

Conflicts in new product development: frequency, consequences, and handling recommendations

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New product development (NPD) nowadays often relies on team-based structures with cross-functional teams. This organization form can increase NPD performance by an early integration of different point of views but – at the same time – can be assumed to deteriorate the performance by provoking conflicts within and between teams. Drawing upon a sample of 116 German manufacturing firms, this article investigates this contradiction. A typology of conflicts is developed and used to analyse the frequency and the consequences of different conflict sources and aspects on team and NPD performance by applying covariance structure modelling as well as cluster and variance analysis.

1. Introduction

During the last 30 years various approaches and methods have been proposed to better integrate business functions like R&D, marketing, or manufacturing during the new product development (NPD) process (see, e.g., Griffin & Hauser 1996 for a recent review). Most of these approaches make use of team-based organization structures relying on cross-functional teams where individuals from different business functions meet and work together to improve the quality of the necessary decisions on e.g. alternative materials, designs, or production processes. The team-based approach is rather widespread in NPD practice: So, e.g. in the second PDMA survey (Griffin 1997) 60 % of the US firms indicated to use cross-functional stage gate processes for NPD and teamwork was especially common in innovative projects (over 84 %).

Whereas an intensive inter- and intra-team communication is generally assumed to have a positive influence on the NPD process (see e.g. Pinto & Pinto 1990 for the importance of internal communication and Ancona & Caldwell 1992 for the effect of communication outside the team boundaries on innovation), it is also widely recognized that divergent interests, points of view,

and goal orientations as well as socio-emotional tensions could be a source of conflicts (see, e.g., Lawrence & Losch 1967). Moreover, during the NPD process, these conflicts are assumed to appear so often, that they are described as a feature which cannot be avoided (see, e.g., Kezsbom 1992; Pinto & Kharbanda 1995), but which can have positive and/or negative consequences on team performance and success. So, e.g., Shaw et al. (2003) describe conflicts between engineers and marketers during NPD processes that led to cooperation barriers whereas other authors (e.g., Jehn & Mannix 2001) have shown that conflicts can contribute to goal attainment by demonstrating and understanding different points of view. The literature still has not come to a final conclusion whether certain types of conflicts can be beneficial to team effectiveness, or if conflict in general is negatively related to team performance (De Dreu & Weingart 2003). The same holds for a profound systematization of conflicts during NPD processes. There exist numerous classification attempts each addressing different underlying conflict sources and appearances (see Rese et al. 2005 for an overview). Despite the statement that conflict is a natural phenomenon in NPD (Lam & Chin 2005), conflicts seem to be empirically difficult to record: In a large-scale observational study on NPD processes in three German firms, where altogether 265 situations were

identified as critical for the success of the engineering process, only 22 (8.3 %) were rated by the observers as „conflicts“ (Badke-Schaub & Frankenberger 2004). Similarly, in a survey on the relationship between the functional areas marketing and engineering, only 9.1% of the interviewed engineers indicated that their overall degree of conflict with marketing colleagues is high (Shaw et al. 2003).

Given the importance of new products to the survival of firms and studies showing that managing conflict is one of the most critical project success factors (Gemünden & Lechler 1997) we seek to answer the following questions:

- How often do conflicts occur in NPD ?
- What types of conflict occur ?
- What are the consequences of these occurrences on the NPD performance ?
- Which recommendations for managing conflicts can be derived?

In an effort to bridge these gaps in the literature, the objective of this paper is to empirically examine conflict frequency, conflict consequences and conflict management in NPD. In Section 2 of this paper we develop the conceptual framework of our study from the literature, within which conflicts, its causes and their effect on team performance are investigated and a classification scheme addressing different underlying conflict sources and appearances is introduced. Using the framework, a questionnaire was developed and sent to a sample of German manufacturing firms. In Section 3 we describe the methodology, i.g. the questionnaire items, the sample selection and data collection method, and present our results. Analysis of the data led to further confirmation of previous research findings, but also provided new insights about conflict intensity and conflict consequences. The results of the analysis and implications for managing conflicts are discussed in Section 4.

2. Literature Review and Research Hypotheses

2.1 Conflicts in NPD

Conflict has been broadly defined as an awareness of the parties involved that there are discrepancies, or incompatible wishes or desires present (Boulding 1957, Deutsch 1973, 1990, Regnet 2001). With organisations increasingly relying on cross-functional teams in NPD internal or external conflicts can occur regarding team boundaries. Tensions between a team and other persons or teams within an organization (inter-team or inter-group conflicts) are to be due frequently to organizational causes. According to Pinto and Kharbanda (1995) the following characteristics of organizations encourage intergroup conflicts: (1) An incentive payment system, which emphasizes the competition between different

groups of an organization, (2) shortage of resources accompanied by fighting for the necessary support for the own team, (3) unclear authority and competence distribution, leading to uncertainties in the team, to which goals if necessary priority should be granted, (4) very strongly differentiated departments within the organization which can damage the co-operation especially of cross-functional teams. Keszobom (1992) looked at the sources of conflict among project teams and found that the area attracting the most conflict involved the definition of goals and priorities, while conflicts over personalities were rated second. Communication and information flow was ranked at number three followed by politics, administrative procedures, resource allocation, scheduling, leadership, ambiguous roles/structure, costs, reward structure, technical opinions, and unresolved prior conflicts.

With respect to conflicts within a team (intra-team or intra-group conflict), two types of conflict are predominantly proposed in the research literature (Amason & Sapienza 1997, Jehn 1994, 1997, Pelled 1996, Pinto & Kharbanda 1995):

- On the one side there are task-related conflicts, e.g. about the distribution of resources, procedures and policies, judgments and interpretations of facts. They are called substantive (Guetzkow, Gyr 1954), goal-oriented (Coser 1956), issue-based (Deutsch 1969), cognitive (Priem & Price 1991), functional (Pinto & Kharbanda 1995) or task conflicts (Jehn 1995). Task conflict is the awareness among group members that there are differing viewpoints and ideas about task issues and contents, including the importance of task goals, procedures for task accomplishment, and the appropriate choice for action. They may go along with animated discussions and personal excitement, but without personal negative feelings such as dislike among group members.
- On the other side we have socio-emotional or interpersonal arguments e.g. about personal taste, political preferences, or values. They are called affective (Guetzkow & Gyr 1954), emotional (Coser 1956), interpersonal (Deutsch 1969), dysfunctional (Pinto & Kharbanda 1995), or relationship conflicts (Jehn 1995). Emotional conflict is the awareness among group members that there are interpersonal clashes including intense interpersonal negative emotions such as annoyance, dislike, frustration, anger, distrust, fear or other forms of negative affect.

According to Pelled (1996, p.620), task conflicts and relationship conflicts are not completely independent of each other: “In some cases, when group members harbor particularly strong feelings about a task issue, they may become emotional about it, and substantive conflict will lead to affective conflict.” Additionally, Jehn (1997) distinguishes a third type of conflict, process conflict. Process conflict is the awareness of controversies about how task accomplishment should proceed, and includes disagreements about duty or resource delegation and responsibility assignment.

Besides the classification into task, relationship, and process conflict of Jehn (1997) and Jehn & Mannix (2001), there exist numerous other systematization attempts for conflicts each addressing different underlying conflict sources and appearances (see Rese et al. (2005) for an overview). Possible conflict causes frequently mentioned in the literature are (Capozzoli 1995, Regnet, 2001, p.27)

- fundamental differences of the team members with regard to their attitudes (resulting in different goals of the team members), values, needs, expectations (e.g. of how the process will work and what the outcomes will be), or norms,
- different personality types and interests,
- communication deficits (e.g. misunderstandings, poor listening skills, nonverbal cues being missed or ignored, insufficient sharing of information) and different information levels,
- different perception of a situation or problem (resulting in a different interpretation of the same information),

- (scarce) resources,
- organization, systems, structures (e.g. authority and competence distribution, duties and responsibilities, roles, procedures, reward structure).

However, only few attempts try to combine these systematizations and develop a more comprehensive conflict typology. One systematization approach is the conflict typology of Glasl (1980 or 2004) classifying conflicts according to three dimensions, e.g. number of people involved, efforts to overcome the conflict, and emotional involvement in the conflict. In Table 1 we extend these prior systematizations by introducing a multidimensional conflict typology. Altogether 10 conflict sources or aspects are differentiated and assigned to 4 levels, the factual, information and perception, valuation and socio-emotional level. In contrast to Jehn, the process conflict construct is split up into three single aspects, process implementation, resource allocation and role expectations reflecting the underlying responsibility structure.

Table 1. Conflict levels and conflict sources/aspects

Conflict level	Conflict source/aspect
Factual level	Pursued goals/results Process implementation Resource allocation
Information and perception level	Different information status Different information processing/perception
Valuation level	Different interests/preferences/norms/values
Socio-emotional level	Different role expectations Self-centred characters Non-formalized confrontation patterns Emotional tensions

2.2 Conflicts and team performance

With respect to the effect of team conflict on team performance two approaches can be found in the research literature. On the one hand the information-processing perspective focuses on team conflict in general. By bringing about negative reactions such as frustration, anger, tension, and antagonism, and distracting team members from the task, the negative relationship between conflict and team productivity and performance is emphasized and empirically supported. Nevertheless, low levels of conflict are suggested to be potentially beneficial. Prediscussion disagreement can improve decision quality and information exchange, because when in conflict, team members have to confront issues, learn to take different perspectives, need to be creative, and debate the merits of different alternatives in more detail. But with conflict intensifying, cognitive flexibility and creative thinking break down quickly. Altogether, the information-processing perspective suggests a moderate negative correlation between conflict and team performance (see De Dreu & Weingart 2003, p. 741f. for an overview).

Taking a different perspective Jehn (1994, 1995, 1997) differentiates between task and relationship conflict and proposes, that task conflict can be beneficial to task performance, especially when working on complex tasks without standard solutions, so-called non-routine tasks. But empirical evidence was inconsistent, and not altogether supporting the assumption that task conflict and relationship conflict are differentially correlated with team performance. The meta-analysis of team conflict literature of De Dreu & Weingart (2003) contradicts the task versus relationship perspective revealing that both relationship conflict and task conflict have the same consequences, being each strongly and negatively correlated with team performance, and team membership satisfaction. Only when task conflict and relationship conflict were weakly correlated, task conflict was less negatively related to team performance. Also instead of predicted, conflict had stronger negative relations with team performance in highly complex than in less complex tasks. Altogether the information processing perspective was supported suggesting, "that whereas a little conflict may be beneficial, such positive effects quickly break down as conflict becomes more intense" (De Dreu & Weingart (2003), p.746).

3. Research Methodology

3.1 Questionnaire Design

While reviewing the literature on conflicts with a

special focus on NPD, we also interviewed executives of a German automotive manufacturer using their gateway management as a sample application or "reality check" (Rese et al. (2005), p. 283f.) and pretesting the item batteries of the questionnaire. With the help of the manufacturing experts who generally had positive comments on the questionnaire the measures adopted could be refined and the questionnaire design improved. The automotive and mechanical engineering sectors were chosen as research context due to the high research and development intensity and the widespread use of project management as an effective technique for decision-making and operating.

Measures for the different distinguished types of conflict sources and aspects were developed first. The respondents' attention was focussed on two levels, asking them to first state how often the respective conflict cause or aspect could be found in their company, and then to assess its impact on team performance. This permitted a multi-level analysis of conflict frequency and consequences on team performance. Each of the 10 different conflict sources/aspects was operationalized as a construct of at least three questionnaire items, as indicated in Table 2. The items were adapted from the literature, especially from Jehn's scales for task, process and relationship conflict, and suggestions by the executives interviewed. The item lists are given in the appendix of this paper. The items for conflicts due to the pursued goals comprised three questionnaire items based on Jehn's (1994) measure of task conflict. Another three items were adapted from the research by Green et al. (2000) and Song et al. (2000) to measure goal incongruity and uncertainty. For the process conflict construct, three of the four items were adapted from the measure developed by Shah & Jehn (1993), and for the relationship conflict construct two items from Jehn (1994). Corresponding to Cummings (2004) resources were distinguished in financial, personnel resources and equipment. One of the process conflict items of Jehn & Mannix (2001) dealing about resource allocation disagreements was used to formulate the questionnaire items. To assess conflicts due to different information status, the items of Song et al. (2000) measuring the quality of cross-functional information were adapted and extended looking also at the information exchange inside the group. The item scale of Bradford et al. (2001) for modelling differences in areas/scope of knowledge was adapted for analyzing differences in information processing/perception due to differences in education and differences in interests/preferences/norms/values. Besides, items with other aspects leading to a different interpretation of the same information were newly developed. That was also the case with the other four items for the scale of conflicts due to different interests/ preferences/norms/values. The construct for role conflicts comprised the aspect of

power differences adapting two items of the scale of Bradford et al. (2001) and one of the process conflict items of Jehn & Mannix (2001) looking at conflicts about task responsibilities. To measure self-centred characters we analyzed commitment differences to the team or the task looking especially at the team-based reward system and adapting two items of Xie et al. (2003) on joint reward systems. The items for non-formalized confrontation patterns were newly developed taking into account the literature, especially Glasl (1980). The items were measured using five-point Likert scales, ranging from 'conflict frequency is low (not at all)' (1) to '... is high (very often)' (5) for the frequency of conflict sources/aspects and 'consequences on team performance is negative' (1) to '... is positive' (5) for consequences of conflict sources/aspects.

Because team performance was measured in combination with conflict frequency, additional item-scales to measure team performance were not introduced. Instead, innovation performance was used as rather "indirect" indicator for NPD performance and success. The construct combines altogether six items, adapting three items suggested by Miller & Friesen (1982). The item list is also given in the appendix. High innovation means the existence of a strong emphasis on R&D, the introduction of many new products/services over time, and significant changes in products/services. Corresponding to Frishammar & Hörte (2005, p.256) the respondents were asked about products instead of lines of products because of the smaller firm size. In addition to Miller & Friesen (1982) the third item was split up looking at the changes in products from the point-of view of the company and of the market whereby the latter should indicate a higher innovation performance. Further, two new items were introduced regarding the product development, with one item asking to compare the performance of the product development to the industry sector. Because systems, procedures and structures in organizations could be arranged in a conflict-laden way with a negative influence on innovation performance, the second item was rating the organization of the product development of the company in comparison with the industry sector. The items were rated on a five-point Likert scale anchored by 1 = 'strongly disagree' and 5 = 'strongly agree'.

To complete the framework, some organizational features of conflicts and of the NPD process were developed. Altogether six items on a five-point Likert scale (1 = 'frequency is low', ..., 5 = 'is high') asked how many people usually were involved in a conflict (two in a group, more than two in a group, the whole group, members from two or more groups) and their hierarchical position (persons of the same hierarchical level, superior also involved). Additionally the type of team (work team, coordination team, decision team), the phase of the new product development process (strategic planning, conception, series development,

series) and the general conflict frequency in the groups of the respondents were analyzed.

3.2 Data Collection

Data for the study were collected via a mail survey between June and August 2005. The target population comprised manufacturing firms with 175-2,500 employees in the German automotive and mechanical engineering sectors. The size of the companies was controlled, to obtain firms large enough to be likely to have a range of diverse function units and to make use of project teams in developing (Pinto & Pinto 1990, p.205). At the time they should still be sufficiently small permitting a single respondent to have a satisfactory overview of operations (Frishammar & Hörte 2005, p.256). Creditreform-Database was used to develop a sample frame of 1,000 companies.

The research focused on R&D managers and directors, since it seems to be widely believed that top administrators provide the best information about environmental and organizational characteristics (Frishammar & Hörte 2005, p.256). The self-completion questionnaire was therefore addressed to the head of research and development of the respective company. After two mailing waves, a total of 116 questionnaires were returned. 23 recipients from the list replied, that the firm had no in-house product development, NPD was not completed as teams, the company had become insolvent, they felt they could not answer the questions of the questionnaire or they simply did not want to participate. These non-response reasons yielded an effective sample size of 977, thus providing a response rate of 11.9 %. Considering, that the selected interview partners – top level managers responsible for the NPD processes in their firms - could not be addressed personally, the resulting response rate is high. Nevertheless, the responses and further inquiries of the interview partners signaled a high relevance of the interview topic. Controlling the position of the interview partners, of those who responded to the survey and gave detailed information about their position in the respective company on a voluntary basis almost all (97.4 %) were top level managers.

4. Analysis and Results

4.1 Analysis and results with respect to conflict frequency

The frequency of different conflict types and their consequences on the perceived NPD performance is analyzed using covariance structure modelling as well as cluster and variance analysis. First, in order to test the measurement model including the ten latent conflict sources/aspects as conflict constructs, a confirmatory factor analysis via AMOS version 5.0

(Arbuckle & Wothke 1999) was run using unweighted least square (ULS) estimation due to the small sample size (Anderson & Gerbing 1988; Bentler 1990). For the confirmatory structure analysis missing data was replaced by using mean imputation. The test of the measurement model included the estimation of the composite reliability and the average variance extracted of each conflict construct (Homburg & Giering 1996). Also, Cronbach's α was calculated to verify the reliability of the conflict constructs in this sample. Altogether 7 of the 44 items were dropped, because of their low item reliability (<0.4). The results in Table 2 indicate that the measures used in this study are fairly robust in terms of their composite reliability and convergent validity. All Cronbach's α values are higher than 0.6, which is suggested as acceptable by Malhotra (1999) and by Murphy & Davidshofer (2001). Even the guidelines of Nunnally (1978) for basic research proposing a value of 0.7 are exceeded in 70 % of the single conflict constructs. The composite reliability of the conflict constructs range from 0.651 to 0.852, and exceeds Bagozzi & Yi's (1988) minimum value of 0.60 supporting the reliability of the constructs. In addition, the average variance extracted (AVE) for seven of the ten conflict constructs exceeds 0.50, which is the recommendation of Fornell & Larcker (1981), suggesting that there exist some evidence of discriminative validity of the conflict constructs. In summary, the multiple item constructs are generally satisfactory.

The overall model evaluation resulted in a good fit with GFI = 0.937 and AGFI = 0.925. From this base, we looked at the substantive relationships and formed group level indices by averaging individual-level indices.

An essential result of the empirical investigation is the fact that from the view-point of the NPD management conflicts did not arise as frequently as expected on the basis of the relevant literature. Only in more than a third of the companies the interview partners stated that conflicts happen frequently (31.3 %) or very often (5.2 %). On the one hand in introductory overview articles conflicts are said to generally arise with product development projects or with innovations so frequently that they are described

virtually as a distinctive feature of innovations (e.g. Posch (2003), p.249). On the other hand situations were evaluated in empirical studies only in somewhat less than 10 % of the cases as conflict-laden (Badke-Schaub & Frankenberg (2004), Shaw et al. (2003)). Thus this empirical investigation lies between these two extremes. The results show that conflicts in product development took place most frequently between two members in a group (mean: 3.32), followed by conflicts including more than two members of a group (mean: 2.95). In contrast conflicts concerning the whole team (mean: 1.76) or emerging across team boundaries (mean: 2.64) happened less frequently. Likewise clearly more frequently noticed were conflicts between co-workers on the same hierarchical level (mean: 3.49), than conflicts, into which the superior is also involved (mean: 2.92). Since the questionnaire was filled out mostly by R&D managers and directors, who also have a superior function, the respondents seem to refer particularly to conflicts in groups, in which they were with the other group members on a hierarchically similar level. Conflicts, in which they take a superior role, play in contrast a clearly smaller role. With respect to conflict sources/aspects, conflicts due to a delayed or insufficient flow of information were most frequent (see Table 2). At the same time tested and tolerated forms for conflict management were obviously very seldom present in the firms, i.e. non-formalized discussions were likewise to be found frequently.

However, correlation analyses makes clear, that conflict is a multilayered construct, which is characterized by many different influences such as differences in goals, methods, attitudes or values (see Table 3). Thus the frequency of conflicts on the factual level, i.e. disputes about results, processes, procedures or resources, is closely related with the information and perception level (information and knowledge differences, contrary interpretation models). Simultaneously they also go along with emotional tensions. Emotional tensions most frequently appear together with information and knowledge differences. Conflicts therefore cannot be described as simply linear and non-overlapping.

Table 2. Summary Statistics, Conflict Construct Reliability

Conflict source/aspect	Initial number of items (see appendix)	Items remaining	Mean (standard deviation)	Cronbach's Alpha	AVE ^b	Composite reliability ^a
Pursued goals/results	6	6	2.78 (0.59)	0.625	0.243	0.651
Process implementation	4	3	2.19 (0.67)	0.730	0.593	0.811
Resource allocation	4	3	2.47 (0.80)	0.787	0.611	0.818
Different information status	5	4	2.93 (0.69)	0.787	0.513	0.804
Different information processing/perception	4	3	2.79 (0.93)	0.793	0.550	0.785
Different interests/preferences/norms/values	5	4	2.26 (0.70)	0.782	0.563	0.835
Different role expectations	4	3	2.53 (0.72)	0.623	0.404	0.637
Self-centred characters	3	3	2.13 (0.69)	0.635	0.439	0.691
Non-formalized confrontation patterns	4	4	2.85 (1.17)	0.907	0.591	0.852
Emotional tensions	5	4	2.13 (0.64)	0.644	0.477	0.782

^a: Composite Reliability = $(\sum \lambda_i)^2 / ((\sum \lambda_i)^2 + \sum \text{variance}(\epsilon_i))$, with λ = standardized factor loading, ϵ = indicator measurement error

^b: Average Variance Extracted (AVE) = $\sum \lambda_i^2 / ((\sum \lambda_i)^2 + \sum \text{variance}(\epsilon_i))$, with λ = standardized factor loading, ϵ = indicator measurement error

Table 3: Intercorrelations among the measured conflict frequency constructs

Conflict source/aspect	1	2	3	4	5	6	7	8	9
1 Pursued goals/results									
2 Process implementation	.49**								
3 Resource allocation	.44**	.34**							
4 Different information status	.55**	.36**	.45**						
5 Different information processing/perception	.41**	.17	.17	.42**					
6 Different interests/preferences/ norms/ values	.35**	.14	.36**	.41**	.39**				
7 Different role expectations	.51**	.27**	.31**	.42**	.46**	.32**			
8 Self-centred characters	.30**	.24*	.28**	.35**	.39**	.34**	.44**		
9 Non-formalized confrontation patterns	.1	-.13	.00	.37**	.30**	.1	.27**	.17	
10 Emotional tensions	.37**	.23*	.35**	.46**	.27**	.41**	.34**	.41**	.24

*: Correlation coefficients significantly different from 0 with $p \leq .05$; **: with $p \leq .01$

Grouping the 116 firms according to their agreement to the NPD performance construct (see appendix for the six items) by means of a one-dimensional cluster analysis (method: average linkage within group) in 41 "more innovative" and 68 "less innovative" firms (7 firms could not be assigned due to missing data), information and knowledge differences as well as non-formalized

confrontation patterns showed up in "more innovative" firms significantly less frequent. In these firms, team members exchanged information more accurately and without time delay, and in particular cross-functional teams had developed information sharing processes. Also, a grouping was established by diving up the firms according to the general conflict frequency into firms, in

which conflicts appear "seldom" up to "occasionally" (73 firms with an "overall low conflict frequency"), and in firms with "frequent" up to "permanent" conflicts (42 firms with an "overall high conflict frequency"); Respondents responsible for the product development in firms with an "overall low conflict frequency" were confronted considerably less with disputes about goals,

results, and processes as well emotional tensions. Non-formalized confrontation patterns seem to arise however often and independently of the general conflict frequency. This means that all firms have rather seldomly implemented methods and procedures of conflict management (see Table 4).

Table 4: Frequency¹ of conflict sources/aspects with respect to innovativeness and overall conflict frequency

Conflicts source/aspect	More innovative firms (n=47)	Less innovative firms (n=62)	Firms with an overall low conflict frequency (n=73)	Firms with an overall high conflict frequency (n=42)
Pursued goals/results	2.70	2.86	2.63	3.02**
Process implementation	2.13	2.24	2.05	2.40**
Resource allocation	2.46	2.50	2.39	2.59
Different information status	2.72	3.08**	2.82	3.10*
Different information processing/perception	2.74	2.81	2.65	3.03*
Different interests/preferences /norms/values	2.29	2.26	2.17	2.41
Different role expectations	2.54	2.58	2.48	2.61
Self-centred characters	2.08	2.18	2.18	2.02
Non-formalized confrontation patterns	2.39	3.15**	2.93	2.68
Emotional tensions	2.13	2.16	1.99	2.36**

¹: Response scale: 1='frequency is low', ..., 5='frequency is high'

*: Differences significantly different with $p \leq .05$; **: ... with $p \leq .01$

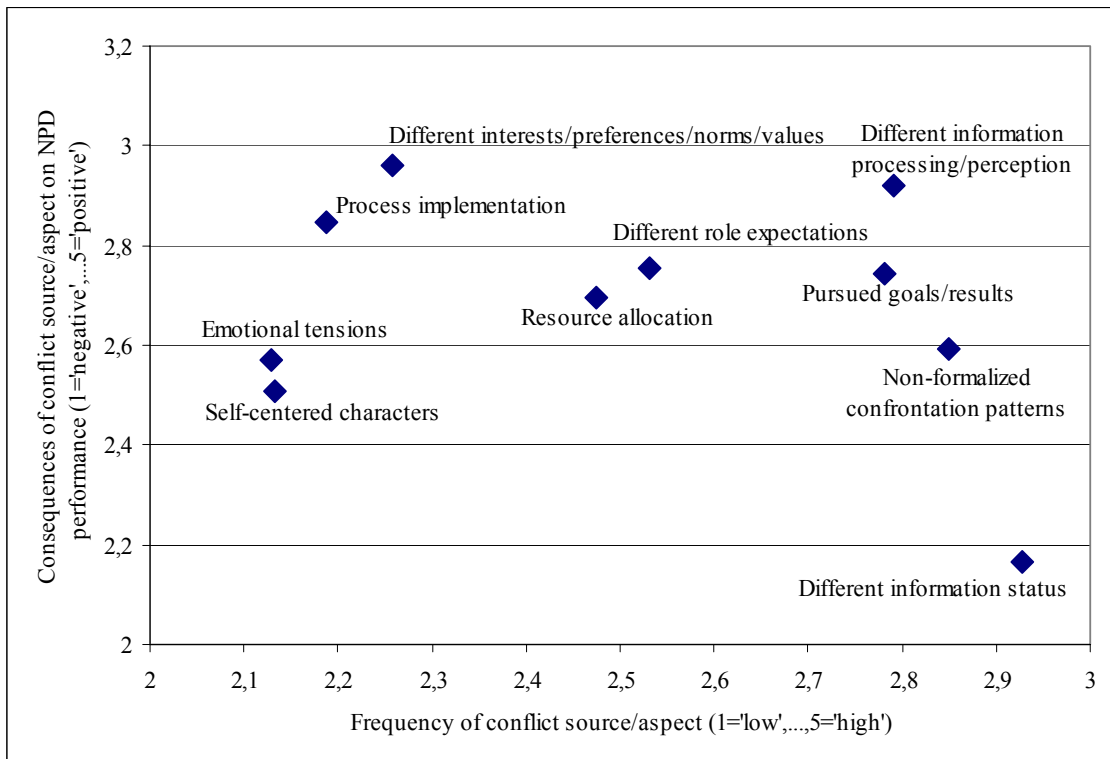
4.2 Analysis and results with respect to conflict consequences on team performance

It could be shown that conflicts due to a delayed or insufficient flow of information were most frequent with the most negative influence on inter-team and intra-team team performance. On the other hand the effect of conflicts due to individually different interests, preferences, norms and values as well as due to different information processing/perception is assessed rather positively on team performance (see Fig. 1).

Some other results will be briefly summarized: Looking in more detail at different types of teams, disputes about process implementation were comparatively more frequent in decision groups and evaluated at the same time also clearly more negative with

respect to team success. In contrast conflicts due to contrary roles expectation were to be found more frequently in work and/or coordination groups. The same holds for non-formalized arguments. In decision groups methods and forms of conflict management were implemented more frequently. Differentiation according to the size of the firms showed, that conflicts due to information and knowledge differences were particularly frequent and especially negative evaluated in small enterprises (up to 249 employees). In particular information exchange and communication between groups functioned badly. In large enterprises (starting from 1,000 employees) generally resources allocation conflicts developed particularly frequent, especially about personnel resources between groups. Further process implementation disputes are clearly more frequent, which concerns the take-over and/or the delegation of subtasks within groups.

Fig. 1: Frequency of different conflict sources/aspects and their consequences on the NPD performance



5. Summary and Handling Recommendations

This paper looked in more detail into conflicts in NPD. An intensive literature review helped to develop a new, comprehensive typology of conflict sources and aspects combining different systematization approaches. In the empirical investigation the measurement model proved to be satisfying regarding the overall model fit. Nevertheless the single conflict constructs should be further improved. The empirical results showed that conflicts during NPD processes did occur less intensively throughout the NPD processes as supposed. Although an introductory conflict definition was placed in front the questionnaire, which also referred to positive effects of conflicts in form of an intensified information exchange and a higher decision quality of groups, it cannot be excluded that the respondents answered socially desired. In everyday-life linguistic use the term implies an unwanted condition, which is connected mostly with negative emotional validations of the persons concerned, since the achievement of the pursued goals is endangered. Nevertheless, in more than a third of the companies the interview partners stated that conflicts happen frequently or permanently, indicating the relevance of conflict as a research topic. Looking at the conflict sources, in contrast to earlier empirical investigations, conflicts due to a delayed or insufficient flow of information were most frequent with the most negative influence on inter-team and intra-team team performance. The importance of this conflict source and the necessity to improve information exchange and communication in new product

development is also emphasized through the empirical result, that in successful, that is, more innovative firms, team members exchanged information more accurately and without time delay, and in particular cross-functional teams had developed information sharing processes.

From the empirical results the following additional recommendations for conflict management in NPD can be derived: The removal of information and knowledge differences is the most important issue, especially within decision groups. Non-formalized confrontation patterns are still evaluated problematic in decision groups despite the higher conflict management professionalism prevailing there, therefore the already existing procedures should be checked thoroughly and improved. Information and knowledge exchange should be improved in particular within small enterprises. Regarding conflicts between two persons in a group it should be considered that frequently also information exchange between the groups is disturbed. Large enterprises should concentrate on procedures for the solution of resource allocation conflicts, in particular the distribution of personnel resources between groups. Established methods of conflict management are missing for work and coordination groups and should be established - independently of the business size. Further, in work and coordination groups, also in those which are only temporarily established, task responsibilities and thus the role expectations should be more clearly specified.

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APPENDIX 1: NPD performance response scale and item list (translated from German)

Response scale:

1 = 'strongly disagree', ..., 5 = 'strongly agree'

Item list:

1. The company puts a very strong emphasis on R&D, technological leadership, and innovations.
2. In the last five years many new products were developed.
3. Changes in products have been from the view of the market of fundamental nature.
4. Changes in products have been from the view of the company of fundamental nature.
5. Our company is considered in our branch as leading with respect to NPD success.
6. Our company is considered in our branch as leading with respect to NPD organization.

APPENDIX 2: Conflict source/aspect response scales and item lists (translated from German)

'Frequency of conflict sources/aspects' response scale:

1='frequency is low', ..., 5='frequency is high'

'Consequences of conflict sources/aspects' response scale:

1='consequences on team performance is negative', ..., 5='... is positive'

'Pursued goals' item list:

1. Within our teams there are disagreements concerning the desired results / goals of the teamwork.
2. Members within our teams have conflicting opinions over the tasks to be accomplished as a team.
3. Members within our teams do not match with respect to the tasks to be accomplished as a team.
4. The goals of different teams are not harmonized.
5. The team goals are imprecise and allow for a variety of interpretations.
6. Time priorities of the different teams regarding NPD differ.

'Process implementation' item list:

1. Within our teams there is disagreement about who should take over which subtasks.
2. The members in our teams do not approve of the way a team task shall be accomplished.
3. Within our teams there are arguments over the delegation of subtasks.
4. Between our teams there are arguments over the delegation of subtasks.

'Resource allocation' item list:

1. Within our teams it comes to arguments concerning personnel resource allocation.
2. Between our teams it comes to arguments concerning personnel resource allocation.
3. Within our teams it comes to arguments concerning financial / equipment resource allocation.
4. Between our teams it comes to arguments concerning financial / equipment resource allocation.

'Different information status' item list:

1. Information exchange within our teams is problematic.
2. Information exchange between our groups is problematic.
3. Information exchange between groups is retarded.
4. Information exchange within our teams is incomplete and inaccurate.
5. Information exchange between our teams is incomplete and inaccurate.

'Different information processing/perception' item list:

1. Teams with members with different experiences and have problems with comprehension.
2. Information is interpreted differently by team members due to their education.
3. Information is interpreted differently by team members due to their interests.

4. The team members use different approaches for data interpretation.

‘Different interests/preferences/norms/values’ item list:

1. Due to the education of team members within different areas (e.g. economics, engineering), conflicts emerge.
2. Due to different interests and preferences within our teams, conflicts come up.
3. Due to different interests and preferences between our teams, conflicts come up.
4. Due to different norms and values within our teams, conflicts come up.
5. Due to different norms and values between our teams, conflicts come up.

‘Different role expectations’ item list:

1. Within teams there is disagreement over task responsibilities.
2. Due to differences in interest between different hierarchy and function levels disagreements are caused.
3. One person dictated the direction of the team work due to his or her status contrary to the wants of the other team members.
4. One person dictated the direction of the team work due to his or her expertise contrary to the wants of the other team members.

‘Self-centred characters’ item list:

1. Team members use the team work for self-profiling.
2. Team members take advantage of the fact that they are judged on the basis of the team achievement and not on their individual achievement.
3. Teams take advantage of the fact that all departments share equally in the rewards from a successfully commercialized new product.

‘Non-formalized confrontation patterns’ item list:

1. For problem solving in teamwork rules and procedures are missing.
2. Our teams didn’t introduce own rules and procedures for problem solving till now.
3. Conciliation proceedings for conflicts are missing within our teams.
4. Conciliation proceedings for conflicts are missing between our teams.

‘Emotional tensions’ item list:

1. Within our teams the relations are tense.
2. Between our teams the relations are tense.
3. Rivalry and envy are common within our teams.
4. Rivalry and envy are common between our teams.
5. Within our teams different personalities clash.