UNDERSTANDING THE RELATIONSHIP OF INNOVATION AND QUALITY IN A FAST-CHANGING MARKET:
AN AUTOMOTIVE PERSPECTIVE

4TH VIRTUAL BROWN BAG – “EMOTIONAL CONNECTEDNESS”

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The **purpose** of this research was to explore the impact that quality practices have on the innovations that are an expected outcome of the advanced product development, or conceptual design process in the traditional automotive industry.

**Approach**
- Draws upon literature in innovation, quality, their intersection, organizational culture, interdepartmental interactions and information exchange.
- Convergent Parallel Mixed Methods Research Design

**Key Findings**
- Quality and conceptual design teams perceive their culture to be the same
- In some cases, the language of the quality and conceptual design teams are different
- The meaning of *innovation* is different between teams in the firm
DEFINITIONS

- **Innovation** – “an idea, practice, or object that is perceived as new by an individual or other unit of adoption...If an idea seems new to an individual, it is an innovation.” (Rogers, 2003, 2010)

- **Quality** – “A subjective term...In technical usage, quality can be 1. the characteristics of a product or service that bear on its ability to satisfy stated or implied needs 2. a product or service free of deficiencies.” (American Society of Quality (ASQ))

- **Conceptual Design** – is an early phase of the design process, in which the broad outlines of function and form of something are articulated. Also known as *Advanced Product Design*

- **Culture** – the underlying glue that binds the organization together (Cameron and Quinn, 199, 2011)

- **Interdepartmental Interactions** – consists of two primary aspects: interdepartmental connectedness, the degree of formal and informal direct contact among team members across departments (Jaworski and Kohli, 1993), and conflict, the tension among departments arising from incompatibility of actual or desired responses and goals (Raven and Kruglanski, 1970)
How does today’s quality system impact/drive/influence innovative designs?

Motivation: Individual and Organizational Performance

- What is the motivation here to deliver customer driven innovative designs?
- Advanced Design

Customer Driven Designs
- (Innovative) Customer Driven Designs
- In-Plant Design Feedback

Available, but used?
- Adhoc
- No Standard process
- Why?

Customer Feedback/Quality Indicators
- Surveys
- Repairs
- Social Media
- 3rd Party Feedback (i.e. JD Power, Consumer Report)

Engineering

Manufacturing

Quality Production Execution

Customer
PROBLEM OF PRACTICE

• Consumer electronics industry is getting new products to market at a rapid rate

• Automotive original equipment manufacturers (OEM) must get new products and features to customers faster and with high quality

• An accelerated product development (PD) process requires a positive relationship between innovation (in particular, advanced design of innovative products) and quality

• Research shows that there are mixed results on whether innovation and quality can coexist (Prajogo and Sohal 2001).
CONCEPTUAL MODEL

Quality and Innovation
Team Factors

Culture (CVF)
(Cameron & Quinn, 2011)

Shared Meaning

Information Exchange
(Subramaniam & Youndt, 2005)

Interdepartmental Interactions
Jaworski and Kohli (1993)

Firm Performance

Quality
Performance

Advanced Product
Design Performance
(Silva, et al 2013)

Menon, Jaworski et al. (1997).
MIXED METHODS RESEARCH

- We implemented Convergent Parallel Mixed Methods approach.
- Assumption is that using both qualitative and quantitative data will provide a more complete understanding of the research problem than if only one approach is used alone. (Creswell, 2014).
- Fortune 50 Automotive Firm (the “Firm”)
- Interviews
  - Semi-Structured
  - 20 Firm Executives
  - Prior roles in Advanced Product Design, Quality, or Both
- Survey
  - Conceptual Design and Quality engineers
  - Three Organizations; Product Development, Research & Advanced Engineering, and Quality
  - 314 Participants
Interview Construction and Linguistic Research Tools

Used to analyze interview responses and survey open-ended questions

- The interview tool was designed to yield information about the beliefs, values, and norms that are present by the firm’s executive leadership.
- The structure of the interview questions was designed to elicit the perceptions of innovation performance and quality performance based on the interactions, culture, subcultures, and information exchange of the teams.
- The questions were worded to capture the team members’ experiences.
- Three tools were used to analyze the interviews: WORDij, LIWC, and Atlas.ti.
- Also assessed Shared Meaning from the survey respondents’ definition of INNOVATION and QUALITY.

<table>
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<tr>
<th>Tool</th>
<th>Description</th>
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<tr>
<td>WORDij</td>
<td>WORDij is a tool to map and analyze text to understand it through semantic networks. This method captures the relationships among words within the message to establish a network perspective.</td>
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<tr>
<td>Linguistic Inquiry and Word Count (LIWC)</td>
<td>LIWC reads a given text and counts the percentage of words that reflect different emotions, thinking styles, social concerns, and even parts of speech.</td>
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<td>Atlas.ti</td>
<td>Atlas.ti is a computer program used for the qualitative analysis of large bodies of textual, graphical, and video data. Atlas.ti has a function that facilitates the creation of relations among codes in a network view for grounded theory development.</td>
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Manager average positivity index was highest among all groups

Vice President average positivity index was the lowest of all groups

The interviews with the top positivity scores were a director (scribed) and manager (recorded) from conceptual design and hybrid, respectively.

The next positivity index was about half the value of the #2 ranking interview.

Director Interview positivity indexes were split, with about half higher than the average PI and about half lower than the average.
• Using Atlas.ti, the network node Quality was established. The resulting co-occurring nodes introduced innovation
• Quality is a part of Innovation
• Culture is an intervening condition for quality and innovation
• Leadership and quality role determine the outcome of quality and innovation

(Bell and Gluesing, Forthcoming)
CONCEPTUAL DESIGN AND QUALITY TEAMS
ARE TEAMS SET UP TO DELIVER INNOVATION AND QUALITY SIMULTANEOUSLY?

- Major nodes connected to the Teams Group
- Identified team collaboration, innovation: team organization, and team tensions and cohesiveness as key areas of focus
- Conceptual design leaders spoke of teams more than any other group

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<th>Code Document Table</th>
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<tbody>
<tr>
<td>Concept Design</td>
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<td>Hybrid</td>
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<td>Quality</td>
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<td>teams</td>
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<td>21</td>
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(Bell and Gluesing, Forthcoming)
CULTURE: FOCUS ON THE CUSTOMER

QUESTION: WHAT CULTURE DO YOU BELIEVE IS NECESSARY TO DELIVER BOTH INNOVATION AND QUALITY TOGETHER?

- Directly connected to the Culture Group and culture node
- What do interviewees say about culture as it relates to the customer?
- 19 quotations emerged
- Results lead right back to Competing Values Framework, Cameron (2011)

(Bell and Gluesing, Forthcoming)
DEFINITION OF INNOVATION AND QUALITY - LIWC

SURVEY RESULTS

• LIWC was run for the **definition** of **Quality** and **Innovation** for all **3 groups** to get the PI scores.

• The results for the definition of **INNOVATION** show the quality group with the **highest positivity index** score of **12.21**
  • 3 times more than the positivity score for the ADP group
  • 2.82 times the positivity score of the hybrid group

• For the definition of **QUALITY**, **all** of the group’s positivity scores were **relatively the same**

• These results suggest that the perception of **quality is consistent** across all three groups, whereas there is more **variation around the concept of innovation**.

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<th>Innovation</th>
<th>Quality</th>
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<tbody>
<tr>
<td>Advanced Product Design</td>
<td>3.69</td>
<td>2.30</td>
</tr>
<tr>
<td>Quality</td>
<td>12.21</td>
<td>2.23</td>
</tr>
<tr>
<td>Hybrid</td>
<td>4.31</td>
<td>2.82</td>
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The OptiComm module provides insight into the linkage of key words by generating an optimal semantic path from a seed word to a target word based on the actual words in a given text.

Provides the user with a set of messages designed to find a semantic path that links two words in three ways:
- novel or innovative path where the strings have low average pair frequency
- set of messages to reinforce an existing message when the strings have a high average pair
- set of messages designed to move two words further apart by linking a seed word to a remote target on the periphery of the semantic network.

For this study, it was important to understand the distance between the words “innovation”, which was the seed word, and “quality” which was the target word and their average pair frequency.

For the survey responses there were no mentions of the word innovation in the definition of quality; “customer” was used as the target word.
Groups are aligned on the definition of Quality.
DEFINITION OF INNOVATION - WORIDIJ

SURVEY RESULTS

OptiComm: **Seed** word is innovation, **target** word is quality

**Proposition 2a is supported**

There is no consistent meaning for the definition of INNOVATION
DEFINITION OF INNOVATION AND QUALITY – ATLAS.TI

SURVEY RESULTS

Notable quotes

“Innovation is being the first to show customers new technology and advancements and doing it right the first time”

“Doing it right the first time and every time”

“Surprise and delight is enabler of innovation”

“Quality is meeting customer expectations. Providing new technologies that surprise and delight the customer and that don’t have error states that require repairs. Quality has cost added to it. Great quality should not cost a lot.”
Future Research

- There is a need to develop organizational theory that incorporates the relationship between language and culture in order to shed light about how changes in language can bring about the changes in culture that helps organizations adapt.

- More research is needed on how the definition of quality is evolving/needs to evolve to link it to conceptual design and innovation.

- Investigations of the role of leadership at the intersection of innovation and quality could deepen understanding of how leaders can foster the development of quality and innovation together.
PRACTICAL IMPLICATIONS

- Interdepartmental Interactions have an impact on the element of firm performance relative to advanced product design for two different groups; advanced product design and quality.

- Culture – Customer satisfaction is a component of both advanced product design as it relates to innovation and quality. Customer satisfaction could be used to create corporate strategies that are aligned.

- Connecting the word QUALITY to INNOVATION in messaging can foster cultural change that bring these concepts together in employees’ minds.
Thank you & Questions