New Product Introductions and Activation of Shop Floor Organizational Communication

Nobuyuki INAMIZU\textsuperscript{a}) and Mitsuhiro FUKUZAWA\textsuperscript{b})

Abstract: In the Japanese electrical and electronics industry, examples abound of factory managers proposing and introducing new products for production in factories that have retained their competitiveness. In other words, adding new products activates shop floor communication. This research uses data from a survey to analyze the “openness” (kazetōshi, which literally means “ventilation” in Japanese, is an indicator of communication activity) of the shop floor organization. This analysis, while not revealing a correlation between openness and quality, cost, delivery, and flexibility (QCDF), does reveal a positive, significant correlation between openness, the “number of new product introductions,” and “new product proposal/development.” In reality, factories in which the latter two factors had a greater presence had good openness. This suggests that factory managers’ actions and

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policies of proposing and adding new products help to activate shop floor organizational communication.

Keywords: new product introduction, organizational communication activation, electric and electronics industry

Introduction

This research suggests that in Japanese factories, factory managers’ actions and policies of proposing and adding new products activate the shop floor organization, in particular its communication.

As a general trend since the 1990s, Japanese manufacturing sites have been in a predicament. Despite this, factories that have maintained competitiveness and have active shop floors do exist. Japan’s electric and electronics industry serves as a microcosm for this situation.

So then, what are the traits of competitive manufacturing shop floors and their respective organizations? Let’s take as an example interview-based surveys in the electric and electronics industry that were conducted as part of the work of Shintaku, Inamizu, Fukuzawa, Suzuki and Yokozawa (2014). In these surveys, they found that one trait of competitive factories with active shop floors was their predilection toward reaching out to headquarters (or even other companies in some cases) to acquire the capability and to bring to fruition the manufacture of new products (in their parlance, “a factory with marketing and sales”).

With that as the background, this research utilizes data from questionnaire surveys to analyze the relationship between new product additions and shop floor organizational activity, focusing on active communication. The results of this analysis, while not
revealing a significant relationship between “openness” (kazetōshi, which literally means “ventilation” in Japanese, is an indicator of communication activity) and quality, cost, delivery, and flexibility (QCDF), did reveal a positive, significant relationship between openness, the “number of new product introductions,” and “new product proposal/development.” It was also found that factories that had superior levels of new product additions and proposal/development had good openness. This suggests that factory managers’ actions and policies of proposing and adding new products activate shop floor organizational communication.

**Cases of New Product Introductions by Japanese Factories**

First, with regard to the traits of competitive shop floors and their organizations in the electric and electronics industry, let’s examine “factories with marketing and sales,” or factories that propose and develop new products, a phenomenon brought to light by Shintaku et al. (2014). These factories “do not solely conduct operations assigned to them from their respective headquarters, but think and act on their own, conducting marketing and sales-like activities with their headquarters and even with other companies in order to acquire new work.” Shintaku et al. (2014) cite the following example. Among the factories that they surveyed, they encountered one, which we call Factory A, that had been in danger of closure on several occasions since the 1990s because of changes in the products manufactured at the factory that were driven by headquarters. Factory A had, to evade this danger of closure, utilized its firm’s technological specialties to lobby the development division at headquarters, beginning with product planning, to acquire more work for the factory. Besides, the factory head, who was also a marketing and sales unit head, took great efforts to acquire new work from external companies in fields in which the factory could leverage the company’s technological
Another example comes from a factory—called Factory B—whose core business was transferred to its parent company consequent to business restructuring. In return, Factory B was handed work under the group’s scanner business, a mature, relatively small-scale business. However, Factory B took initiatives to develop mechanical and IT technologies, developing new scanners and expanding their sales scope. Consequently, the products that they were able to develop were ordered en masse by the world’s financial and government institutions, and they have now gained the top position in global market share.

Factory B’s group had also been producing scanners at Chinese factories. However, disasters, flooding, and political risk in China meant that distributed production was necessary. Factory B volunteered to become a producer under that distributed system, communicated with molded piece manufacturers and other transaction partners, presented manufacturing costs in China, and negotiated intensively to cut costs and was finally able to succeed in winning business from Chinese factories.

How then do these actions taken by factory managers impact the manufacturing shop floor? In this research, we conduct quantitative analysis on manufacturing shop floor activation, particularly in communication.

**Method**

The data used in this research was acquired through questionnaire surveys that were conducted with Japanese businesses and factories in the electric and electronics industry between December 2013 and January 2014.¹ Three surveys were used on the basis of the

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¹ See Inamizu (2015) and Fukuzawa (2015) for other research based on these
respondent’s position in the organizational hierarchy. The respondents for each are as follows:

1) Study A: Business/Factory Survey
   For factory heads, administrative managers, and others who understand the overall state of the factory/business
   Respondents: 97 businesses (of the 163 businesses targeted, response rate 59.5%)

2) Study B: Leadership Survey
   For workplace leaders of manufacturing lines at the businesses/factories applicable to Study A
   Respondents: 354 people (of the 446 people targeted, response rate 79.4%)

3) Study C: Worker Survey
   For persons working under workplace leaders applicable to Study B
   Respondents: 3,116 people (of the 3,990 people targeted, response rate 78.1%)

The indices used in this research are as follows:

1) Indices on competitiveness
   Study A asked respondents regarding factory competitiveness. Here, competitiveness includes QCDF and other items related to innovation as suggested in the previous examples (Bhamu & Sangwan, 2014; Bozarth, Warning, Flynn, & Flynn, 2009; Fujimoto, 1999, 2003, 2012; Holweg, 2007; Holweg & Pil, 2004; MacDuffie & Pil, 1995; MacDuffie, Sethuraman, & Fisher, 1996; Schroeder & Flynn, 2001; Shah & Ward, 2003, 2007; Turkulainen & Ketokivi, 2012; Womack, Jones, & Roos, 1990). In particular, Study A asked respondents to comparatively rate their own factory versus rival factories within the same company that same surveys.
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Table 1. Mean, S.D., and correlations of the items of competitiveness

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>S.D.</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>A6</th>
<th>A7</th>
<th>A8</th>
<th>A9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1: Customer satisfaction</td>
<td>4.07</td>
<td>.966</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2: External defect ratio</td>
<td>4.16</td>
<td>.987</td>
<td>.876**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3: Production cost</td>
<td>1.83</td>
<td>1.195</td>
<td>-.161</td>
<td>-.331**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4: Productivity</td>
<td>3.90</td>
<td>1.014</td>
<td>.585**</td>
<td>.406**</td>
<td>.016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5: Delivery</td>
<td>3.85</td>
<td>.833</td>
<td>.567**</td>
<td>.406**</td>
<td>.033</td>
<td>.515**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6: Flexibility</td>
<td>3.78</td>
<td>1.054</td>
<td>.418**</td>
<td>.263*</td>
<td>.150</td>
<td>.430**</td>
<td>.521**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A7: # of new product introduction</td>
<td>3.59</td>
<td>1.295</td>
<td>.303**</td>
<td>.241*</td>
<td>.048</td>
<td>.259*</td>
<td>.213*</td>
<td>.238*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A8: Development of unique production technology</td>
<td>4.22</td>
<td>1.066</td>
<td>.530**</td>
<td>.544**</td>
<td>-.243</td>
<td>.411**</td>
<td>.210*</td>
<td>.304**</td>
<td>.537**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A9: Mass production start-up</td>
<td>4.17</td>
<td>.979</td>
<td>.484**</td>
<td>.345**</td>
<td>-.037</td>
<td>.333**</td>
<td>.428**</td>
<td>.357**</td>
<td>.528**</td>
<td>.577**</td>
<td></td>
</tr>
<tr>
<td>A10: New product proposal and development</td>
<td>4.13</td>
<td>1.086</td>
<td>.418**</td>
<td>.427**</td>
<td>-.171</td>
<td>.397**</td>
<td>.321**</td>
<td>.319**</td>
<td>.671**</td>
<td>.800**</td>
<td>.654**</td>
</tr>
</tbody>
</table>

Note: N = 82, ** p < 0.01, * p < 0.05,  + p < 0.1

handled the same products for the following ten items in the most recent year (from October 2012 to the end of September 2013), using a five-point scale for all items:

A1: Customer satisfaction
A2: External defect ratio
A3: Production cost (e.g., labor, materials)
A4: Productivity (e.g., man-hours per item manufactured)
A5: Delivery (e.g., the number of days from customer order to delivery)
A6: Flexibility in altering production models/volume
A7: Number of new product introductions (per year)
A8: Development of unique production technology (e.g., production refinement, faster processing)
A9: Rapid mass production startup
A10: New product proposal and development

Table 1 presents the key statistics for these items.

2) Items on openness (Study C)
As an indicator of active shop floors, particularly communication
therein, we focus on openness. We generally define this term as “the state, primarily found within companies, where there is an environment of free communication of opinion regardless of hierarchical rank and where there is a strong flow of communication and information sharing.”

With this in mind, the four items used in Study C related to work climate are as follows.

Respondents were asked to respond with a yes or a no (two-point scale) to the following statements:

C1: In my workplace, there is an atmosphere in which it is easy to make work-related requests or have work-related discussions even with those not directly linked to my chain of command. (Yes=1, No=0)

C2: In my workplace, there is an atmosphere in which people can be included even if they have differing opinions. (Yes=1, No=0)

C3: In my workplace, there are intense discussions in the interest of problem-solving that are not bound by age or rank restrictions. (Yes=1, No=0)

C4: Many opinions are taken from the shop floor and

Table 2. Mean, S.D., and correlations of the items of openness

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>.59</td>
<td>.493</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>.54</td>
<td>.499</td>
<td>.51 **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>.43</td>
<td>.495</td>
<td>.30 **</td>
<td>.33 **</td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>.43</td>
<td>.496</td>
<td>.29 **</td>
<td>.36 **</td>
<td>.33 **</td>
</tr>
</tbody>
</table>

Note: N = 3021, ** p < 0.01, * p < 0.05,  + p < 0.1

2 Translated from the entry found at http://www.practical-japanese.com (search date 20 February 2017).

3 In drafting items related to workplace openness, this paper also references indices related to “organizational weight,” said to indicate poor openness (Numagami, Karube, Kato, Tanaka, & Shimamoto, 2007).
implemented. (Yes=1, No=0)

Table 2 shows the key statistics for these four items. Cronbach’s $\alpha$ is 0.69, and the simple sum of these is dubbed “openness.”

**Results**

In our analysis, we created a dataset that integrates the data from Studies A and C under the framework defined by Study B. For almost all businesses, we obtained one response to Study A, three to Study B (meaning three workplaces responded per business), and thirty to Study C (meaning ten persons responded per workplace, with three workplaces selected per business). When inserting data from Studies A and C into Study B’s dataset, the same data from Study A was inserted for workplaces sharing the same business. For Study C’s data, the mean values were calculated and inserted for each workplace.

After creating this integrated dataset thus, we conducted an analysis only on the workplaces in the top-selling business. We did this because it allowed us to conduct an analysis limited to each place of business’s core workplace for each core business. This is also because when creating this dataset, since we inserted the same data from Study A for workplaces at the same place of business, we were able to sift through and choose one workplace at each place of business.

The results of the process outlined above yielded 81 places of business (factories) for analysis. Of these, there were 38 cases of one workplace selected per place of business, 31 cases of two workplaces selected per place of business, and 12 cases of three workplaces selected per place of business. Therefore, the number of workplaces for analysis totaled 136 ($38 \times 1 + 31 \times 2 + 12 \times 3$). Workplaces with missing values were excluded from the respective analyses.
New product introductions and activation of shop floor organizational communication

Table 3. Correlations between competitiveness and openness

<table>
<thead>
<tr>
<th>A1: Customer satisfaction</th>
<th>.12</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2: External defect ratio</td>
<td>.14</td>
</tr>
<tr>
<td>A3: Production cost</td>
<td>-.14</td>
</tr>
<tr>
<td>A4: Productivity</td>
<td>.06</td>
</tr>
<tr>
<td>A5: Delivery</td>
<td>.13</td>
</tr>
<tr>
<td>A6: Flexibility</td>
<td>.17</td>
</tr>
<tr>
<td>A7: # of new product introduction</td>
<td>.28 **</td>
</tr>
<tr>
<td>A8: Development of unique production technology</td>
<td>.28 *</td>
</tr>
<tr>
<td>A9: Mass production start-up</td>
<td>.16</td>
</tr>
<tr>
<td>A10: New product proposal and development</td>
<td>.35 **</td>
</tr>
</tbody>
</table>

Note: $N = 82$, ** $p < 0.01$, * $p < 0.05$,  + $p < 0.1$

Table 3 presents the correlation coefficients between openness and each competitiveness item. There is no visible correlation between QCDF and openness. However, for items A7 (the number of new product introductions) and A10 (new product proposal/development), we can see positive, significant correlations with a 1% significance threshold.

We then focused on A7 and A10 for the next steps of our analysis. Figures 1 and 2 show the respective frequency distributions of A7 and A10. Factories responding with a “5” constitute about half of the total respondents for both figures, with a two-peak distribution. We then split the respondents by response choice for our next analysis—for those choosing 5, we assigned them the “upper” group, while assigning the “lower” group for those choosing responses 1–4.

Table 4 and Figure 3 show the results of the analysis for determining the existence of a difference in mean openness indices between the upper and lower groups for A7 and A10. A $t$-test to determine the existence of that difference for A7 (number of new
product introductions) revealed a significant difference ($t = 2.278, p < 0.05$). A similar $t$-test for A10 (new product proposal/development) also revealed a significant difference ($t = 2.807, p < 0.01$). These
Table 4. Difference in means of openness

<table>
<thead>
<tr>
<th></th>
<th>Lower group</th>
<th></th>
<th>Upper group</th>
<th></th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A7: # of new product introduction</td>
<td>N 50</td>
<td>Mean 1.65</td>
<td>S.D. .724</td>
<td>N 33</td>
<td>Mean 2.01</td>
</tr>
<tr>
<td>A10: New product proposal and development</td>
<td>N 39</td>
<td>Mean 1.57</td>
<td>S.D. .656</td>
<td>N 44</td>
<td>Mean 1.99</td>
</tr>
</tbody>
</table>

Note: + p < 0.1, * p < 0.05, ** p < 0.01

Figure 3. The relationships among A7, A10, and openness

results allow us to conclude that for the upper groups as relevant to A7 and A10, openness indices are higher than they are for the respective lower groups.

Discussion and Conclusion

In this paper, we used data from questionnaire surveys to analyze organizational openness of shop floors in the electric and electronics industry. The results, while not revealing a correlation between openness and QCDF, do reveal a positive, significant relationship between openness, the “number of new product
introductions,” and “new product proposal/development.”

First, as expressed through case studies conducted by Shintaku et al. (2014), it is likely that proposing new products to a factory’s headquarters and/or to other companies and the consequent frequent introduction of new products lead to the activation of shop floor organizations. The proposal, adoption, and resulting introduction of new products by factory managers lead to additional work. The outsourcing of production to overseas sites and other similar phenomena increasingly lead to reductions in production volumes at Japanese factories. Given this situation, additional work would help to activate factory shop floors. Further, this new work, being unconstrained by the usual cycles of routine work that the factory is accustomed to, would positively impact the workplace’s communication with not only other individuals but also other company divisions. Consequently, it is likely that this would create a better feeling of openness in the workplace.

Caution is necessary when considering this relationship between the activation of shop floor organizational communication and QCDF. Workplaces with good openness are also proactively engaged in initiatives such as kaizen-style improvement proposals, which are generally considered to contribute to better performance related to QCDF and mass production startup (Koike, 2012, 2013; Koike, Chuma, & Ota, 2001). However, the survey that was conducted as part of this research was unable to find a significant relationship with any of these items. Normally, the start of production of new products would have a negative effect on QCD.4 Frequent introduction of new products, even for a highly competent factory with an activated

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4 In Table 1, we can see a positive, significant relationship in general with A1–A10 overall. However, we do not see a significant correlation between A7 (the number of new product introductions), A2 (external defect ratio), and A3 (production cost). Moreover, we do not see a significant correlation among A10 (new product proposal and development), A3 (production cost), and A5 (delivery).
shop floor, could present a difficult hurdle to overcome in terms of maintaining a superior QCD measure. Further, active communication by itself may not be sufficient to show results in terms of QCDF, and it is highly likely that some additional factors are critical for the attainment of those results.

All things considered, while the proposal and subsequent manufacture of new products may have some costs among QCDF measures, it does improve shop floor organizational openness. We may well be able to consider it to be quite an effective way of activating shop floor communication.

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**References**


