Dependence and Conflict Between Production and Sales*

Paul A. Konijnendijk

Functional interdependence between production and sales leads to the need for coordination and existence of conflict. Their plans and activities have to be coordinated. It is commonly recognized, however, that many conflicts may exist between these two functions due to, for example, differences in orientation. In this article, the coordination process will be discussed based on a telephone survey among 54 industrial companies. It will provide results on the way production and sales coordinate their plans and activities, on the experienced problems in the coordination process and on suggested improvements. These topics are presented in relation to the logistics structure. Some differences between make-to-stock, make-to-order, and engineer-to-order will be identified. The results illustrate some of the intuitively identified problem areas, but not all of them. The main conflict areas concern information flow, orientation and setting, and meeting delivery lead-times.

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INTRODUCTION

In this era of integral or cross-functional management, recognizing the importance of functional interdependence, it is often argued that functional conflicts should be avoided. Functional conflicts within industrial organizations are generally acknowledged. It is necessary to study the causes of these conflicts and create possible ways for conflict resolution. The conflict area between the production and sales function, or generally, between marketing and manufacturing has received some attention in the literature. One of the first papers on this issue is by Shapiro [6]. He identifies the areas of conflict, for example capacity planning and breadth of product line as in Figure 1. These areas generally describe functional interdependences of marketing and manufacturing. For example, in product line issues, the marketing function wants many different products to satisfy more customers, in contradiction to manufacturing, which, in order to be able to make economical production runs, wants the product line to be limited. According to the Shapiro, the causes of the existing conflicts are the functional orientation, the evaluation and reward systems based on these orientations, and the differences in culture, but also the mere complexity of the inter-relationships. More re-
Potential for conflict and cooperation.

Recently, Powers et al [5] identify several sources of conflict, which are related to the areas defined by Shapiro and depicted in Figure 1. The problems and conflicts they describe mainly concern inaccuracy or uncertainty in information flow in both production and sales planning systems.

The issue of coordination of production and marketing objectives is discussed in Payton [4]. He argues that understanding the functional interdependence is crucial to be able to coordinate objectives. The papers described above are mainly argumentative and not based on any empirical evidence. Relevant empirical research papers discuss role relationships and agreements on goals and planned actions [2, 7]. Attribution of dissimilar personal values to role partners between production and sales, as reported by Clare and Sanford, leads to creation of “distance” between members of these functions [2]. From role partner choice and role partner value attributions, Clare and Sanford conclude that there is more potential for conflict than for cooperation at the marketing-manufacturing interface. St John researched the differences in perceived competitive pressures, objectives, and recommended actions between production and sales in the carpet industry [7]. The findings suggest that marketing and manufacturing functions agree on the general characteristics of objectives, such as improving profit margins, or developing a full line of products, and marketing requirements like reliable due dates and quality. They disagree, however, on specific actions or strategies to meet these goals, for example, decreasing manufacturing costs or elimination of low profit items. Most disagreements were found to be firm specific, the results do not show a consistent pattern of favored or opposed actions by marketing or production as suggested by Shapiro. Only the elimination of low profit items was found to be consistently favored by manufacturing. It must be noted that, in this study, respondents were asked to answer from a firm perspective, not from a functional perspective.

Next to these qualitatively oriented papers, there have been some attempts to mathematically solve the coordination problem. This does not seem to be very helpful in understanding or resolving the conflict due to the high amount of questionable assumptions (see, e.g., [1]). In these papers, all kinds of uncertainties in cost and demand patterns are neglected while these uncertainties are identified as important causes of the existing conflicts between production and sales.

All of these papers do not specifically describe the way production and sales are presently coordinated in practice. Also, they do not make a distinction between different production or marketing situations. Most papers implicitly assume that companies are in a make-to-stock situation where customers are supplied from end product inventories in the distribution system. It can be expected that the way products are produced will have an influence on the way the production and sales functions should be coordinated. This article will discuss the presently used methods of coordination in relation with the logistics organization. The discussion is based on a telephone survey among 54 small to medium sized companies in the Netherlands. This survey is mainly explorative in that it

<table>
<thead>
<tr>
<th>Shapiro</th>
<th>Powers et al</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity planning and</td>
<td>Information flow</td>
</tr>
<tr>
<td>long term sales forecasting</td>
<td>within the organization</td>
</tr>
<tr>
<td>Production scheduling and</td>
<td>between organization and</td>
</tr>
<tr>
<td>short term sales forecasting</td>
<td>environment</td>
</tr>
<tr>
<td>Delivery and physical</td>
<td>Product flow</td>
</tr>
<tr>
<td>distribution</td>
<td>to the environment</td>
</tr>
<tr>
<td>Breadth of product line</td>
<td></td>
</tr>
<tr>
<td>New product introduction</td>
<td></td>
</tr>
<tr>
<td>Quality assurance</td>
<td>within the organization</td>
</tr>
<tr>
<td>Cost control</td>
<td>Orientation</td>
</tr>
<tr>
<td>Adjunct services (spare parts, repair)</td>
<td></td>
</tr>
</tbody>
</table>

FIGURE 1. Conflict Areas Identified
tries to provide material to better describe the way the production and sales functions coordinate their planning (tactical level) and their activities (operational level) in relation with the logistics structure. Experienced problems and possible improvements, as identified by respondents, will also be discussed. For this purpose the products that are very expensive to stock (for example insulation materials)

- Engineer-to-order (ETO): All manufacturing activities, from design to assembly, take place to customer specification. Production is on multipurpose machinery requiring skilled operators. This usually concerns large customer specific products like installations or machines

In relation to these three situations, methods of coordination, experienced problems, and suggested improvements had to be identified. As the survey was explorative, the method used to gather information on these subjects was structured telephone interviews with both the sales manager and the production manager of each company.

The population selected consisted of small and medium size companies (between 50 and 500 employees) in the Netherlands. In larger sized companies, it would be hard to find people having enough overview of the situation to answer the questions. A total of 140 companies have been approached, of which 54 (39%) agreed to participate. Characteristics of nonresponse groups are summarized in Table 1. In selecting the companies, an attempt was made to obtain an equal distribution of participants over the three logistics structures.

Contacts were made with the CEO of each company. When he (indeed, it always concerned a male person) agreed to participate, he was asked which persons, representatives of the production and sales, should be interviewed. Table 1 shows the percentages of interviews per reason for nonresponse.

### Three distinct situations.

This article is organized as follows. First the methodology of the survey will be described. This will be followed by the presentation of the most important findings. These findings will be further discussed in a concluding section.

### METHODOLOGY

The main objective of the survey was to get better insight into how production and sales coordinated their plans and activities in relation with the logistics structure of the company. The underlying idea was that companies manufacturing standard products and selling from an end product inventory would have different information and coordination requirements than a company in a situation where products are designed and manufactured to customer order specifics. The logistics structure of a company is fixed for a longer period as it involves much of the manufacturing equipment and market channel (distribution system) investments. The applicability of the structure depends on market requirements on product line breadth and delivery lead-times, and manufacturing technology and costs. We identify three distinct situations:

- **Make-to-stock (MTS)**: Standard products are manufactured and stocked and customers are serviced from an end product inventory. Production is on dedicated machinery, often in large batches. Often consumer goods are produced and marketed this way. In industrial situations, one can think of standard components or materials like bolts and nuts or steel plate.

- **Make-to-order (MTO)**: Known products are manufactured from a raw material or (purchased) components inventory after a customer order has been accepted. This is common in situations with very large or specific product ranges (for example packaging materials) or

<table>
<thead>
<tr>
<th>Reason for nonresponse</th>
<th>#</th>
<th>(%)</th>
<th>Recognition problem area</th>
<th>#</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>lack of time</td>
<td>36</td>
<td>42</td>
<td>yes</td>
<td>31</td>
<td>36</td>
</tr>
<tr>
<td>no sales or</td>
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<td></td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>production function</td>
<td>13</td>
<td>15</td>
<td>unknown</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>not interested</td>
<td>6</td>
<td>7</td>
<td>not applicable</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>unknown</td>
<td>14</td>
<td>10</td>
<td></td>
<td>32</td>
<td>37</td>
</tr>
<tr>
<td>other</td>
<td>17</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>100</td>
<td></td>
<td>86</td>
<td>100</td>
</tr>
</tbody>
</table>

# = absolute number, (%) = percentage of total.
sponsible for production or sales, to interview. In all cases, after introduction to the survey by the CEO, the sales and production managers agreed to cooperate.

The Questionnaire

The structure and contents of the questionnaire were mainly based on previously gained experiences in short case studies in four companies from a similar population. In these companies, we had extensive open interviews with both production and sales managers to gather information on the production and sales processes, the logistics structure, and planning and control mechanisms. This enabled us to select more specifically the subjects of the questionnaire and to limit the amount of time for an interview to 25 minutes. The questionnaire used in the telephone interviews of the survey consisted of both open-end questions and multiple choice questions. Only where very diverse qualitative or quantitative information was needed were open-end questions used. After formulation, the questionnaire was tested in another four companies. The data of these tests are included in the overall results as the questionnaire seemed to work well enough. There are three parts in the questionnaire:

- Tactical level coordination of plans and budgets
- Operational level coordination of customer order related activities
- Company characteristics concerning products, markets, size, structure and operational processes

The data gathered were coded (open-end questions were classified) and entered in a Lotus 123 spreadsheet. From this, frequency tables can easily be made, sorted to various keys. The differences between production and sales where the same questions were asked were tested with a t-test for matched pairs, and the differences between groups were tested with the difference between population proportions in a binomial distribution. All differences discussed in the body of this article are significant at the 0.05 level.

RESULTS

The results of the survey provide material to describe the production and sales coordination in relation with the logistics structure. The tables presented all show the combined answers of production and sales managers. Due to the use of partly open-end telephone interviews, there is also some anecdotal material that can be used to further illustrate the different situations.

The three logistics structures identified are not always uniquely descriptive for the participating companies. In some situations, hybrid configurations were found. Some MTS companies have a small product range of MTO products, and some MTO companies produce several fast moving items to stock. However, 70% of the companies were able to typify their situations as one of the three structures. Table 2 provides some characteristic data on the three groups in the survey. It can be seen that MTS companies tend to be larger and have a higher amount of sales per employee when compared to the other groups.

### Tactical Level Coordination

Within the strategic settings of target markets and manufacturing technology, companies want to plan their actions for a longer period ahead. Typically, total sales plans are made on which budgets can be based for material requirement and production and sales capacity. At this tactical level, production and sales should coordinate their (aggregate) plans to avoid many operational problems. However, tactical level coordination is present in only 63% of all companies surveyed. Reasons for not having a tactical level of coordination varied from unnecessary ("we know everything from each other") to impossible ("everything will change the moment we write something down"). There are some differences over the groups in the amount and ways to execute tactical level coordination as portrayed in Table 3. It is far more common in MTS companies (77%) than in MTO and ETO companies.

Still, the plans or agreements resulting from this co-
Market uncertainty makes it hard to quantify plans.

Coordination can be very general; everything is still possible. Some 10% of the companies actually doing some coordination did not bother to write down the results. In these situations there can be no control.

The subjects of coordination of the companies that actually have a tactical level of coordination are summarized in Table 4. The total volume is an issue for all groups. It is clear that for ETO companies the tactical coordination is less extensive. Often these subjects can only be discussed based on actual customer orders as products; quality and lead-times are customer specific. MTS companies deal with many (small) customer orders and therefore try to standardize many aspects of order acceptance. This requires a tactical level of coordination in which the operational framework can be set. However, price levels, product mix, and quality are most often an issue for production sales coordination in MTO companies. The product mix is not fixed as in MTS companies, but also not totally uncertain as in ETO companies. As the mix is partly fixed but products are customer specific, the related price levels must also be coordinated. In all three groups, long term lead-time indications are often set at a tactical level.

To get a feeling for what problems there may exist in tactical coordination, respondents were asked to name their biggest problem. The problems mentioned are summarized in Table 5. It can be remarked that there are only small differences in the problems mentioned by production managers or sales managers. At this level, market uncertainty is a big problem, especially in MTS companies. Market uncertainty makes it hard to formulate and quantify plans, which is more important in MTS companies for they cannot wait for customer orders to arrive to make their plans. Also, ETO companies will experience a lot of market uncertainty, but do not seem to see that as a major problem. The data suggest that the difference in "language" or orientation also plays a role at the tactical level. Some respondents point their fingers at the other side with harsh statements like "sales does not have the slightest notion of the technical specifications of our products" or "production only thinks in impossibilities." This is more prevalent in MTO and ETO companies. The reason for that could be that, in these two groups, the production employees are often skilled craftsmen with a technical orientation. This is not present in many MTS companies, where, due to a high level of mechanization, many manufacturing jobs have become unskilled.

The solutions or improvements suggested for tactical level coordination often concern more frequent meetings. Present planning systems typically have a horizon of one year with monthly reviews, which does not seem to be

### Table 3

<table>
<thead>
<tr>
<th>Instruments of Tactical Level Coordination*</th>
<th>MTS %</th>
<th>MTO %</th>
<th>ETO %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgets</td>
<td>18</td>
<td>36</td>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>Sales/Production plan</td>
<td>25</td>
<td>8</td>
<td>22</td>
<td>11</td>
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<tr>
<td>Forecast</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>25</td>
<td>11</td>
<td>5</td>
<td>15</td>
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<tr>
<td>No record</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>77</td>
<td>59</td>
<td>56</td>
<td>63</td>
</tr>
</tbody>
</table>

*Instruments used and total number of coordinating companies in percentage per group

### Table 4

<table>
<thead>
<tr>
<th>Tactical Level Coordination Subjects*</th>
<th>MTS %</th>
<th>MTO %</th>
<th>ETO %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>91</td>
<td>93</td>
<td>89</td>
<td>91</td>
</tr>
<tr>
<td>Mix (volume per product)</td>
<td>78</td>
<td>85</td>
<td>50</td>
<td>74</td>
</tr>
<tr>
<td>New product introductions</td>
<td>65</td>
<td>41</td>
<td>56</td>
<td>53</td>
</tr>
<tr>
<td>Lead-times</td>
<td>70</td>
<td>74</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Price levels</td>
<td>39</td>
<td>67</td>
<td>56</td>
<td>54</td>
</tr>
<tr>
<td>Stock levels</td>
<td>74</td>
<td>56</td>
<td>28</td>
<td>54</td>
</tr>
<tr>
<td>Quality issues</td>
<td>91</td>
<td>81</td>
<td>56</td>
<td>78</td>
</tr>
</tbody>
</table>

*Percentage of companies coordinating a certain subject per group
TABLE 5
Tactical Level Coordination Problems and Improvements

<table>
<thead>
<tr>
<th>Problem areas</th>
<th>MTS %</th>
<th>MTO %</th>
<th>ETO %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market uncertainty</td>
<td>52</td>
<td>26</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>Lead-times</td>
<td>4</td>
<td>15</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Difference in “language”</td>
<td>4</td>
<td>33</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Production capacity</td>
<td>9</td>
<td>7</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Procedures</td>
<td>9</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>None</td>
<td>9</td>
<td>4</td>
<td>11</td>
<td>7</td>
</tr>
</tbody>
</table>

| Improvements                  |       |       |       |         |
| More frequent coordination    | 76    | 48    | 22    | 34      |
| Change procedures             | 13    | 7     | 28    | 15      |
| Better market relationships   | 13    | 15    | 6     | 12      |
| Strict agreements             | 17    | 0     | 0     | 6       |
| More mutual understanding     | 0     | 15    | 6     | 7       |

*Percentage mentioning a problem or improvement per group

enough. Also, changing the planning procedures and developing better market relationships seems, to many respondents, to be ways to improve coordination.

Only in 11 companies (20%), both the sales manager and the production manager experience the tactical level coordination as good. In 14 companies, the two functional managers disagree in their opinion of the quality of the coordination at this level. In all cases, where one manager experienced coordination as poor, his colleague did not agree on that. Sales is often leading at the tactical level of coordination.

**Operational Coordination**

The second level of coordination is the operational level, where production and sales coordinate activities are triggered by customer orders. From the results in Table 6, we can see that this level of coordination is indeed very important to ETO companies. Several MTS companies have such a good standardized operational framework that customer orders never have to be coordinated between production and sales, the functions are completely decoupled at the operational level. We also found that, at an operational level, sales is most often leading although the influence of production in operational coordination is slightly higher than at a tactical level.

The all over coordination problem at an operational level is setting lead-times. This is strongest in MTO and ETO companies, with 48 and 53 percent of respondents mentioning this problem, respectively, but it is also present in 27% of MTS companies. This may be caused by a separation of objectives as suggested by Shaprio (cost versus turnover). As production tries to minimize cost, long production runs and long lead-times become necessary. It is not very common for sales functions to have objectives concerning delivery performance; this is strictly a production matter [3]. Strict agreements on cost or lead-times can only be made when both production mix and volume are sufficiently stable.

Getting order specifications is often mentioned as a problem area in ETO companies. Many problems are company specific as portrayed in the “Exceptions/specials/others” category in Table 7. Often respondents see no direct way to improve this situation. The most men-

**TABLE 6**
Operational Level Coordination: Frequency and Subjects

<table>
<thead>
<tr>
<th>Coordination of customer orders</th>
<th>MTS %</th>
<th>MTO %</th>
<th>ETO %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>always</td>
<td>43</td>
<td>63</td>
<td>78</td>
<td>62</td>
</tr>
<tr>
<td>usually</td>
<td>13</td>
<td>15</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>sometimes</td>
<td>30</td>
<td>17</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>never</td>
<td>13</td>
<td>4</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

| Subjects of coordination       |       |       |       |         |
| delivery due-date/lead-time    | 96    | 87    | 94    | 92      |
| quantity                       | 62    | 39    | 41    | 45      |
| specifications                 | 53    | 46    | 50    | 49      |
| price/costs                    | 15    | 9     | 28    | 17      |
| order changes                  | 27    | 27    | 41    | 31      |

*Percentage mentioning a problem or improvement per group

**TABLE 7**
Operational Level Coordination Problems and Improvements

<table>
<thead>
<tr>
<th>Problem areas</th>
<th>MTS %</th>
<th>MTO %</th>
<th>ETO %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting lead-times</td>
<td>27</td>
<td>48</td>
<td>53</td>
<td>44</td>
</tr>
<tr>
<td>Production capacity planning</td>
<td>25</td>
<td>17</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>Order specifications</td>
<td>0</td>
<td>7</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Difference in “language”</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Exceptions/specials/others</td>
<td>43</td>
<td>13</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>None</td>
<td>7</td>
<td>13</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

| Improvements                   |       |       |       |         |
| More frequent coordination     | 8     | 4     | 22    | 10      |
| Better planning                | 22    | 13    | 13    | 15      |
| More flexibility               | 14    | 11    | 6     | 10      |
| Set longer lead-times          | 24    | 17    | 7    | 20      |
| Strict agreements              | 11    | 9     | 9     | 9       |
| More mutual understanding      | 8     | 13    | 22    | 13      |
| None                           | 13    | 35    | 22    | 25      |

*Percentage mentioning a problem or improvement per group
toned possible improvement option in all three groups is to persuade the customer to accept longer lead-times. In today’s competitive environments, this may not be the best way. Better, structural solutions will have to be found.

**DISCUSSION**

Although the many numbers and percentages in the aforementioned tables suggest some “hard” empirical data, we must be careful in interpreting these data. The aim of this survey was not to test hypotheses, but to get descriptive information, and that is what we have here. However, some points have become clear. Production and sales are separate functions that need to be coordinated, but there are many problems in this area.

We found several illustrations for problems in the area of long-term capacity planning due to the high amount of market uncertainty at this level. This, typically, is a MTS and MTO order company problem. Short-term production scheduling or, more specifically, delivery lead-times, are also identified as problem areas, most profoundly in ETO companies. These problems concern information flows at an operational level. The tactical problems found in the survey concerning the difference in “language” may point at the difference in orientation. Salespeople are often very much sales-oriented, thereby overlooking technical production problems. The orientation in production is focused on cost and technology. This is mainly present in MTO and ETO companies, not in MTS companies. We did not find much illustrative material of coordination problems in other areas like product line breadth, quality assurance, or cost control.

Although the biggest problems were omnipresent, many other issues were specific for a group. In MTS companies, most problems occur at the tactical level, in ETO companies, the operational level is more problematic. The solutions, therefore, should be adapted to different situations, a one-size-fits-all solution will not work. It is very difficult to estimate the size or urgency of these problems. The problems of coordination are not directly coupled to performance criteria, such as profitability or service level. The discussions and conflicts, therefore, stick to examples or exaggerations.

Coordination between production and sales needs to be tackled in a very structural way. Although many companies recognize the problems, few actually try to improve the situation. The complexity of the problem drives people to accept it as unchangeable or even cherish it as the symptom of “healthy competition” within the company. This is a serious underestimation of the problem.

**REFERENCES**