Open Innovation in the Automotive Industry: What can carmakers' annual reports tell us?

Ramírez-Portilla A1, Brown T, and Cagno E

Abstract. Recent research shows the adoption of open and collaborative innovation in the car industry suggesting these practices could be applied in other mature industries. However, researchers have studied the car industry mostly through case studies showing the relevance of innovation practices mainly from their viewpoint and less from the firm’s perception. Thus, the purpose of this study is twofold: (1) to confirm the application and the weight that carmakers give to Open Innovation concepts and, (2) to extend the methods and data sources used to study Open Innovation. Based on a conceptual content analysis of the annual reports from 2005 to 2012 from ten large carmakers, this cross-sectional study shows that all the selected firms have included assertions closely related to openness and collaboration in innovation. Concepts related to inbound Open Innovation appear in greater extent than outbound concepts, but there is no clear evidence of the aggregated value of both groups of concepts on firm performance. The results of this research support the idea that in last years open and collaborative innovation in carmakers has genuinely increased in practice and not only on the researchers attention.

Keywords: open innovation; automotive industry; large carmakers; content analysis; annual reports.

1 Introduction

The adoption of Open Innovation (OI) is one of the hottest topics in innovation management. Clear evidence in academic literature shows the number of citations of Chesbrough's seminal book (2003) increasing from 1,800 in July 2010, to 8,000

1Andrés Ramírez Portilla (✉ e-mail: andres.ramirez-portilla@indek.kth.se)
Department of Industrial Economics and Management. School of Industrial Engineering and Management. KTH Royal Institute of Technology. Lindstedtsvägen 30, 10044, Stockholm.
in May 2014. This astounding citation trend could be explained by the wide applicability of the Open Innovation model in different firms and contexts (Schroll and Mild, 2011). In practice, this is also evident with the increase of open and collaborative innovation practices adopted during the last years, not only by high-tech sectors, but also by manufacturing firms (Grundström et al., 2013; Laursen and Salter, 2006) as well as firms in mature industries with expensive innovation development costs (Armellini et al., 2012; Chiaroni et al., 2010, 2011).

Research verifying the external validity of Open Innovation in different contexts has provided evidence to confirm OI as a valuable notion to manage innovation (Huizingh, 2011). In part, this has been possible due to a research agenda on testing OI concepts in industries beyond high-tech sectors (Chesbrough and Crowther, 2006). The automotive industry is one of them because even though the innovation process has been traditionally restricted to the boundaries of the firms, Open Innovation seems to be a latent alternative (Ili et al., 2010).

Nevertheless, despite the valuable research of OI in the automotive industry, most findings have been drawn from case studies, which prevents understanding the real perception that automotive firms have towards Open Innovation practices. This drawback could result in an escalating narrative fallacy and a distortion bias (Taleb, 2010) of the relevant innovation practices for automotive firms. Addressing this problem is noteworthy, as researchers need to be critical on the methods used to study Open Innovation (Schroll and Mild, 2011) to better differentiate between what they want to see and what is really there. Likewise, firms invest resources mainly in innovation practices that perceive as important; therefore, a wider adoption of Open Innovation across the whole industry will be possible only if OI practices are considered as strategic (de Freitas Dewes et al., 2010).

This paper explores Annual Reports (AR) from 10 large carmakers (2005 to 2012) as data sources to study OI practices. As previous research has revealed the validity of AR assertions on innovativeness (Michalisin, 2001), analyzing OI assertions could be an objective way to evaluate the weight that firms in the automotive industry truly assign to OI. Thus, the purpose of this study is twofold: (1) to confirm the importance that carmakers give to Open Innovation concepts and, (2) to extend the research methods used to study these concepts in mature industries.

The paper is organized in the following way. Section 2 provides a brief overview of Open Innovation research in the automotive industry and the constructs used in the analysis. Section 3 explains the methodology and sample selection criteria. Section 4 discusses the results with theoretical and practical implications. Finally, section 5 provides the most relevant take away messages and conclusions.

## 2 Open Innovation Research in the Automotive Industry

Open Innovation is frequently defined as ‘the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets
for external use of innovation, respectively’ (Chesbrough et al. 2006, p. 1). The first process has been labeled as inbound OI and the second outbound OI, both modes operationalized by specific practices. The inbound mode consists of the practices to explore and leverage external technologies and discoveries while the outbound mode involves the practice of developing external relationships to commercialized proprietary technologies (Bianchi et al., 2011). The variety of inbound and outbound practices can be broad as OI can encompass several phenomena such as crowdsourcing, community-based innovation, and mass customization (Schroll and Mild, 2011). Thus, a particularity of OI is the possibility to integrate it with other innovation management concepts and practices (Huizingh, 2011).

Automotive OEMs have heavily involved their suppliers in new product development since the 80s. Still, researchers studied these partnerships focusing mainly on how one party achieved imbalanced benefits (Ge and Fujimoto, 2006). Since the term of OI was coined (Chesbrough, 2003), researchers have started to study gradually the car industry under its assumptions. Results are contrasting because while some state R&D inside large carmakers seem to move towards an OI model (Ili et al., 2010), others claim OI is not viable since supplier involvement is still a practice controlled by strict guidelines from OEMs (Dodourova and Bevis, 2012).

Even if OI has not been diffused in the whole car industry, it is undeniable the increasing literature on this topic. Relevant examples include Ili et al. (2010) study in the German car industry or Karlsson and Sköld (2013) study on vertical and horizontal OI in global automotive groups, both remarking the potential of OI to support better R&D productivity. Dodourova and Bevis (2012) exploration on knowledge flows determines that OEMs are most likely to use OI practices than Tier-1 suppliers and SMEs. Lazzarotti et al. (2013) study on different levels in the automotive value chain confirms that OI practices enhance innovation performance. Similarly, Di Minin et al. (2010) study on Italian carmaker Fiat shows the effectiveness of adopting a strong OI strategy to increase overall performance; yet, others shown that only some OI practices influence firm performance (Mazzola et al., 2012). Based on the above, some of the most relevant OI practices used or with potential to be used by OEMs are presented in table 1.

Table 1 Open Innovation practices used or with potential to be used in the automotive industry.

<table>
<thead>
<tr>
<th>Modes</th>
<th>Ili et al., 2010</th>
<th>Karlsson and Sköld, 2013</th>
<th>Mazzola et al., 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-bound</td>
<td>Development request, reverse engineering, trend and technology scouting, common research laboratory, online portal for ideas, market places, competitions, venture capital</td>
<td>Announcing possibilities, systems for assessing offerings, open to initiatives, partnering and cooperation with firms</td>
<td>Supplier, university and government collaborations, national public funding, in-licensing acquisition</td>
</tr>
<tr>
<td>Out-bound</td>
<td>Reciprocal license agreements, licensing, alliance, joint venture, patent sale, business unit sale, external training, grant-back license, consulting, personnel exchange</td>
<td>Continuous scanning of small high-techs and start-ups, open up for bids from all potential suppliers, joint and new ventures initiatives</td>
<td>Out-licensing, divest, external technology commercialization, co-patent, manufacturing and R&amp;D alliance</td>
</tr>
</tbody>
</table>
3 Research Approach

Annual reports (ARs), considered as grey literature, have been used for years as valid sources of primary data for management and innovation studies (Michalisin, 2001). ARs communicate key information to the firm’s shareholders, its market and other stakeholders; consequently, by analyzing ARs content it is possible to study the firms’ corporate strategy (Bowman, 1984). In addition, previous studies have shown the value of analyzing ARs to monitor the evolution of managerial ideology in car OEMs (Tinker and Neimark, 1987) or to explore the strategic relevance of R&D activities (Mangematin and Nesta, 1999). Content Analysis Method (CAM) was chosen as it can also be used to investigate cultural patterns, reveal the focus of attention, and describe trends in communication (Weber, 1990).

In this study, ARs were preferred over the ‘Form 10K’ as most sampled firms do not issue this report. The car OEMs were chosen based on the criteria to be included either on the lists of Reuters “Top 100 Global Innovators”, Forbes ‘Top car makers’, high growth potential carmakers from ‘BRIC’ countries, or in academic literature as firms practicing Open Innovation (see Table 2). Carmakers such as Honda, VW and GM although included in the aforementioned lists, were not used, as some of their ARs were not public. The conceptual CAM included the steps of collecting, coding and statistical processing the ARs to later interpret the results (Weber, 1990), and it was done with the software QDA Miner. To not bias the results, the data were analyzed by the researchers and verified by an external coder.

Table 2 List of automotive OEMs used for this study including their selection criterion.

<table>
<thead>
<tr>
<th>Name</th>
<th>Country</th>
<th>Region</th>
<th>Criteria</th>
<th>Name</th>
<th>Country</th>
<th>Region</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ford</td>
<td>USA</td>
<td>NA</td>
<td>Reuters’ list</td>
<td>Hyundai</td>
<td>Korea</td>
<td>AS</td>
<td>Forbes’ list</td>
</tr>
<tr>
<td>Toyota</td>
<td>Japan</td>
<td>AS</td>
<td>Reuters’ list</td>
<td>DFM</td>
<td>China</td>
<td>AS</td>
<td>OEM - BRIC</td>
</tr>
<tr>
<td>Renault</td>
<td>France</td>
<td>EU</td>
<td>Reuters’ list</td>
<td>Tata</td>
<td>India</td>
<td>AS</td>
<td>OEM - BRIC</td>
</tr>
<tr>
<td>Scania</td>
<td>Sweden</td>
<td>EU</td>
<td>Reuters’ list</td>
<td>BMW</td>
<td>BMW</td>
<td>EU</td>
<td>Academic Lit.</td>
</tr>
<tr>
<td>Daimler</td>
<td>Germany</td>
<td>EU</td>
<td>Forbes’ list</td>
<td>Fiat</td>
<td>Italy</td>
<td>EU</td>
<td>Academic Lit.</td>
</tr>
</tbody>
</table>

4 Results and Discussion

The overall results show that all of the selected OEMs have included assertions of concepts related to Open Innovation in their annual reports with an increasing trend over the last years (Fig. 1). Even though some carmakers exhibited a greater number of assertions than others during specific years (e.g. in 2011 lowest value was 4 and highest was 35), a clear ranking of OEMs adopting Open Innovation practices could not be established. Similarly, albeit a lack of remarkable difference between the average results if analyzed by regions, a subtle trend was the earlier
existence of OI indicators in European OEMs. Another major finding was the clear and greater presence of assertions related to concepts of the Inbound mode over the Outbound mode. Moreover, when comparing the results of these two modes with yearly revenues (Fig. 2) a bigger number of Outbound practices do not seem to have a greater effect on performance.

A surprising finding to arise from this study was that carmakers such as Fiat or BMW, which have been portrayed in literature and in practice as applying Open Innovation, did not show a higher rate of OI related assertions in comparison to other OEMs. On one hand, these firms might not consider OI as a strategic initiative that needs to be stressed in annual reports; but on the other, these firms could have embraced OI practices as part of their regular strategy and thus, they do not communicate it in ARs. We believe in the later as previous studies (Gassmann et al., 2010; Ili et al., 2010; Lazzarotti et al., 2013; Di Minin et al., 2010) have provided positive and specific evidence of these firms adopting OI.

Taken together, the results suggest that even though OEMs do not always explicitly communicate it, they have adopted Open Innovation ideas during the last years, even during the automotive industry crisis of 2008-10. In general, these findings enhance our understanding of the relevance that firms in mature industries allocate to Open Innovation (Chiaroni et al., 2010) and suggests that a higher rate of outbound activities does not clearly influence an improvement on measures of firm performance (Mazzola et al., 2012), such as higher revenues in car OEMs.
Finally, the findings of this study have a number of important implications for practice and policy. The automotive industry has been considered as a barometer of technological development and other indicators of global economy; therefore, this study suggest that it could also be considered as an indicator of the diffusion of the adoption of OI practices in asset-intensive, mature industries (Chiaroni et al., 2010). Concepts related to OI in Annual Reports could be a proxy of the degree of openness of a firm. Even though large carmakers include several concepts related to innovation in their ARs, a suggestion is to communicate explicitly Open Innovation initiatives. These actions can support the development of the firm’s strategic innovation communication (Trautmann and Enkel, 2014) that could have a positive impact in shareholders, potential partners and the market.

Moreover, results of this study show that Open Innovation could influence in some degree key performance indicators such as OEMs revenues, which in turn increase their overall performance. This may suggest that in order to increase the industrial performance of the automotive industry, firms belonging to and collaborating in this industry should adopt OI. However, a note of caution to OEMs here is appropriate: open and collaborative innovation can take several forms and some of them may affect the industry negatively if not embraced by carmakers on time. Car-sharing communities are an example of open collaborative initiatives that can impact the sales of cars directly and the profitability of OEMs. With this phenomenon in mind, Daimler and BMW have already launched their own car-sharing initiatives, and we foresee other carmakers will join them soon on similar practices.

5 Conclusions and final remarks

The purpose of this paper was to evaluate the increasing relevance of open innovation practices in the automotive industry by examining annual reports from OEMs.
We analyzed the annual reports from years 2005 to 2012 of ten large OEMs using a conceptual content analysis method. The current study adds to a growing body of literature on the phenomenon of the adoption of open innovation in mature industries with expensive innovation development costs. Likewise, as previous studies, this paper confirms the increasing potential of studying open innovation in the automotive industry (Ili et al., 2010; Lazzarotti et al., 2013).

Some limitations need to be noted. The study was limited to the analysis of text and it disregarded the innovation context of some images as the research scope did not cover a relational content analysis or a semi-objective textual analysis (Beattie et al., 2004). Nevertheless, we believe using such research approaches would yield analogous results. Similarly, although the current study is based on a small sample of firms, it serves the purpose of being used as a base for future studies that investigate the role and effects of Open Innovation practices in similar industries.

Further research that extends the ideas proposed in this paper can focus on studying the isolated and aggregated effects, of inbound and outbound modes in different types of performance measures. For instance, the overall effect on performance could be studied by considering the environmental and industrial dimensions. It would be interesting to explore the relevance of open and collaborative innovation in other types of firms in the automotive industry. Future studies should focus in other actors interacting in the car industry like universities, small suppliers, or smaller carmakers. More broadly, research is needed to determine the validity and utility of open and collaborative innovation in low-tech firms from mature industries and investigate how they can successfully adopt these practices.

6 References


