

When Precedents Become Normative: Routine Rigidity & Environmental Innovations

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Abstract

Environmental innovations are essential to climate change mitigation as they aim to conserve the consumption of resources. Routine rigidity is rarely discussed as a barrier to environmental innovations and this article aims to provide empirical evidence that substantiates its relevance in the discussion on environmental sustainability. A qualitative approach employs a logic model to analyse two sequences of events which track the implementation of innovations that had been overlooked for some time. The evidence shows that the selected innovations were previously inhibited by a failure to change the organisation's formal processes and informal cultural norms. This is especially true of innovations that altered the daily routines of the focal firm's employees and of innovations that potentially alienated customers. The characteristics of the innovations (high impact and low barrier to implementation) mean that firms are now less able to justify inaction by hiding behind the traditional barriers of environmental innovation.

Keywords: routine rigidity; environmental innovation; organisational inertia; threat perception; eco-innovation; green innovation

Introduction

The European Commission plans to reduce greenhouse gas emissions by 80% by 2050 with the intention of keeping climate change below 2°C. This will be delivered in incremental steps with milestones of a 40% reduction by 2030 and 60% by 2040 and all of these targets are compared to 1990 emissions levels (European Commission, 2011). This has been enhanced by the Paris agreement which was signed in December 2015 and saw 195 countries adopt the first-ever legally binding global climate deal. These targets are indeed a step in the right direction, however, they will not be met through the incremental innovation of business as usual and firms cannot just sit around and wait for technological advancements to deliver the reduction in emissions (Jackson, 2009). Peters et al. (2013) claim that meeting the European Commission target will require *immediate significant and sustained global mitigation, with a probable reliance on net negative emissions in the longer term* while other scholars argue that this target will not be achieved without imposing global carbon taxation (Rogelj et al., 2013).

Environmental innovations focus on reducing environmental impact and in achieving environmentally focused sustainability targets. They are essential to climate change mitigation as they aim to conserve the consumption of resources and to reduce the generation of pollution and waste (Rennings, 2000; Del Rio et al., 2010; Forsman, 2013). Organisational inertia inhibits the ability of organisations to be innovative and to adapt to change (Hannan and Freeman, 1977). It is

typically split into two distinct categories which are resource rigidity and routine rigidity (Gilbert, 2005). Resource rigidity is the failure to change the organisation's resource allocations and routine rigidity is the failure to change the organisational processes. This article focuses on routine rigidity which can be understood as the inability to change the organisation's formal processes and informal cultural norms. It has been shown in the past that product innovations can be stimulated by R&D spending but that the same cannot be said for process innovations (Rehfeld et al., 2007; del Río González, 2009). As a consequence, understanding process and organisational innovation is especially important as it is difficult to positively affect these types of innovation.

A great deal of attention has been paid to environmental innovation and most of this has focused on environmental innovation and economic performance (Shrivastava, 1995; Reinhardt, 2000; Doran and Ryan, 2016), whether tougher environmental regulation is likely to stimulate innovation (Porter and van der Linde, 1995; Boons and Wagner, 2009; Horbach et al., 2012) and the development of new product designs that reduce environmental impact (Hart and Milstein, 2003; Hofmann et al., 2012). Far less attention has been paid to the relationship between environmental innovation and organisational inertia and only one study has examined its relationship with routine rigidity. Routine rigidity is a new but relevant area in the literature and its strength lies in its ability to explain why some rational innovations are not implemented. To date, it has only been referenced in the literature on environmental sustainability with regard to sustainable procurement policies (Meehan and Bryde, 2011). To close this gap, this article collects empirical evidence that sheds further light on the relationship between these two concepts.

The focal innovations in this article do not require large investments and do not rely on technological advancements. Furthermore, they do not require additional learning or knowledge integration and they could have been implemented in the focal firm at any time in the previous decade. The innovations create substantial improvement of economic and environmental performance and aim to overcome the previous failure to change organisational processes. This is especially true with regard to the implementation of environmental innovations that directly impact the daily routines of their employees or the firm's performance as viewed by their customers.

The observed innovation characteristics of high impact (economic and environmental) and low barrier to implementation (cost and technological) make the relationship between environmental innovations and routine rigidity a valuable study area as firms are now less able to justify inaction by hiding behind the traditional barriers of environmental innovation. This article aims to add to the empirical research on organisational inertia and especially in the context of environmental sustainability. To add to the understanding on these topics this article asks the following questions: (1) Can routine rigidity inhibit environmental innovations? (2) What mechanisms can overcome routine rigidity? and (3) Does threat perception catalyse or inhibit environmental innovations?

The following section addresses inertia theory from the environmental innovation perspective. The next section addresses the method used to analyse the environmental innovations which were implemented in a multinational telecommunications firm. The fourth section discusses the results of this analysis and the fifth section discusses the relevance of these results. The final section provides a conclusions, addresses the limitations of the current study and offers recommendations for future research.

Theoretical Framework

Organisational Inertia

The concept of structural inertia was first introduced when scholars began examining the adaptability of organisations in changing market conditions. It described the factors that limited the ability to adapt and it was comprised of internal structural arrangements and (economic) environmental constraints (Hannan and Freeman, 1977). The factors that were internal to the organisation were related to sunk costs, the availability of information, internal political constraints and the constraints generated by the organisation's historical path. According to inertia theory, the history of the organisation determines the development of standard operational procedures and the allocation of tasks and authority. As the theory developed this path dependence was succinctly described as *the tendency for precedents to become normative standards* (Hannan and Freeman, 1984).

Incremental innovation reinforces the normative standards and the capabilities of established organisations whereas more ambitious innovation strategies force organisations to ask new questions and to develop new skills (Henderson and Clark, 1990). Thus, if organisations are seeking to overcome organisational inertia then they must develop new organizational capabilities. This is a challenging task as they are costly to adjust, difficult to create, cannot be purchased and thus they must be built within the organisation (Teece and Pisano, 1994; Teece et al., 1997). Organizational capabilities are made up of routines that are highly patterned, repetitious and are founded partially in tacit knowledge and the specificity of objectives (Winter, 2003). The foundation upon objective specificity and tacit knowledge is the reason why capabilities cannot easily be bought and must instead be built. It is also the reason why being more ambitious than incremental innovation is difficult.

Incumbent inertia has been described as the inability of organisations to implement change in order to respond to significant (economic) environmental fluctuations (Miller and Friesen, 1980). It has been extensively studied by past scholars and a key reason for this is that incumbent failure is extremely common (Christensen, 1997). Gilbert (2005) studied the struggle of incumbent firms in the face of innovations that create discontinuous change. He defined the role of rigidities and cognitive frames and categorised the sluggishness of the incumbent's response into two distinct categories. Under the conditions of discontinuous external change, resource rigidity is the failure to change the organisation's resource allocations and routine rigidity is the failure to change the organisational processes. However, the concept of routine rigidity has a long history. Nelson and Winter (1982) discussed rigid firms in the context of organisational change in their seminal work and the term itself was used by scholars as early as the 1990's (Dickson, 1992; McMaster and Sawkins, 1996).

In the past, scholars have made contrasting discoveries when studying the influence of external discontinuities on organisational inertia. The literature suggests that threat is a response catalyst however, some scholars have found that an external threat acts as a catalyst to overcome organisational inertia while others have found that threat perception increases organisational inertia (Gilbert, 2005). Threat perception typically has three elements which can be summarised as having a negative effect on the organisation, being associated with loss and being outside the organisation's control (Dutton and Jackson, 1987). Threat related stress has been shown to overcome inertia by

catalysing radical renewal efforts which are more ambitious than incremental adjustments (Huff et al., 1992). However, Gilbert (2005) claims that threat perception decreases resource rigidity but increases routine rigidity in a predictable, repeated pattern.

The reconfiguration of established organisational processes produces a challenge to organisations as it disrupts routines and requires a change in behaviour of the firm's employees. This is why organisational innovations are more complex than process innovations which can be as simple as upgrading an item of production equipment. The renewal of organisational processes lies on the boundary between process and organisational innovation and determining the difference between these two innovation types is a common step when examining innovation cases. This is because both typologies essentially aim to decrease costs through new and more efficient concepts of production, delivery and internal organisation (OECD, 2005). A simple way of presenting the two types of innovation is to define process innovation as being related to equipment, software and specific techniques or procedures, while organisational innovation can be defined as being related to people and the organisation of work (OECD, 2005). This is in line with the research of another scholar who argues that the reconfiguration of organisational processes is a measure of the innovativeness of the whole firm and not just the actions of a few people and thus should be characterised as organisational innovation (Rogers, 1983). Thus, organisational innovations are needed to reduce routine rigidity.

Environmental Innovations

This article concentrates on environmentally focused organisational innovations which is seen as a subset of environmental innovations. The core focus is on organisational inertia and environmental innovations and in particular on environmental strategies that are routinely ignored due to the failure to change established organisational processes. The term environmental innovation is synonymous with eco-innovation and green innovation and it refers to the improvement of products or processes as well as the development of new ideas or behaviours that reduce environmental impact (Rennings, 2000; Del Rio et al., 2010; Forsman, 2013). The term green innovation is less suitable as scholars often argue that it focuses primarily on technologically driven advancements (Aguilera-Caracuel and Ortiz-de-Mandojana, 2013). Environmental innovation is used in preference to sustainable or sustainability innovation as these terms open the focus to social sustainability which is beyond the scope of this article (Hansen et al., 2009).

The barriers to environmental innovations have been described as being related to the lack of financial resources, low technological competency to develop environmental innovations internally and low technological competency to absorb environmental innovations developed externally (Del Río et al., 2010). Other studies found that the main barrier was caused by environmental products having a higher price than competitor products (Rehfeld et al., 2007). In addition to this, Foxon and Pearson (2008) present the barriers to environmental innovation as system failures related to investment in infrastructure, failure to keep pace with changing technology, lock-in effects and institutional failures.

The topic of organisational inertia featured prominently in the win-win environmental management literature of the early 1990's. Shrivastava (1995) described one of the barriers to the adoption of environmental strategies as being related to that fact that organisations are accustomed to doing

things in certain set ways and that they have established decision routines, standard procedures, and cultural habits. It is commonly referenced in the modern dialogue on environmental innovation but it is rarely tackled in a detailed manner. Organisational inertia is often classified as a general barrier, discussed in the context of cultural attitudes surrounding the causes of climate change and presented as a justification for more governmental regulation (Long et al., 2016; Simboli et al., 2014; Bleda and Shackley, 2008; Qi et al., 2010). It is in the context of governmental regulation and legislation where it most commonly appears. Porter and van der Linde (1995) argue that tougher environmental regulation is likely to stimulate business innovation by removing inhibiting organisational inertia and this is referenced by a number of scholars who touch upon organisational inertia and argue that it can be overcome by increased regulation (Boons and Wagner, 2009; Moon et al., 2014; Rassier and Earnhart, 2015). Könnölä and Unruh (2007) also touch on the interaction of regulation and organisational inertia and argue that environmental management systems need to be developed in a manner that does not inhibit innovation.

When organisational barriers to environmental innovation have been studied in depth, their relevance has clearly been demonstrated and it has been claimed that they are stronger inhibitors of environmental innovation than product, process or technological barriers. (Lenox and Ehrenfield, 1997). The organisational barriers that were considered to be most relevant were related to learning, knowledge integration and knowledge interpretation within the organisation (Lenox and Ehrenfield, 1997; Wong, 2013; Dooley, 2017).

Research process

A qualitative research design has been employed in this study (Creswell, 2014; Yin, 2009). The research setting is a multinational telecommunications firm with an annual turnover of approximately 10 – 15 billion euros and due to the sensitivity of the data it will be referred to as the *focal firm* only. The focal organisational process is the improvement of economic and environmental performance. This is an attractive research setting not least because of the focal firm's size but also because the firm is considered as one of the leading firms in its industry with regard to environmental and social sustainability. This study provides insights into the environmental innovation selection process prior to and subsequent to the discontinuous environmental change brought about by the global recession that began circa. 2008.

In the years before implementation of the selected innovations, the focal firm had been actively improving their environmental performance over many different areas of the organisation. For example their environmental plans included the following targets: (a) to increase the average energy efficiency of their product portfolio by 5% per year on average; (b) to reduce the energy consumption of their own operations by 5% per year on average; (c) to introduce emissions targets for new cars in their European service fleet; (d) to reduce the CO₂ emissions from buildings by 30% over the course of 5 years and (e) to divert 75% of their operational waste from landfill. This study focuses primarily on the environmental innovation selection process and especially on environmental innovations that require a change in the existing organisational processes.

Our research is based on several data sources:

- Qualitative and quantitative data from semi-structured interviews with members of the environmental management team.

- Archival data was also collected from internal strategy documents, internal progress reports, press releases and annual reports.
- Observations were made through many visits to the organisation's headquarters and during group discussions at workshops which were organised to debate the merits of various environmental innovations.
- Emails and phone calls were also used to fill any gaps that emerged during the process.

The primary data source is 60 minute semi-structured interviews. 10 interviews were conducted in total and each member of the environmental management team was interviewed. The interviews were structured to initially discuss environmentally oriented innovation at the level of the whole firm and then to focus on each person's area of expertise. The interviewees included the manager of the environmental team and the executive who is responsible for reporting corporate responsibility issues to the executive board. The qualitative approach employs a logic model to analyse two sequences of events (Yin, 2009). Qualitative data has been collected in order to explain the organizational decision making process that lead to the outcomes and quantitative data has been collected to show the financial and environmental drivers behind the strategic activities.

Results

The focal organisation reduced the greenhouse gas emissions of their outbound logistics by 64% from 2011 to 2013. This emissions reduction was calculated as being equal to 87 000 tonnes of CO₂-eq. by their annual sustainability report and 90% of this environmental performance improvement was delivered by just two strategies. Both strategies were concerned with the transportation of the firms outgoing products. The first strategy aimed to minimise the use of air freight in favour of sending the products by land and sea freight and the second strategy aimed to replace traditional timber transportation crates with a packaging solution adopted from the consumer retail industry.

Both of these strategies were relatively inexpensive to implement, resulted in substantial cost and emissions reductions and relied on well-known existing technology that had been developed many years earlier. This study examined the factors that had inhibited these strategies in the past and the triggers that overcame the initial inertia.

Moving from Air to Land and Sea

In the face of reduced sales due to the global recession, the focal firm aimed to introduce cost cutting strategies which eventually resulted in substantial cost savings and environmental performance improvement. The three-stage model developed as part of this study describes the dynamic interplay between the external (economic) environment, the internal activities of the organisation and the resultant outcomes (see figure 1). It was confirmed in the interviews that the strategies were initiated solely on the basis of cost savings and that they would not have been implemented for environmental reasons alone. Furthermore, when the suggestion to eliminate air freight was raised by the focal firm's management it received considerable negative feedback from the sales department. These activities are labelled number 3 and 4 in the logic model. The sales department were concerned that they would lose out to direct competitors who could offer their customers a shorter lead time from order to delivery. As environmental manager in charge of logistics and packaging noted: *I know that in the beginning the sales department said, we do not at*

all have a chance to fulfil this because our customer wants to have his product and he wants to order on short request.

Despite the concerns of the sales team the organisation moved forward with the strategy and implemented a strict approval rule for all air freight orders that cost over €5,000. Any air freight order that had logistics costs of over €5,000 had to be approved by the head of the regional sales department and any air freight order that cost more than €10,000 had to be approved by the organisation's COO. This activity can be seen as component number 5 in the logic model. The environmental manager in charge of logistics and packaging explained that due to the size of the firm's products this rule impacted the vast majority of orders by saying that: *€10,000 is nothing in shipment costs.*

The sales team had been concerned by the potential reaction of their customers to the longer lead times, however, as it turned out there was no need to be concerned. The environmental manager in charge of logistics and packaging confirmed this by saying that the innovation has been in place for over 2 years and that it has not negatively impacted upon sales: *of course there was a risk, but given that they have been doing it for 2 years now and our sales figures have been increasing I don't see that the customer is overly concerned about the time.* Another interviewee summarised the issue by explaining that their customers are not overly concerned with the total length of the lead time as long as the products arrive by the deadline that is agreed during the ordering process. Thus, the customers are not overly concerned if the agreed delivery date is 6 weeks or 10 weeks from the date of order as long as they arrive on time. Furthermore, it can be concluded that the strategy to move away from air freight has been accepted by the customers as a standard operating procedure by the focal firm. This can be seen by the fact that customers are now willing to pay for their products to be sent by air freight when a delivery is expedited at their request. The customer related outcomes are shown in the logic model as components 6 and 7.

The strategy was viewed as being a success by the focal firm as it substantially reduced costs and emissions without alienating customers. It was judged to have been *surprisingly easy* by the environmental manager in charge of logistics and packaging and was a result of the logistics and sales teams accepting the new operational process in order to avoid confrontation with the firm's COO. This is seen as component 8 in the logic model. The same interviewee said that acceptance of the strategy resulted in a *cultural change* within the firm.

Prior to the implementation of this strategy the firm had introduced measures with the aim of reducing the use of air freight. The percentage of products that were sent by air freight was made a key performance indicator (KPI) and this was monitored over time. However, this KPI was easily dismissed when delays in the supply chain were encountered and sending products by air freight was necessary in order to meet the delivery deadlines that had been agreed with the customers. Now that the strategy to move away from air freight has been adopted as a standard operating procedure, new internal measurement practices have been introduced to support it while also supporting the customer's choice to expedite their delivery when it is necessary. As the environmental manager in charge of logistics and packaging explained: *In the beginning we had a KPI regarding how many percentage can be transported by airfreight, and now we have two KPIs. One regarding the*

percentage transported by airfreight and the percentage transported by air freight of material we can decide how we want to transport it.

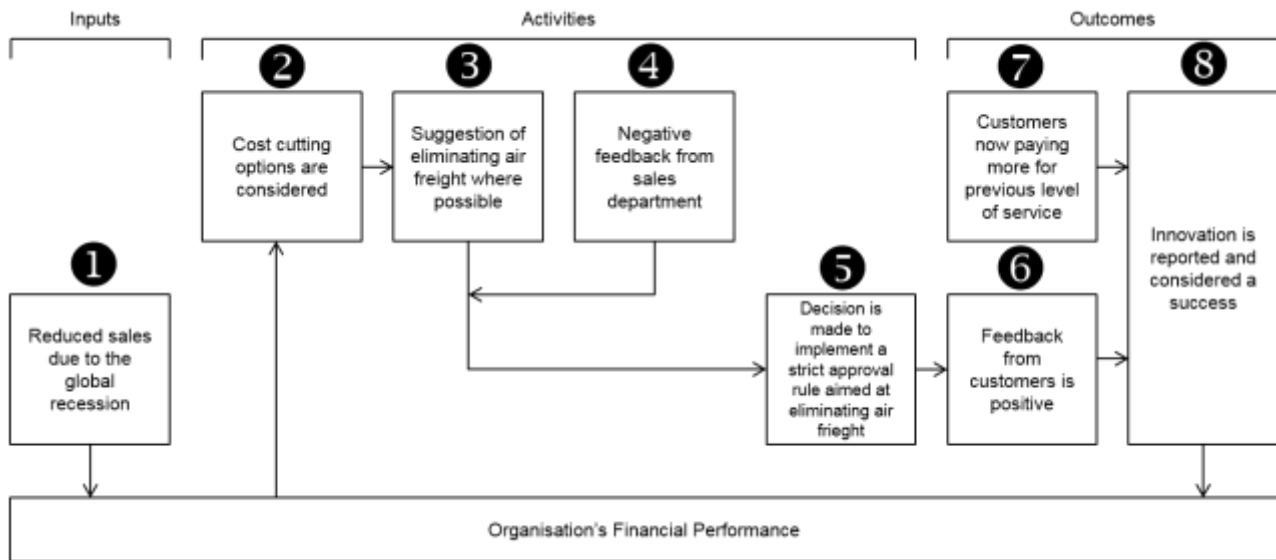


Figure 1: A three-stage logic model that depicts each component of the strategy to move away from air freight

Alternative Packaging Method

The strategy to adopt an alternative packaging method for the firm's products followed a similar pattern to the previous example as the strategy was not driven by a technological breakthrough, it initially received negative feedback and it was eventually accepted as a standard operating procedure. The change was driven by the need to deliver costs savings and it was initiated when the focal firm's packaging department suggested an alternative method to the industry standard timber transportation crates. The existing method of using timber transportation crates involved packaging the individual products in cardboard and then placing these individually packed units inside timber crates, which would then be loaded into airplane or train cargo holds, shipping containers or onto trucks. The alternative method placed the individually packed products onto wooden pallets and added a layer of packaging which covered the collection of products and attached them to the wooden pallet. This method was widely used in retail electronics but had not been adopted for the higher value products of the commercial electronics and telecommunications industries. As the head of packaging solutions explained: *I think it is the most common way of doing things, if you order things into a shop or anything, the palletized load is most commonly used, but with us, it was really ok don't take any risks, there's a €10,000 a piece per product inside, so a single damage is going to wash away your savings.* A three-stage model is shown below in figure 2 which describes the inputs, activities and outcomes of the strategy.

The result of using the alternative packaging method was a substantially higher packaging efficiency as the pallet method offered an array of packaging combinations compared to the timber crates. For example, on average 14 product units could fit into a shipping container using the pallet method whereas an average of only 6-8 units could fit into the same container using the timber crates. As the head of packaging solutions described, the pallet method also offered a saving on packaging materials: *previously, ok depending on volume of units but six, seven, eight units on that container and now 14 units on the new solution and less cost on packaging material.*

The strategy to move to the pallet method was originally raised more than 10 years prior to being implemented. On the previous occasion, it was rejected by customers and negative feedback was received from internal stakeholders who were also sceptical of the protective ability of the pallet method. As a result, the pallet method was not used by the firm even though it complied with the technical packaging specification that was demanded by the customers. As the head of packaging solutions explained: *every now and then we would get complaints that this is not strong enough and we want the plywood. Then we would say that ok, tell us what specifications do you need the plywood solution to fulfil and then they give us the specification which it (the pallet method) fulfils.* The interviewee went on to explain that in their opinion the customer preference of the timber crates over the pallet method was emotionally driven: *it's a mind-set game, people have the perception that the plywood is stronger, but actually we have data saying that if they (pallet method) are under pressure and there is a crash, they will hold on longer, so it is much more durable.* The interviewee did concede, however, that the protection provided by the pallet method was based on the cardboard retaining its structural properties which could be reduced under conditions of very high humidity: *but the problem really is that it's organic material, its strength is related to humidity.*

When the strategy to move to the pallet method was proposed for the second time the original negative feedback was considered and the decision was made to trial the method internally by using it for internal logistics from the factories to the regional transportation hubs. Thus, in the new environmental conditions where cost cutting was a priority, the original internal negative feedback was overcome but the negative customer feedback was respected. These activities are labelled number 3, 4, 5 and 6 in the logic model. The organisation's outgoing logistics has two stages. Stage one involves products being transported in bulk from the factories to the regional transport hubs and stage two involves the individual orders being sent from the regional transport hubs directly to the customers. The pallet method was used for stage 1 and the standard timber crate method was used for stage 2. The trials were conducted as there were concerns regarding the ability of the pallet method to protect high value electronic equipment under all conditions. As the head of packaging solutions interview said: *but this time we were not going to go asking for permission, but we said that this is what we are going to do, we are going to try that, we are going to see if it works, we are going to run trials, pilots, we are going to be very careful, we will be collecting feedback all kinds of things that we did and now it has been used on the hub inbound for year and a half.*

The trials have been successful and the firm claim that the pallet method requires 8kg less packaging material per pallet load and that it reduces the fuel consumption by approximately 43%. As a result the firm are now introducing the pallet method in their deliveries to customers. The pallet method will initially only be used on large bulk orders and the standard timber crate method will be used on smaller orders.

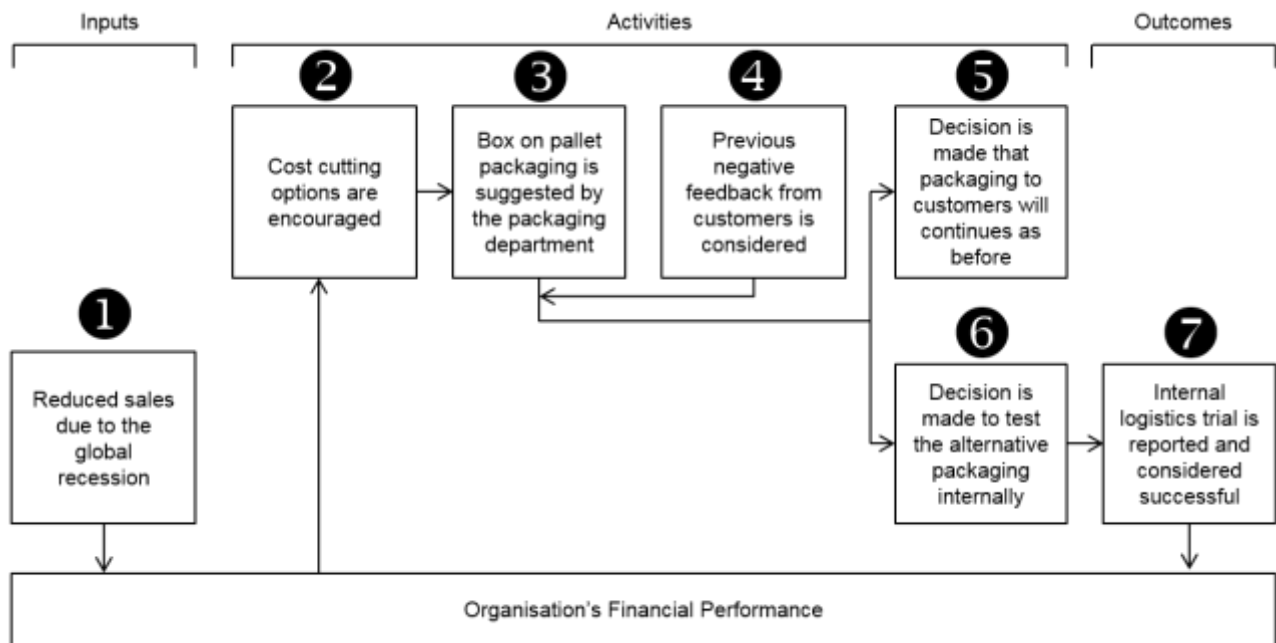


Figure 2: A three-stage logic model that depicts each component of the strategy to adopt an alternative packaging method

Discussion

The evidence of this study suggests that inertial forces inhibited these innovations from being implemented. This can be seen as the changes did not require large investments, they did not rely on recent technological advancements and they could have been implemented in the firm at any time in the previous decade. The innovations were not previously implemented due to a failure to change organisational processes and they can be considered as empirical examples of routine rigidity.

It is important to consider the factors that inhibited these innovations in the past. The first innovation was not implemented as the sales team overestimated the importance of the delivery time of the firm's products. As it turns out, the customers tolerated the lengthening of the lead time and communicated that their primary concern was that the pre-agreed delivery deadline should be met. The second innovation was previously overlooked as customers and various stakeholders within the focal firm were uncertain that the alternative method could protect the firm's high value products. The internal stakeholders were reluctant to implement the new method as in their opinion the risk of damaging the high value products was not worth taking for transportation savings alone. Their argument was based on the fact that even a minor amount of damage would be an expensive mistake due to the cost of replacement. Furthermore, the negative feedback from customers continued despite the focal firm providing evidence that the alternative method complied with the technical requirements of the customer's packaging specification. Once again, the concerns of the stakeholders that provided the negative feedback turned out to be unfounded and the innovation was a successful replacement of the original method.

In the past, reductions in cost and environmental impact had been actively sought after, however, this was habitually undertaken in the name of continuous improvement. The scale and ambition of these innovations was inhibited by routine rigidity as the firm sought to perpetuate the existing

organisational processes (Christensen, 1997). This is why the innovations remained incremental and included targets such as reducing the energy efficiency of products, improving the energy efficiency of buildings, reducing waste from facilities, reducing the emissions of newly bought cars and targets to reduce the emissions of the whole firm. The previous innovations were all similar in that they were extensions of continuous improvement tasks that were already in place, they did not alter the daily routines of the focal firm's employees and they did not risk the firm's customer reputation. This explanation suggests why the firm were willing to make changes in some areas but not in the areas examined in this study. The focal firm displayed a greater degree of routine rigidity than resource rigidity as they were willing to invest in research and design to improve the energy efficiency of their products, to invest in improvements to their buildings and to buy more fuel efficient vehicles but they were unwilling to implement innovations that directly impacted the organisational routines.

The discontinuous environmental change that initiated the eventual implementation of the innovations was caused by reduced sales of the focal firm's products, which in turn was caused by the global recession. This threat prompted the focal firm to look for cost savings within their operations and at this point the need for savings was greater than before. The focal firm was more willing to take risks in order to achieve cost savings and thus was more willing to change their organisational processes. This relaxed the routine rigidity and thus the incumbent inertia and it resulted in the innovations being implemented. In the case of the alternative method of freight, the routine rigidity was related to conservatism in the focal firm's sales department who criticised the proposed delivery timetable. The inertia was overcome by a top-down order from a firm executive. In the case of the packaging method the focal firm's routine rigidity was relaxed when the head of packaging solutions was given permission by his supervisors to gradually test the alternative packaging method internally with a long-term view to implementing the innovations throughout the whole operations. In this case there was also evidence of routine rigidity in the behaviour of the customer firms. The customer firms repeatedly rejected the innovation even though it fulfilled their technical requirements. They ignored their requirements and requested the packaging technology that they were familiar with and that they trusted. The focal firm plan to continuously relax this rigidity over time by slowly introducing the alternative method to the customers and gradually demonstrating its ability to protect the products.

Organisational inertia is typically related to learning, the availability of information, the political make-up of the organisation and the tendency to continue with the existing organisational processes (Hannan and Freeman, 1977). It is important to note here that the environmental innovations were not inhibited by learning, knowledge integration and knowledge interpretation within the organisation as has been witnessed by previous scholars (Lenox and Ehrenfield, 1997; Wong, 2013; Dooley, 2017). It is clear that the alternatives were known over a decade before they were implemented and thus they were not inhibited by a lack of organisational capabilities related to searching for alternatives, learning or knowledge integration (Winter, 2000). They were, however, inhibited by the failure to question their own organisational processes. The focal firm was especially sensitive to innovations that altered the daily routines of their employees and of innovations that potentially alienated customers. This sensitivity to their employee's routines and customer preferences can be seen by the fact that, despite the savings that could be achieved, the

innovations were completely discounted upon receipt of the initial negative feedback. The evidence in this article also reveals an insight into the role of cognition in explaining routine rigidity. The past literature on cognition and organisational inertia has focused on organisational learning and knowledge integration, managerial attention and organisational incentives (Tripsas and Gavetti, 2000; Eggers and Kaplan, 2009; Kaplan and Henderson, 2005). In the context of the focal firm the influence of the formal and informal cognitive frames on routine rigidity may be seen. The formal routines are the official organisation policies and processes and they are represented by managerial cognition. The informal routines are the cultural norms of the organisation and its customers. In this case the discontinuous environmental change has impacted the managerial cognition of the focal firm and thus routine rigidity has been relaxed via a top-down approach. However, in order for this to be sustained and to remain relaxed over time the cultural norms of the organisation and the customers must also be changed. This can be seen in the first example where the acceptance of the innovation by the organisations employees has facilitated the change and has made it *surprisingly easy* and the resulted in a *cultural change* within the organisation.

Conclusion

Environmental innovations are essential to climate change mitigation as they aim to conserve the consumption of resources and to reduce the generation of pollution and waste. This article aims to close the research gap on routine rigidity and environmental innovations and to add empirical evidence to justify its importance in the field of environmental sustainability. It is the characteristics of the innovations studied in this article that makes routine rigidity particularly interesting. The innovations do not require large investments, they do not rely on technological advancements, they do not require large amount of organisational learning or knowledge integration and yet they produce a substantial improvement in economic and environmental performance. This combination of high impact (economic and environmental) and low barrier to implementation (cost, technological and learning) means that firms can no longer justify passiveness in this area by hiding behind the typical environmental innovation barriers (Lenox and Ehrenfield, 1997; Rehfeld et al., 2007; Foxon and Pearson, 2008; Del Río et al., 2010; Wong, 2013).

Based on existing theory and empirical evidence, it is argued that routine rigidity can inhibit environmental innovations and especially those innovations that challenge deeply established processes and cultural norms. The focal firm have consistently improved economic and environmental performance, however, in the past they tended to rely on incremental innovations that were extensions of continuous improvement tasks that were already in place. They were willing to make investments in this area but they were sensitive to the alteration of the daily routines of their employees and to risking the firm's customer reputation. This unwillingness to upset the applecart of routines can be seen by the fact that, despite the savings that could be achieved, the innovations were completely discredited by the initial negative feedback.

The initiation for the relaxing of the routine rigidity was produced by the global recession. This prompted the questioning of the formal routines and official organisation policies which demonstrated a change in managerial cognition. This was then underpinned by the relaxing of the informal cultural norms held by the firm's employees and customers.

The case presented here can also shed light on the influence of threat perception on routine rigidity. As can be seen from the empirical evidence, threat perception did catalyse a response from the focal firm. Contrary to Gilbert's (2005) findings, the evidence shows that threat perception relaxed routine rigidity by changing their organisational processes which resulted in a cultural change within the organisation. This is similar to the catalysis of radical renewal efforts that has been described by previous scholars (Huff et al., 1992).

The research discussed here sheds light on the influence of external cultural norms on environmental innovations. In future research and particularly in qualitative studies of understanding customer expectations, scholars could seek to unpack these mechanisms in greater detail. Climate change continues to be such an important topic that the whole value chain is beginning to understand the need to reduce environmental impact. Frequently, the end customer is aware of the need to purchase products that have as low environmental impact as this reduces their environmental risk and enhances their brand reputation. Further research is required to examine mechanisms where customers are encouraged to relax their expectations, such as a longer lead time, in order to end up with a product that has a lower environmental impact.

The approach in this article demonstrates one empirical methodology for exploring Gilbert's (2005) insights on inertia theory, however, the approach has limitations. The findings discussed above are presented from a normative point of view and the argued influence of routine rigidity on environmental innovations should be tested in more than one firm. Another limitation of this study is that the precise economic impact of the innovations could not be attained from the focal firm. It is clear that there are substantial cost savings derived from reducing carbon emissions by 87 000 tonnes through fuel and packaging savings but without the exact cost savings the impact of the innovation is somewhat blunted.

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