Innovation in the Auto Industry- A Review of Organizational Structure in Relation to Innovation

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Abstract

The Automotive Industry has entered a period of rapid change. Technological advances have given rise to many new profit models from the automobile, which has created massive corporate growth potential. Consumer expectations have also changed, pushing Automotive companies into a new business territory. While external factors have transformed, are Automotive companies organized to innovate within their industry and create profits from these new expectations? In this paper the author examines a history of the organizational framework used in the Auto Industry to help answer this central question. Additionally, through a survey of industry professionals, this paper will examine current organizational structure within automotive companies and link the results to possible explanations of innovation. Chi Squared Goodness-to-Fit models are developed to show trends of innovation within the survey data. The study of innovation within the Automotive Industry is an important consideration as it will help industry leaders harness the benefits of an innovative workforce.

Keywords

Automotive, Innovation, Organizational framework, Auto industry

1. Introduction

The Automotive (Auto) Industry is said to be in unprecedented times. According to Bill Ford, Executive Chairman of Ford Motor Company, "this time is unlike any other Ford has experienced. The same is true for the rest of the (Auto) Industry". Over the last 100 years, there has not been any period of innovation and accelerated development like the last decade, and there is no anticipated end to this acceleration. One central question to the auto industry is the organizational infrastructure of current automotive companies, are they structured to innovate? Through research on current organization structures, it appears the Automotive industry widely uses a matrix organization structure, and that structure is not the correct organizational structure to promote innovation. To prove this hypothesis, this report will examine survey results from professionals in the automotive Industry.

Innovation implies new activities that would result in new added value to the business ecosystem that includes suppliers, producers and consumers (Edison, Ming, 2010). This definition is used to help answer the central question; do auto companies have the correct organizational infrastructure to promoted innovation? To investigate the hypothesis further, an Industry study was conducted across 37 automotive professionals.

1.1 Problem Statement

From the literature review, the problem statement becomes clear. Unless the Auto Industry changes the fundamental organizational structure that has been in place for decades, the industry will continue to have trouble with capturing and profiting from innovative ideas. In order to be successful, Auto Companies need to find a place in the future where they play to their strengths and capture innovative ideas. The hypothesis of this paper suggests that traditional Auto Company are not set up for innovation, as the Matrix Organization of these traditional businesses will not create an environment for innovation. This hypothesis is expanded upon because the matrix organization is not the sole limiting factor for innovation. Rather it is a matrix organization mixed with the traditional business mindset, Institutional theory, of senior and executive management keeping the business on a risk adverse and stable business path, which limits innovation.

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2. Literature Review

Innovation is critical in this new era of the Auto Industry. Innovation in this space is key because innovation creates new content, new content replaces old model content and creates sales, which drives market share, which in turn drives profits and stock price (Murphy, Suzuld, Smith 2016) A Merrill Lynch market analysis shows that between 2018 and 2021, the US Auto industry will introduce new vehicles every year equivalent to 21 percent of the industry's total volume. This compares to an annual "turnover" rate of 16 percent between 1998 and 2017. (Murphy, Suzuld, Smith 2016). What Industry changes are expected and what could the future hold when it comes to automobiles and transportation? Of course the future is difficult to predict, but there are some signs at the current moment that suggest what comes next for this industry. Regardless of the specific proposal about what comes next, it is important to look at the idea of the proposal, and not focus on the proposal in its final form. Such ideas as electrification, autonomy/ mobility, connected vehicle, big data, smart cities, regulatory compliance, Industry 4.0, ride sharing and a changing supply chain are all quickly shaping the future of the industry. As (Traditional OEM's) navigate this crisis (change), automotive leaders may gain an advantage by reimagining their organizational structures and operations (Hofstätter, Krawina, Mühlreiter, Pöhler, Tschiesner, 2020). Because of this disruption, the traditional OEM's are being forced to update their business models and expectations, which shows a need for innovation. The traditional Technology (Tech) companies (Apple, Google, IBM) are some of the largest disruptors in the current landscape. As these Tech companies buy in for autonomy and data collection, they bring with them a business model that expects initial gross margins of 70% (Cordrey, 2020). Current automotive margins are much smaller on a vehicle, historically a 5%-10% EBIT. A 2019 market analysis by Lazard and Roland Berger shows an overall Industry EBIT average of 7.3% (Daniel, Fritz, Mogge, Schlick, Sondermann, 2019) This disruption highlights the need for the Traditional OEM to ensure the company can innovate and remain profitable. Automotive business leaders will only have a brief window of opportunity to reimagine their core operations yet companies that reimagine their operations will perform best in the next normal (Hofstätter, Krawina, Mühlreiter, Pöhler, Tschiesner, 2020)

3. Methods

To test the hypothesis, a 13-question survey was administered to automotive professionals. The questions ask the respondents to rank their agreement on innovation. The survey assumes some level of innovation takes place within a company. What we must understand is does the organization structure support innovation, or do we see other business priorities take priority over innovation. The categorical questions will give us discrete data distributions on which to analyze. For each categorical question, the survey respondents were asked to pick the choice that best describes their agreement with the question.

4. Data Collection

Anonymous responses were collected through an online survey database. A wide variety of industry professions were asked for a response, using professional and Educational contacts from the authors. No preference was given to job title, to include feedback from all work functions and backgrounds. Professionals that work at OEMs, Tier I suppliers and sub-suppliers were asked for feedback.

5. Results and Discussion

With each discrete distribution, a chi squared goodness to fit test (CSGTF) can be administered to test the fit of the data, where we compare the survey results with a specified distribution. Minitab was used to run the data analysis for this study. To effectively use a CSGTF, a null and alternative hypothesis are created. The null hypothesis (H0) for each data set assumes there is no difference between the observed and the expected data sets. The alternative hypothesis (H1) assumes a difference in observed and expected values. We will use the standard significance value (alpha) of the CSGTF test, equal to .05. Minitab will output a Chi-Square value and a proportion value (p-value) for each data set. If p-value > alpha, we fail to reject the null hypothesis. If p-value <= alpha, we reject the null hypothesis. The Chi Squared test also outputs a chi-squared result, which shows the correlation or degree of difference between the observed values and the expected distribution. Because the hypothesis in question assumes the auto industry is not correctly organized for innovation, we assume and test as though the data distribution is an even distribution of responses for each question. We test the survey data against an even distribution of answers across the 5 categories, (H0 = test proportion for each category is 0.2). An even distribution of data would suggest 20% of an organization is innovating, while 80% has a lesser involvement up to no involvement in innovation. Important to note is that we cannot assume the null hypothesis would show no innovation (test portions equal to 0)

in any response category. This would excessively skew the data and invalid the Chi-Square test, as the test needs a category portion >0.

5.1 Graphical Results

The survey results of the 37 professional show a multi-functional pool of respondents, Figure 1.

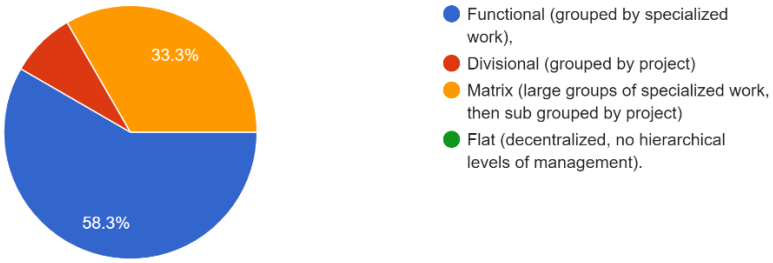

Figure 1. Multi-functional pool of respondents

5.2 Numerical Results

Three key questions are used to answer the hypothesis. These three questions all focus on the worker's use of innovation. Is innovation one of your listed job responsibilities? (Figure 2). Regardless of the previous answers, would you say you innovate in your day to day job (Innovation includes but not limited to product, process, ideas). (Figure 3). If you do innovate, does your organization encourage innovation through money, time, resource allocation? (Figure 4). Two of the three data sets reject the null hypothesis, proving the data is not evenly distributed across all survey answers for these key innovation questions. One data set shows acceptance for the null hypothesis, giving us the conclusion that an equal number of workers are not organizationally responsible to innovate compared to those that are.

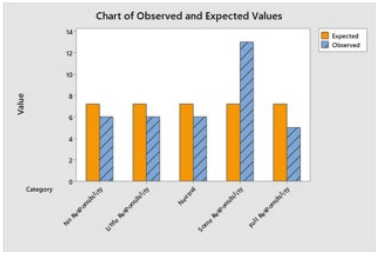

Figure 2. Job responsibilities

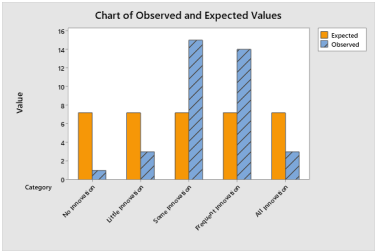

Figure 3. Daily innovation

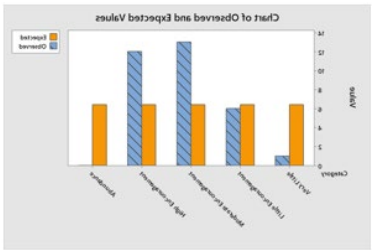

Figure 4. Innovation encouraged

The key categorical question and associated p-value are displayed below, in Table 1.

Table 1. Categorical question

Categorical Questions	N	DF	Chi-Sq	P-Value	Accept or Reject Null Hypothesis?
Is innovation one of your listed job responsibilities?	36	4	5.94	0.203	Accept
Regardless of the previous answers, would you say you innovate in your day to day job (Innovation includes but not limited to product, process, ideas)	36	4	25.1	0	Reject
If you do innovate, does your organization encourage innovation through money, time, resource allocation?	34	4	17.47	0.002	Reject

5.3 Future Improvements

The survey results also open an interesting examination of data sub-sets. The author wanted to examine trends based on organization type, gender and time in the industry. The chi square test for association above also shows limited data was used in the calculation, making the result inconclusive. If further data was collected, further analysis could be completed and more conclusions could be drawn about innovation within the Auto Industry. What we do know, from the survey results and data breakdown, the hypothesis is proven wrong, as the Auto Industry has an organizational structure that promotes innovation.

6. Conclusion

Our first conclusion will focus on the question about reporting organization. The majoring of respondents answered that they belong to a functional organization. The hypothesis of this paper states a matrix organizational structure is used throughout the Auto Industry; these results prove that hypothesis is incorrect, as a majority of workers belong to a functional organization The second conclusion shows that Auto workers in the survey do innovate, and their organizations either encourage or prioritize innovation in their structure. This conclusion proves the paper's hypothesis incorrect, as the Automotive Industry is structured to promote innovation.

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Biography

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