings from global sourcing strategies and helping innovation with suppliers involved in new product development since early stages.

However, circular procurement initiatives are ad hoc, case by case. They are not an integral part of the PSM agenda. Focus stays on business compliance and developing sustainable sources for agriculture based raw materials.

As mentioned, external commitments on use of PCR (post consumption resin) and increase of recyclability were done and 2020 is the dead-line.

An experienced packaging buyer was nominated to find a solution to one of the most critical primary packaging of the company. There is a triple layer pouch that is made of pure resins and due to the different types of resin required, it is not recyclable in the country. This pouch is used to pack liquid detergent.

The traditional PSM approach would be: brief to current suppliers or brief to regular supply market. In these case, a collaborative approach was done. Instead of considering well established suppliers, the buyer looked for a pool of innovative suppliers, in a circular economy network. One small supplier came up with a very interesting solution that would replace the mid layer for PCR, allowing not only the use of recyclable resin but also making it recyclable as well.

The solution was more an intention than something tangible at that time. A lot of joint development would be required. Basically, product would have to be redesigned.

When designing for a technological cycle, designers aim to develop products in such a way the materials (“technical nutrients”) can be continuously and safely recycled into new materials or products. The waste resources are to be recycled into material having properties equivalent to those if the original material (Bocken at al., 2016)

The buyer partnered with R&D and a new project started. A new packaging specification was drafted, and pilot trials were made. Several rounds of experimentation were necessary to have a sample with a good level of quality that could be presented to Marketing for approval.

PCR was not a well-developed chain in the area this company has its operation. The sourcing solution considered a new supply chain for the capture of recyclable post consumption material

in the market, separation, cleaning and film extrusion. This mid layer would be sent to the current pouch supplier, that would finalize the triple layer extrusion process and printing artwork.

Only because the buyer had control of the whole portfolio of pouches, he was able to develop a complete new sourcing strategy and splitting volumes amongst suppliers, there will be no on cost to the solution.

The success factors of these initiative were:

- The buyer had full control of his category and he was able to do the required trade-offs in the portfolio to present a healthy proposal to the business.
- Collaboration with non-traditional suppliers and establishment of a long-term relationship.
- R&D involvement in circular product redesign.
- Marketing as business partner.
- Performance indicators not focused exclusively in material cost.

After almost 1 year of development, the new pack is ready to be launched to market.

6. Conclusions

Circular Procurement is a new territory for the PSM organizations. It will evolve as companies embed circularities and closed loops into process, products and services.

There are several practices already in place to support Procurement new requirements for the Circular Economy, but clearly there is a gap in terms of defining Circular Procurement as integral part of the PSM role.

There are business synergies when circularity is embedded in the procurement strategy since the beginning. The development of a circular sourcing strategy that considers the elements of the circular economy since the design of the products is fundamental to the success in the long term. The case study demonstrated that competitive costs can be achieved, and supply risk can be mitigated if the buyer plays within his total portfolio in the closed loop chain.

However, it is critical that PSM organization presents a minimum level of maturity to make this happen. Strong internal and external collaboration and total business integration are key enablers to move forward in a sustainable way.

The collaboration amongst current and new partners and industries becomes a key driver for the success of the circular economy within Procurement. That leads to a different level of professionalism in the PSM organizations, more focused on the network of industries that can provide the circularity solutions for the specific needs of the company.

This paper proposes that there is a new stage in the maturity model that is required to characterize the circular procurement integration to the business: the ecosystem integration.

A total integration to the vast network of companies that will together allow that all elements from suppliers to end consumers are truly circular, with close loops in every stage of the production and consumption chain, as presented in figure 6.

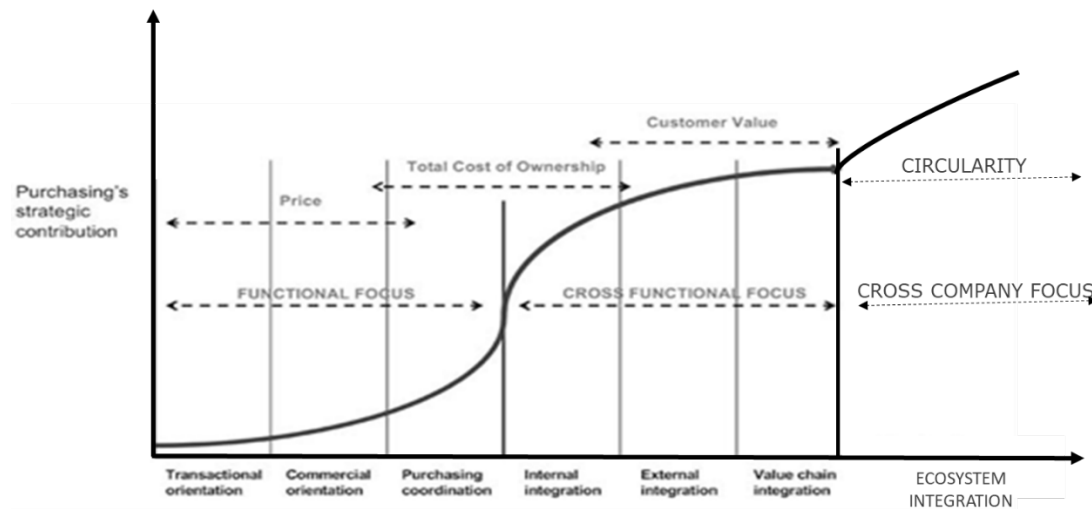


Figure 6: adapted by the author

This would allow a different level of contribution from PSM organizations to the business.

The level of knowledge of the PSM teams on the circular economy principles needs to increase to make it more natural when developing new strategies. A different skill base is to be part of the PSM development programme, considering not only circular economy theory and principles, but also concepts related to development of new business models. Think in systems instead of the traditional linear supply chain will fundamental to the PSM organization.

Procurement goals achieve to value chain integration have to be reviewed and the new value creation as part of circular economy approach have to be incorporated in the procurement models, including circular performance metrics that would measure the success of circular sourcing strategies, beyond traditional PSM indicators.

A new mindset will be needed for the PSM teams, considering the whole ecosystem perspective.

This study presented the key drivers of Circular Procurement and argued that a complete integration of circular Procurement concepts and practices in the Procurement organizations and structures is required, in a next stage of Procurement evolution.

It opens a discussion for futures researches considering that further stages in the PSM maturity models are required, considering value creation in the total industrial ecosystem, beyond the boundaries of a single company.

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