Management and New Production Systems

Papers from the
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Hosted and edited by
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1995
University of Twente
School of Management Studies
Department of Technology and Organisation
PREFACE

Welcome to the second conference of the recently formed European Operations Management Association.

The theme of the conference is Management and New Production Systems which throughout the years remains an important umbrella to combine a lot of areas within the production environment which need to be considered very precisely and consistent in order to remain competitive as a company. The contents of the proceedings is organised in an alphabetical way by author, but the large number of papers can be roughly clustered in four main areas: (i) operations strategy, (ii) implementation, including product and process innovation, (iii) operations management, and (iv) monitoring, control, performance measurement and learning. This clustering can be recovered in the organisation of the presentation sessions.

The abstracts of the papers for this conference were all double blind refereed and we would like to express our thanks to the following persons for their help in this process:

- prof. Christer Karlsson (EIASM, Belgium)
- prof. Will Bertrand (Eindhoven University of Technology, Netherlands)
- prof. Roland van Dierdonck (De Vlerick School of Management, Belgium)
- dr Gerry van Dyck (EIASM, Belgium)
- dr Per Lindberg (Chalmers University of Technology, Sweden)
- dr Andy Neely (University of Cambridge, UK)
- prof. Chris Voss (London Business School, UK)

Thanks also to Jeannette Visser-Groeneveld, Vera Scholten and Peter Dieltjes for their invaluable help in putting together the final version of the conference proceedings, and carrying out much of the organisation and administration associated with the event.

The conference also owes considerable debt to Scania Zwolle (thanks Frans Ruffini) and Grolsch which allowed us to visit their factory in order to get better acquainted with the most modern ways of practising production management in order to get top-quality products.

Special thanks go to our key-note speakers Dan A. Werbin of Volvo/Nedcar and Christer Karlsson who gave special attention to the problems and solving methods involved in running an industrial joint venture the market-oriented way.

The delegates are the most important stakeholder in the conference and we are very glad that they took the opportunity and also the risk of visiting the University of Twente in a period that rain is very likely. Without them there would be no conference and we are looking forward to meet again in the near future.

Domien Draaijer
Harry Boer
Koos Krabbendam

May 1995
The paper is laid out along the following lines. First of all a presentation and brief description of the operational and organisational JIT Purchasing attributes examined. This is followed by the explanation and justification of the methodology adopted in the survey. Finally, the main results are discussed.

Aspects analysed:

1. The use of multifunctional purchasing teams is spreading into an increasing number of industries.

2. The buyer-supplier organisational integration. The broader buyer-supplier interdependence area involves not only sales forces (on one side) and purchasing forces (on the other) but also other departments within both organisations (such as design, production and quality control). It is therefore necessary to have joint organisational buyer-supplier interfacing procedures and roles capable of guiding this wider interaction. This is an aspect which has not been sufficiently studied in depth in the literature. Helper [14] is one of the few contributors, who from an empirical survey notes that a supplier performance improvement takes place when buyers and suppliers interact intensively and exchange visits. We quote in addition Dumond and Newman’s [15] and Clark and Fujimoto’s studies [16], which point out the importance, when

In the introduction, the study analyses the relationships between the buyer-supplier “organisational link” understood as the connection between the respective operation value chain, and the “organisational link”, understood as the actions of an organisational nature aimed at the selection and control, integration and qualification of sources (sometimes called “supplier development activities”). The survey empirically documents the close connection between these two aspects. In addition, the study demonstrates that the recourse to and nature of the supplier development programs depend on the kind of the vendor-vendee operational connection. In particular, the joint development of new products seems to represent the most important factor to trigger the organisational actions activated by the buyer firm.

The study’s objective is to analyse, through exploratory empirical research, the relationship between the operational and organisational JIT Purchasing attributes. The hypothesis on which this research is based is that a close relationship exists between these two sets of attributes. The paper is laid out along the following lines. First of all a presentation and brief description of the operational and organisational JIT Purchasing attributes examined. This is followed by the explanation and justification of the methodology adopted in the survey. Finally, the main results are discussed.
designing and industrialising new products, of organisational devices aimed at simulating and gathering technical suggestions from the suppliers.

- **Supplier assistance and training.** The need for supplier assistance and training has often been debated in the literature. Bache et al [10] and Das and Goyal [9], note, for example, the need to assign resources to assist the suppliers in the development of an effective operational link. These should be mainly directed to the areas of quality (statistical process control) and equipment-maintenance. Inman [18] discusses the importance, in the implementation of the TQM programs, of training courses aimed at making the suppliers aware of problems involved in quality. The establishment of interactive relationships with suppliers, observe Lysons et al. [7], replace the traditional approach of substituting inefficient sources with the supplier support and assistance.

- **Supplier incentives.** This study has analysed contractual incentives as one of the mechanisms which stimulate supplier’s development. According to Newman [16], the supply contract has to take into account the costs sustained by the supplier to implement programs of statistical process control, modifications or and modernisation of productive assets, and for redesigning of facilities to allow a smoother running of the operations. In other words the supply contract should compensate the vendor for additional costs encountered when changes are made in production and logistic distribution areas in order to motivate the development of the sources [19]. Das and Goyal [9] observe that the operational success of a JIT system can only be sustained if the rewards received by the vendors are proportionate to their contribution to the system.

The areas of operational link taken into consideration in the study are:

- **Product development.** Several studies and empirical observations have demonstrated the importance of early supplier involvement in product development [17] [20] [21] [22]. The benefits of a collaboration with the sources in the design stages may be summarised as follows [23]: reduction in development costs (early availability of prototypes, consistency between design and suppliers’ capabilities, reduced engineering changes), improvement in the product quality level, reduction in the overall development time (due to the early identification of the supplier’s technical problems, joint decisions regarding materials and components) possibility of incorporating supplier originated innovations.

- **Production planning and scheduling.** Frequent and small-lot supplies (typical of JIT environments) require synchronisation between the order contracting, planning and scheduling activities; this promotes the integration of the production planning stage and control systems. This type of integration takes place on three levels [24]. The first level is the one where the supplier is informed of the material needs according to the aggregate demand forecasts. Typically, this leads to the drawing up of open purchase orders. The second level corresponds to the transmission of the production plan to the supplier. The integrated production planning system, i.e. ordering system linked directly to the manufacturer’s production system, allows the supplier to anticipate his client’s requirements therefore improving adherence to the schedules set out. Finally a delivery plan operated according to a pull logic allows the materials to be shipped directly to the buyer’s plant. In the short run both production authorisation and the movements of materials from the supplier can be achieved with the use of kanbans.

- **Distribution.** The JIT supply system involves a reduction in the purchasing quantity per shipment and an increase in the frequency of supplies. JIT deliveries, that is synchronised to production requirements, are probably the most discussed attributes in the literature [1] [25] [23]. There are three further aspects which are closely connected to this in the literature:

  + The need for quality at source. The main objective in JIT is to eliminate any source of waste and increase the rate of material flow. The elimination of buffer stock and specifically the reduction or elimination of incoming stock inspections, is possible only if the quality of the suppliers is high on a consistent basis. This creates the need for certified supplies.

  + The congruence of packaging. According to Newman [16], frequent and small-lot deliveries underline the importance of the vendor-vendee packaging congruence: the use of standard, reusable, automatically identifiable containers can help speed up incoming procedures to the advantage of the flow rate.

  + The geographical proximity of suppliers. According to several authors, in order to provide JIT deliveries it is preferable for the suppliers to be located near the buyer’s plant. The geographical proximity of the sources reduces delivery costs and allows a more reliable service [8] [11] [16].

The interaction between the supplier and the buyer within these three operational areas is supported by an extensive communication flow [26]. This kind of mutual information exchange mainly regards the product (design simplification and product modularization, component standardisation, choices regarding materials) the process (production cycles and equipment combined definition of the process) and the quality (joint definition of quality specifications, transmission of quality tests and charts, transfer of statistical process control data).

**Methodology**

The methodological steps followed can be summarised in these points:

**Research approach and survey strategy.**

The study undertaken is of an explanatory nature as its intention is to verify and analyse the relationship between concepts which occupy a specific area of analysis (buyer-supplier interaction).

Thus recourse was made to a survey, taking the plant as a unity of analysis.

The sectors sampled are those of electronics and machinery (including some auto-suppliers) in which the interaction with the suppliers is a competitive variable of increasing importance. The sample, selected at random among plants employing more than 100 people, is stratified into two levels: “traditional” and “world class reputation” plants. These were selected consulting specialised magazines and following the advice of experts in the sector.

The data and elaborations formulated in this study refer to a sample of 37 units and 424 respondents.

**The development of the measurement instrument.**

The operationalization process of each attribute has lead to the identification of one or more indicators each of which represents a more or less extended portion of the domain of content of the attributes taken into account.

In the case where the attribute was complex (=related to several aspects) and not directly observable, perceptual multi-item measures were adopted. In this case the operationalization was carried out using 5-point Likert-scales. The items of each scale were spread out through the questionnaires (in order to prevent the respondents from recognising the construct analysed) and addressed to at least three respondents (the purchasing, plant and production managers). Some of the questions were addressed also to the Quality Managers, Process Engineer, Information System Manager, two supervisors and four workers for a total of 12 respondents for each plant. The questionnaires were pre-tested on a limited number of firms.
The measurement instrument validation

- Reliability assessment. The two components of reliability, that is stability and equivalence (see for example [27] [28]), were verified in the following manner:
  + the test-retest method. The correlation of measurement over time proved satisfying (0.5<\rho<1) for all the constructs verified.
  + the Cronbach's alpha test. All the constructs (except one which was marginally shorter) have an alpha value greater than the cut-off value (0.6) that is suggested as acceptable for empirical research of this nature [29].

- Validity assessment. The main types of validity, i.e. content validity and construct validity were verified respectively:
  + by a review of the literature, the theoretical revision used by the research group, a comparison with some managers of the firms sampled.
  + by using factor analysis for the uni-dimensionality test of constructs. The scales used showed high validity and only in certain cases the existence of more than one underlying dimension led to the elimination of certain items (although the inter-item correlations coefficients were significant).

Table 1 provides a summary of the measurements used and their reliability coefficient.

<table>
<thead>
<tr>
<th>ORGANIZATIONAL LINK</th>
<th>Cronbach's alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor rating/ranking prod. (3-scale construct)</td>
<td>0.94</td>
</tr>
<tr>
<td>Presence of specific procedures (3-item scale)</td>
<td>0.86</td>
</tr>
<tr>
<td>Level of formalisation of procedures (4-item scale)</td>
<td>0.52</td>
</tr>
<tr>
<td>Team buying (4-item scale)</td>
<td>0.78</td>
</tr>
<tr>
<td>Organisational buyer-supplier interfacing process and roles (4-item scale)</td>
<td>0.72</td>
</tr>
<tr>
<td>Supplier assistance and training (scale) (5-item scale)</td>
<td>0.77</td>
</tr>
<tr>
<td>Contractual incentives (scale) (2-item scale)</td>
<td>0.85</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>OPERATIONAL LINK</th>
<th>Cronbach's alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early supplier involvement (4-item scale)</td>
<td>0.87</td>
</tr>
<tr>
<td>Production planning and scheduling</td>
<td>0.68</td>
</tr>
<tr>
<td>Integrated production planning (3-item scale)</td>
<td>0.74</td>
</tr>
<tr>
<td>Pull (kanban) procurement approach (3-item scale)</td>
<td>0.92</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>DISTRIBUTION</th>
<th>Cronbach's alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>JIT deliveries (frequent and in small lot) (3-item scale)</td>
<td>0.76</td>
</tr>
<tr>
<td>Free pass for deliveries</td>
<td>0.79</td>
</tr>
<tr>
<td>Access to certified suppliers (3-item scale)</td>
<td>0.79</td>
</tr>
<tr>
<td>Packaging congruence (3-item scale)</td>
<td>0.66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INFORMATION EXCHANGE concerning:</th>
<th>Cronbach's alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product development (3-item scale)</td>
<td>0.79</td>
</tr>
<tr>
<td>Production process (3-item scale)</td>
<td>0.97</td>
</tr>
<tr>
<td>Quality practices (4-item scale)</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Tab. 1. Summary of measures

DATA ANALYSIS

A principal component factor analysis was carried out on the operational variables. In fact, most of the attributes analysed were found to be strongly correlated to each other, thus showing their close conceptual interdependence. Using the principal component factor analysis, the number of variables could be reduced to a few orthogonal factors, thus eliminating multicollinearity problems in the successive analyses. In order to more clearly identify the underlying dimensions and interpret their composition, the orthogonal factor rotation was applied. For this purpose the "VARIMAX" algorithm [30] was adopted, which maximises the variation of squared factor loading for each component. The rotation was limited to the first five components, in view of the fact that they account for the biggest portion of variation (75%) (criterion of cumulative proportion of total variance). The rotated matrix of factor loading is shown in table 2.

The orthogonal factor rotation locates:

- a factor (the second in table 2) on which the attributes of "free pass deliveries", "information exchange on quality", "supplier certification" converge. It accounts for more than 17% of the total variance and is defined from here on as "interaction on quality".
- a factor (the third in table 2) on which the attributes of "JIT deliveries", "open purchase orders" (shared forward call-off plans), "pull-kanban procurement approach" converge. It accounts for more than 14% of the total variance and is defined from here on as "delivery synchronisation".
- a factor (the sixth in the table) on which the attributes "supplier's involvement in production development", "information exchange on the product" and "information exchange on the process" converge. It accounts for more than 16% of the total variance and is defined from here on as "interaction of design-product development".

<table>
<thead>
<tr>
<th>FACTOR ANALYSIS: VARIMAX ROTATION FACTOR LOADINGS</th>
<th>Fact. 1</th>
<th>Fact. 2</th>
<th>Fact. 3</th>
<th>Fact. 4</th>
<th>Fact. 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infor. excl. on product</td>
<td>0.40</td>
<td>0.15</td>
<td>0.265</td>
<td>-0.080</td>
<td>0.136</td>
</tr>
<tr>
<td>Infor. excl. on process</td>
<td>0.74</td>
<td>0.02</td>
<td>-0.240</td>
<td>0.320</td>
<td>0.284</td>
</tr>
<tr>
<td>Suppl. involv. in prod. dev.</td>
<td>0.67</td>
<td>0.16</td>
<td>0.265</td>
<td>-0.138</td>
<td>0.263</td>
</tr>
<tr>
<td>Free pass for deliveries</td>
<td>0.16</td>
<td>0.34</td>
<td>0.052</td>
<td>-0.076</td>
<td>-0.025</td>
</tr>
<tr>
<td>Infor. excl. on quality</td>
<td>0.073</td>
<td>0.22</td>
<td>0.186</td>
<td>0.379</td>
<td>-0.050</td>
</tr>
<tr>
<td>Supplier certification</td>
<td>0.133</td>
<td>0.57</td>
<td>-0.316</td>
<td>0.519</td>
<td>0.211</td>
</tr>
<tr>
<td>Open purchase orders</td>
<td>0.134</td>
<td>0.06</td>
<td>0.624</td>
<td>0.045</td>
<td>0.305</td>
</tr>
<tr>
<td>Pull-kanban approach</td>
<td>0.240</td>
<td>0.03</td>
<td>0.608</td>
<td>0.597</td>
<td>-0.015</td>
</tr>
<tr>
<td>JIT deliveries</td>
<td>-0.010</td>
<td>0.40</td>
<td>0.524</td>
<td>0.088</td>
<td>0.421</td>
</tr>
<tr>
<td>Operational proximity</td>
<td>-0.065</td>
<td>0.09</td>
<td>0.560</td>
<td>0.047</td>
<td>-0.447</td>
</tr>
<tr>
<td>Integrated prod. plan.</td>
<td>0.152</td>
<td>0.01</td>
<td>0.097</td>
<td>-0.013</td>
<td>0.843</td>
</tr>
<tr>
<td>Packaging congruence</td>
<td>0.275</td>
<td>0.00</td>
<td>0.220</td>
<td>-0.014</td>
<td>0.746</td>
</tr>
</tbody>
</table>

Tab. 2. The rotated matrix of factor loadings

A canonical correlation analysis was then carried out between the principal components identified from the previous analysis and the group of the four organisational variables. The remaining operational dimensions were excluded for two reasons: 1) their characterisation was uncertain, 2) the percentage of variation they explained was modest. On the operational side, the factor scores associated with the three principal components were used. This was done in order to take into account the weight of each variable in the corresponding factor.

Table 4 shows the results of the canonical correlation analysis. The results of the test may be summarised in the following way:

1. the macro-organisational area is closely connected to the macro-operational area. In fact, the first canonical correlation coefficient is quite large (0.683) as is the second coefficient (0.606). Furthermore the statistical significance (p<0.001) of the first canonical variate is high while the redundancy coefficients is satisfactory. In statistical terms, approximately 29% of the variance of the organisational link is justified by operational link practices. The implementation of advanced

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1. the macro-organisational area is closely connected to the macro-operational area. In fact, the first canonical correlation coefficient is quite large (0.683) as is the second coefficient (0.606). Furthermore the statistical significance (p<0.001) of the first canonical variate is high while the redundancy coefficients is satisfactory. In statistical terms, approximately 29% of the variance of the organisational link is justified by operational link practices. The implementation of advanced advanced
vendor-vendee interaction practices in the design and production-logistics areas goes hand in
hand with a wider participation in supplier’s development. Nevertheless the different operational
dimensions do not play a homogeneous role in determining such a link.
2) Interaction on design - organizational practices
The interaction on design seems to be closely linked with the supplier development actions of
the buyer and in particular with the variables: “organizational buyer-supplier interfacing procedures and
roles” and “supplier assistance and training”. The most obvious reasons seem to be the following:
- the collaboration in product development is a complex and demanding operation for both parties
involved. This therefore leads to more decisive and extensive actions of organizational
integration. According to Suri [31], this phenomenon can be for example easily observed in the
electronics and automotive industry: the prompt and efficient interaction/integration between
designers and product engineers from both companies demonstrates the need for specific
organizational roles and co-ordination tools.
- the supplier’s participation in the design of the product, and therefore the admissibility of
external designers into the development teams, characterises realities structurally and culturally
receptive to the contributions of the sources. Gupta [25] observes that the involvement of the
suppliers in product development implies, above all, a cultural change. This process in fact not only
inverts a tradition of antagonistic behaviour, but it also renders the organisations more transparent
with each other creating long-term relationships and joint optimisation.
3) Logistic link - organizational practices VERSUS interaction on design - organizational practices
An interesting result emerging from the canonical correlation analysis is the fact that the type of
operational interaction (on delivery synchronisation, quality and design) is a discriminating factor in
relation to the organizational practices used by the firms. In particular, the interaction on design is
more closely linked to the buyer’s actions of supplier development than the logistic link (i.e.
interaction on quality + delivery synchronisation). This result is not greatly supported by the
literature which instead places more emphasis on the role of the buyer in the development of an
inter firm logistic network. In the literature the reasons hypothesised to justify the close correlation
between buyer-supplier logistic link and supplier development activities can be summarised in the
following manner:
- JIT supply, that is frequent (in small lots) and well timed (with short delivery lead times),
requires the supplier to suitably reshape his own production and logistic system, adopt
appropriate quality control methods and implement compatible management systems. This is
obviously true only if the supplier responds to the buyer’s JIT delivery needs without increasing
his stock. According to example to Gupta [25], these changes in the supplier’s plant often
would be most difficult to carry out without the direction and assistance of the buyer’s firm,
especially if located at the end of the manufacturing chain.
- an increase in the frequency and reliability of supplies leads to additional costs for suppliers, for
example in scheduling, handling and packaging activities. JIT interaction is therefore linked to
appropriate contractual incentives in order to compensate the supplier for a greater quality and
service content and increased costs sustained. According to Newman [16], these incentives are:
rewards for improvements in quality and delivery reliability, greater stability of relationship
(longer contracts).
An evolutionary perspective like the one suggested by Nelson and Jambekar [32], could partly
justify the different intensity of relations between logistic and design link and organizational
variables. According to them, the process of establishing advanced relationships with the sources
is accomplished by degrees. The extent of the supplier’s operational involvement varies according to
the stage at which the relationship is. At first the operational involvement concerns the greater
transmission of information regarding quality, production scheduling and progress of the material
flow. This is followed by supplies on a JIT basis and it concludes with the supplier’s involvement
in product development. One can therefore hypothesise that, approaching more advanced stages of

<table>
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<th>Canonical</th>
<th>first</th>
<th>second</th>
<th>third</th>
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<tbody>
<tr>
<td>Variate</td>
<td>variate</td>
<td>variate</td>
<td>variate</td>
</tr>
<tr>
<td>Redundancy R² (operational → organizational)</td>
<td>21%</td>
<td>7%</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>Redundancy R² (organizational → operational)</td>
<td>13%</td>
<td>12%</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>Statistical significance (Bartlett test)</td>
<td>p = 0.000</td>
<td>p = 0.021</td>
<td>p = 0.849</td>
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<th>Canonical Loadings</th>
<th>Canonical Loadings</th>
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<td>0.406</td>
<td>0.101</td>
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<td>Contractual incentives</td>
<td>0.311</td>
<td>0.622</td>
<td>0.459</td>
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<td>Organizational buyer-supplier interfacing procedures and roles</td>
<td>0.733</td>
<td>-0.007</td>
<td>0.437</td>
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<td>Specificity and formalisation of vendor rating/ranking proc.</td>
<td>0.549</td>
<td>0.826</td>
<td>0.478</td>
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<td>Supplier assistance and training</td>
<td>0.920</td>
<td>-0.011</td>
<td>0.145</td>
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<td>Explained variance</td>
<td>45%</td>
<td>15%</td>
<td>15%</td>
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<tr>
<td>Interaction on quality</td>
<td>27%</td>
</tr>
<tr>
<td>Delivery synchronisation</td>
<td>42%</td>
</tr>
<tr>
<td>Interaction on design</td>
<td>33%</td>
</tr>
</tbody>
</table>

Tab. 3. Canonical correlation: results

DISCUSSION
In the following paragraphs the link between each operational dimension and the organizational
variable examined is discussed and compared.

1) Interaction on quality - organizational practices
The implementation of JIT programs underlines the need for suitable vendor rating/ranking tools.
The reduction in inventory and in general in slack resources needed to cope any disruption in
the progress of material flow, places the buyer in a more vulnerable position in regard to late or non
conformity of supplies. Deliveries organised on a JIT basis require the quality control at source,
achieved starting from rigorous programs of supplier selection and evaluation. This dimension is
also linked with the variable “contractual incentives”: better contractual clauses are obviously
granted to suppliers who offer suitable quality guarantees.
operational interaction, the buyer’s intervention in favour of the pool of suppliers is intensified and extended. They initiate with more accurate and sophisticated procedures of auditing and selection and follow up with a gradual qualification of the pool of suppliers. Finally they reach the area of organizational integration (where organizational roles are specifically planned).

Statistical analyses carried out do not disprove this hypothetical development. In fact, as the area and size of the operational interaction increases, so does the intensity of the organizational link. However, the analyses of canonical correlation highlights how in the triggering of organizational actions the most important factor is the interaction between the buyer and the supplier in the product’s development: a considerable portion (45%) of the explained variance of the organizational variables are associated with the corresponding canonical variate. These are the possible reasons:

- supplier development initiatives, in particular supplier assistance and training, are for the most part investments which the buyer cannot recover in the event of a termination of the relationship. Therefore they can be more easily justified when the relationship is more selected, exclusive and binding, as occurs when there is collaboration at the design stage;
- the most distinctive capabilities from the buyer’s point of view, that is the capabilities which make the supplier a resource in which to invest, are those that the supplier can put back into the product (for example material selection, joint development of prototypes, value analysis, reduction or standardisation of the components). In other words, the buyer provides support to the suppliers especially when they prove they are able to increase the value of the object supplied and of the final product rather than to the logistics distribution process.

CONCLUSIONS

On the basis of an empirical research, this study has analysed the operational and organizational aspects of the interaction between buyer and supplier. These are aspects which have often been debated in the literature in the context of JIT Purchasing attributes. The results obtained can be summarised as follows:

- the study empirically documents a close connection, often discussed in the literature, existing between the buyer-supplier operational link and the supplier development practices of the buyer;
- the relationship is strictly linked to the type of operational interaction between the customer’s organisation and the suppliers. In particular the interaction on design, within the framework of a close connection with the whole group of organizational variables, accompanies more widespread assistance and training programs and organizational integration. Interaction on quality is instead linked to specific tools of supplier selection evaluation;
- the joint development of new products seems to represent the most important triggering factor for the organizational actions set in motion by the buyer firm. This finding has little support in the literature which places great emphasis on the role of the buyer in the setting up of an appropriate inter-firm logistic network.

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