SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2023
ORGANIZATION AND MANAGEMENT SERIES NO. 187

RESEARCH AND DEVELOPMENT vs PRODUCTION – RIVALRY OR COOPERATION? CASE STUDY OF CHEMICAL INDUSTRY ENTERPRISE

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Purpose: Purpose of research carried out described in article, is to specify problems and causes thereof that occur in relationship between research and development department and production units on example of chemical sector enterprise. It is also on purpose to indicate possibilities that such problems to be prevented.
Design/methodology/approach: Research used the case study method and within framework thereof: literature on the subject and internal documentation review; interviews with technologists and production unit management and laboratory and R&D staff; and self-observation.
Findings: Main problems occurring between employee groups, constituting rivalry and other dysfunctions background were identified, and causes thereof as well, resulting in incubating such attitudes and behaviours. Both in terms of organizational and psycho-social factors.
Research limitations/implications: Query revealed lack of available literature relating explicitly to the relationship between production and R&D areas. Thus, in this case, attribute of building-up, taking into account effect of previous research inquiries by the other authors, is not applicable. Therefore, it can be considered that issue undertaken in present article is of innovative nature. It was focused on literature related to intra-organizational relations in work environment. Literature in form of industry reports or reports on R&D activities of industrial enterprises was also used as auxiliary measure.
Practical implications: Based on research carried out, improving guidelines which can be implemented practically from now on in company constituting the study area are specified.
Originality/value: Nobody has undertaken dichotomy subject matter that exists between R&D and production areas until now. These two activities trigger as it were intrinsically this phenomenon in majority of organizations, regardless of industry sector or branch. Research has shown both effects and causes of this phenomenon, based on which improving conclusions have been derived. In practice, these are easy to implement in any organisation. They can take the form of evolutionary or revolutionary changes without detriment to the social potential employed in areas constituting the field of rivalry, as well as without loss to the organisation itself. Present article fills publication gap within range of R&D and production area cooperation in terms of causes and effects of problems occurring between these activities in organization.

Keywords: research, development and meaning thereof in organization, intra-organization relations, production vs R&D relations.

Category of the paper: Research paper, Case study.

1. Introduction

Between R&D and production activities it comes to frequent dichotomies in role perception and importance of R&D function in organization. They are dependent on organizational area within framework in which employees formulate opinions or undertake defined activities. Both in terms of product development and process improvements as well, including business, technological and other processes. Rivalry is very often exemplification of these interdependencies. Thus, issue undertaken in present article has two contexts. The first one relating to awareness of R&D area importance learning among respondents employed on opposite sides of potential rivalry field. While the second context concerns the construct of organizational behaviour. It is just at level of psychosocial and organizational factors that behaving activities become to be incubated which in consequence are escalated finally to be manifested as dysfunctional and behaving attitudes, including rivalry ones. Proper coexistence and cooperation between such key areas as production and research & development constitutes organisation strength. They should be derived from appropriate organizational leadership being in accordance with contemporary conditionings (Chojnacka, 2021 p. 67). In turn, organizational strength is condition of survival in dynamically changing market environment which in case of chemical sector, besides to customer requirements, is determined by capability of:

- adaptation to changing, increasingly restrictive, environmental regulations, especially with regard to energy transformation and decarbonization (Goranczewski, Kądzielawski, 2022),
- producing new biodegradable, environmentally neutral products.

In enterprise structure which constitutes the case study area, currently there are three production units (Agro, OXO and Power Generation). They are performing production tasks and, as in case of power generation, supporting tasks for basic production. Within internal structure frames of these units, within range of process supervision and improvement, there function technology offices. Furthermore, technologists are employed in individual departments of production units. In Grupa Azoty Zakłady Azotowe Kędzierzyn SA enterprise there is also research and development department. Operation thereof includes following activities:

- quality laboratories which are testing product conformity with requirements and
- research and supporting laboratories such as (environment, HSE, power generation laboratory),
- research & development centre with research agenda dedicated mainly to OXO products,
- alternative fuel laboratory (under construction) which task will be determination of Hydrogen in purity class 5.0, for applications, among others, in automotive branch.

The aim of research conducted, described in article, is to identify main problems that occur in relationship between research and development (R&D) and production departments in the chemical sector enterprise. It is also attempt to indicate possibilities for counteracting such problems. Based on the objective thus formulated, the following research problems were defined:

P.1 Perceiving by employees of role and importance of R&D department in enterprise's activities (partitive and interactional relationships) is closely associated with affiliation to organizational areas constituting rivalry field;

P.2 Perceiving by employees of role and importance of R&D department stem from possibilities of individual potential benefits obtaining created by R&D activities. This, in turn, creates inherent/natural rivalry between job position groups such as technologists and research staff.

Nomenclature used in text in form of: research and development department, R&D area, R&D function or standalone abbreviation R&D which appears in following text, should be interpreted as identical. Also, term 'production' should be understood ambiguously. Objectively as organizational function; as business unit, according to enterprise structure in which research was conducted. Subjectively as: management staff; technologists working in individual production departments and in technology offices of production units as well.

2. Research Method

To resolve problems specified above, in research carried out qualitative tools were used. Research problems presented are of practical nature. Solution thereof may constitute basis for significant improvements not only in enterprise constituting research area. Both R&D department and production understood in broadest sense also, are key areas of activity for each enterprise of this type. Explanatory dimension of research carried out is also essential, enabling generalisations to be made. Both conditions and causes of phenomenon described, context thereof, intervention conditions or preventing activities and/or techniques, will be similar in each entity similar to one under research (Konecki, 2000). In case of qualitative methods used, to describe and explain phenomena, using of hypotheses is unnecessary (Kostera, 2003). Taking into account assumptions thus defined, as leading method, case study was used (Stake, 2014). While, within research framework, research method selection is presented as follows:

1. Literature review on the subject and content analysis of available literature (Creswell, 2013). Source material selection was based on key word identification. Query was conducted in the following scientific databases: Academic Search Ultimate, including Business Source Ultimate, Education Resources Information Center, AGRICOLA, Newspaper Source and Google Scholar. In available records of individual databases, there occur trace amounts of publications that could be recognized as similar to research issue undertaken in article.
2. Internal documentation review, within range described in present article, and in particular, dispositions, instructions and procedures regulating subject matter of inventiveness, innovations and research and development projects. These are unpublished materials, available to the author due to the fact of employment in entity constituting research area (Łuczewski, Bednarz-Łuczewska, 2012).
3. Interviews conducted with the production unit employees, mainly with technologists and managers in charge of production or technology offices (Kvale, 2012). On the other hand, laboratory managers and staff in product development offices were interviewed within range for both fertilising products and OXO alcohols and plasticisers as well. In interviews the persons pursuing implementation doctorates were taken into account. It was assumed for all persons selected that they have experience adequate to issues discussed in article, including real cooperation between R&D and production departments.
4. Self-observation - the author is employee of entity under research, responsible for, among others, research and development department and production unit "power generation" (Ciesielska, Wolanik, Boström, Öhlander, 2012).

Research area was Zakłady Azotowe Kędzierzyn SA. which is part of Grupa Azoty SA - capital group structure. The plant is manufacturer of granulated nitrogenous fertilisers, aqueous urea solutions, ammonia water, among others for power generation industry, technical urea water, liquid fertilisers (nitrate-urea solution), nitric acid, and also OXO products including: alcohols, esters/plasticisers. Research was conducted in September 2023. Research population selection was quota-based and was N = 18, taking into account selection criteria described above in section 3 (interviews).

3. Literature review

Literature review within range of research issue discussed shows that there are no texts in available literature that directly are related to issue constituting subject of present consideration. Therefore, we focused mainly on publications which are dealing with role and importance of function itself as research and development play, and on unpublished elaborations of consulting companies and public institutions that are monitoring and/or analysing innovation and development activities of industrial enterprises as well. In this subset, publications on R&D project management itself are dominating trend (e.g. Gryzik, Knapińska, 2012). Since, development activity is associated with broad possibilities for co-financing, implemented by various types of special purpose funds. Therefore, it is important to manage research projects properly, including intra-organizational cooperation with methodical, model solutions utilizing so that projects could be implemented effectively (Wittek, 2011).

Few of the available source materials relate to issue of expenditures on research and development activities and profitability conditions of these ventures as well (Tylman, 2013). There are also available single isolated analyses and reports within effect study range of business support in research and development activities (NCBiR, 2023; Borowczak, Dobrowolska et al., 2022). Publications available are supplemented by yearbooks of Główny Urząd Statystyczny (GUS) in sections "Research and development activity" and "Science and technology". R&D activity is indispensable element of strategy, especially in chemical sector entities where it is difficult to imagine functioning possibility without activity of research and development centres or start-ups without continuous acquisition and access to up-to-date information in order to anticipate future action directions (e.g. Chojnacka, 2023; Goranczewski, Łukaszczykiewicz, 2023). Available literature query covered also issues selected from problems of organizational behaviour, because correct relationships between two organizational functions, may be recognised to be in this scientific inquiry area. Factors contained thereof can be divided into:

- psycho-social ones, such as managers and co-workers attitudes; motivation and commitment resulting thereof; satisfaction from job done; trust and sense of justice (e.g. Matta et al., 2015; Lavanya, Kalliath, 2015; Thakre, Mayekar, 2016; Ghazi, Jalali, 2017 et al.),
- organizational ones - formalisation degree (including extent, management range, configuration and coordination); supervision degree; autonomy in decision-making, both on and off job position; entitlement and responsibility range (e.g. Kofta, 1979; Kuc, 2009; Newman et al., 2014; El-Kassar et al., 2017; Łobos, 2011, et al.),
- counter-effective and dysfunctional ones, such as (Goranczewski, 2018; Szeliga-Duchnowska, 2021): selfishness; rat race; petty political cunningness relying on diminishing of other’s work importance while emphasising one's own role and importance; qualitative/quantitative work overloading and, analogically, work underloading, etc.

4. Own research carried out results

To resolve issues presented in introduction, research questions were formulated and posed to respondents during interviews. Interview as tool was chosen to utilize because it allows doubts and misunderstandings among respondents to be resolved in real time. Research carried out results with utilizing interview technique for problems P1 and P2 are presented in Tables 1 and 2, respectively. In order to achieve information confidentiality and to guarantee sense of comfort and security for the employees interviewed as well, they were divided into organizationally related groups and to prevent identification by bystanders, coding was done. Coding method is presented as follows:

- A – Technologists and managers of technology offices and managers of production departments.
- B – Research and development department staff; implementation doctoral candidates, quality and research laboratory managers.
- Year range of job tenure (C – 1-8; D – 9-15; E – 16 and up).

Table 1.
Research results for P1 (N = 18)

Question number	Question content	Exemplary responses occurring most frequently, including respondent code
1.1.	What is importance of development department in chemical sector enterprise and what does it derive from? What factors and to what extent do determine the need of functioning thereof? (product, processes, business, market)?	*"…it is of strategic importance; it is responsible to response for current market needs…; for current and legislating branch trend tracking…"* B/C *"...nowadays, large chemical industry enterprise, without its own R&D, will not develop; market is changing due to new regulations and expansion of Chinese chemical products on European market; in addition, there exists need to develop industrial and intellectual property."* A/E *"...R&D centres are becoming indispensable component of chemical industry sector in particular; establishing thereof is determined by rapidly changing market and the need to be competitive through introduction of new products..."* B/D *"...in chemical industry, development department is of key importance; it is necessary constantly keep up in following customer's needs, tastes and even sometimes fashion thereof..."* A/E *"...development department that is people in it; if they have passion for learning about new trends, department can perform leading role for whole organisation..."* A/D *"...R&D department provides possibility to be flexible and adapt to changes and also to improve technological processes..."* A/C *"...development department is of strategic importance; its activity is, by definition, supra-structural; it combines production, business and regulatory competences within range of: available technologies, changes in the state of the art, market realities, dynamic economic changes..."* B/E

Cont. table 1.

1.2.	How high up in the organization structure should development department be positioned and what should relationship between R&D and production look like (subordinate/supportive/rivalry/competition or maybe other, e.g. partnership)? With which areas in organization should the R&D department primarily cooperate closely?	*"…the development department should be positioned in company strategic division…; R&D relationship - production should be partnership and R&D department should be basic support for all company units from range of product innovations...; development department should also cooperate with sales departments…"* B/C *"…the development department should be organizationally positioned in strategic area; ...the implementation of newly developed technologies and products through R&D should be ordered from above for production by managing board..."* A/E *"…R&D should be unit supporting production…; …relationships that provide opportunities for development are partnership and supporting relationships…"* A/C *"…R&D should cooperate closely with production on partnership basis, know current technological problems and try to solve them together, support technologists…; …as team of scientists, could see in practice what working on large-scale installations looks like; we would operate on symbiosis principles, thanks to which both production would know in which aspects we are able to help them and what we are currently dealing with..."* B/D *"…R&D absolutely must cooperate with production and market, because research for research's sake is, in my opinion, detrimental to company…, R&D, due to its competences and potential, should support production"* A/C *"...R&D department tasks in close cooperation with technologists from production department who have more knowledge about large-scale production..., investigating causes of non-conforming products are tasks for R&D..."* A/D *"…R&D relationship – production are of two types: subordinate one – production exerts pressure on department and defines directions of development…, …supporting one – production and R&D department are in state of constant competition…; …competition, in turn, means generating unnecessary costs through repeating expenses for similar projects…"* A/E *"…relationships between them should be partnership/ supporting…, …in both areas there are people who may cooperate by means of knowledge sharing…"* B/C *"…development department should function in enterprise strategic division…; …close cooperation with marketing, trade and regulations is of key importance…"* B/E
1.3.	What expenditures should be incurred on research and development activities, in percentage term, in the structure of enterprise costs or revenues?	*"...expenditures on R+D should account for 10% of all costs; ...they should be treated as critical and have stable level of financing..."* B/C *"...I think that in typical situation, 1% of revenues in company like ours is sufficient...; ...if we want to work on new product, this level of measures is too low..."* A/E *"...we are certainly talking about cost structure of no less than 30%; ...it's a lot, but we're already working within the EU..."* B/C *"...it is assumed that expenditures on R&D activities may account from 1 to 10% of operating costs; ...in my opinion, there should be no rigid guidelines; ...the most important aspect is not amount of expenditures on R&D, but effectiveness of using thereof and translation into implementation..."* A/C *"…5-10% of all costs…"* B/E

Source: own elaboration based on interviews carried out.

With regard to first research problem, role and importance of R&D department are assessed similarly. Respondents point to indispensability and necessity of department functioning, especially in situation of dynamically developing market. Its basic task is to elaborate solutions and, above all, development works within range of products that meet customer requirements, ensuring competitiveness, while taking into account dynamically changing environmental conditionings. Majority of respondents, whether from R&D or production areas, recognizes strategic role thereof, pointing simultaneously to competitiveness and market as main determinant of locating this function on such high level.

Respondents' opinions as to the place in the organizational structure hierarchy thereof are less consistent. Respondents have different understandings of strategic area, especially as to interdependent and partitive relations with regard to other organizational areas. For example, representatives of production units claim that R&D department should play supporting role with regard to production, while R&D representatives claim that it should not play superior but leading role in relations associated with research and development project management. Responses of production respondents reflect view that lack of close cooperation leads to discrepancies relying on conducting research effects of which cannot be applied into large-scale production and in directions which are not market directions. Production acknowledges that technologists have better orientation within range of large-scale production and market needs than R&D employees. Respondents are in line as to that R&D should cooperate closely with units responsible for market issues. There occurs significant discrepancy in opinion regarding indication of expenditures level that should be incurred on development activities. In cost structure it is comprised within range of 1-10%. With cost level running into billions, these are high expenditures representing order of expense magnitude that, in opinion of respondents, should be allocated on research and development.

In Table 2 selected respondent responses relating to second research problem are presented.

Significant symptoms of differences between two groups of respondents begin to become apparent in dysfunction assessment during mutual cooperation. They are based on striking aspect of potential benefits resulting in from development works carried out. This, in turn, constitutes natural trigger for rivalry that is forming. In fact, case is that production units undertake standalone research, especially when quality laboratories are situated in production departments. They are motivated by rationalization inventions or patents and profits resulting thereof, rewarded with additional remuneration. It is also natural striving resulting in from specifics of technologists' work, who are analysing processes currently on regular basis without possibility of abstracting from product quality and thus improvement thereof.

Table 2.
Research results for P2 (N = 18)

Question number	Question content	Exemplary responses occurring most frequently, including respondent code
2.1.	Do you observe discrepancies (dysfunctions) in cooperation between production and R&D departments, and if so, what is possible cause thereof? Is it interest difference or maybe some other reasons (please provide examples)?	*"...in my opinion, R&D department pays too little attention for finding gaps in existing processing procedures at our customers…"* B/C *"…units try to implement R&D work on their own; it may be associated with conviction that if department elaborates certain solution, merit awards go to it, not to the originator..."* B/D *"…production department is not interested in implementing new products because, generally speaking, it causes troubles and confusion for them; as they claim, no one will pay them for implementing something new...; lack of additional remuneration for implementations is main obstacle: lack of financial motivation...; in addition, there take place competition between directors of production departments and directors of development department (who receives awards)…; technology offices without cooperation with R&D department intensify unhealthy competition...; …there should be defined rules and competence division as to what belongs to R&D department work and what belongs to technology offices of production department…"* A/E *"…there is lack of unit specifically dealing with power generation development in connection with decarbonization…"* A/C *"…production = lack of inclination to change…; inappropriate remuneration systems, lack of process connections…"* B/C *"... dysfunctions result in from lack of proper communication or when priorities of both are completely divergent...; ....where R&D unit does not work on solving problem in company, but is conducting research that is unlikely to be implemented..." it is also omission when at initial stage it seems to have something interesting, but with time the topic becomes more and more difficult - then there often lack of courage to finish it...; …there also happens that such projects are associated, for example, with personal development of R&D staff, that is I mean implementation doctorates what additionally complicates the matter..."* A/D *"...there exist many dysfunctions; they are connected to human factor, i.e. through inadequate, non-partnership relationships...; ...this is also vaguely defined activity range of individual departments; this was only since 2022 that it was formally established that research and development should be carried out exclusively in Research Department; such activities were also carried out by production area; ...in result, certain kind of rivalry between R&D area and production area began; this had measurable and negative financial effect for company, because costs of R&D activities on production units were not properly recorded and qualified, e.g. for tax allowance..."* B/E

Cont. table 2.

2.2.	How should correct cooperation between development department and production department look like, and including: how should proceed decision-making process within range of application for new research areas connected to product development, process improving etc?	*"... research work, whether on new product or on new technologies should be assessed at every stage in terms of their economic effects on our company...; ...analysis should be carried out on how changes introduced will affect prevailing realities on market and what these changing conditions may force on us in future...;* A/D *"...it is up to production units that should apply current needs regarding product development and technological process to development department..."* A/C *"...everyone can apply with new idea so as not to block good solutions..."* B/E *"...R&D and production units should work more closely together...; ...beside of orders from production units, B&R centres deal with implementation of their projects about which employees of production units often are not informed; ...there is lack of working meetings and joint implementation of projects at all stages thereof...;* A/E *"...if R&D is going to support production and trade, it seems that need to solve certain problem, improve product or technology in business areas must arise first…"* A/C *"...new research areas should be discussed by both parties in order to consult on possible solutions...; results of laboratory works should be consulted on regular basis..."* BR *"...if ever comes moment when cooperation between development and production departments will be correct, it will be first symptom that organization has deviated from development and innovation paths..."* A/D *"...each employee has possibility to submit research topics...; such application is verified and decision is taken to include research topic into research work plan...; in my opinion, applications should mainly come from market environment..."* B/C *"...business units, knowing market needs best, should apply the need to carry out given research topic, and not act on their own...; Development Department, utilizing research facilities, is working on solutions within range of submitted ideas, being in constant contact with unit, and is keeping it informed currently about work progress..."* B/C
2.3.	Where, in your opinion, is borderline between technologist job, whose task is to improve production/operation processes and that of R&D department, and does such borderline exist at all?	*"...there should be cooperation between development department and technologists so that the latter can verify on regular basis whether conceptual solutions proposed by R&D can be adapted to production installations..."* A/C *"...division between works of production technologists and R&D area is quite fluid, so you have to draw the line (who is responsible for what) because some innovative activities can be carried out in both areas..."* B/E *"...there should be no such borderline, as technologist is developing many ideas which are consulted with his superiors, most frequently it is finished with investment application..."* A/D *"...work of technologists in production units is closely connected to work of R&D staff; the difference is that technologist frequently does not have research facilities and does not have possibility to check ideas and assumptions..."* B/D *"...production technologist is working on so-called living organism and is well familiarized with installation operation specifics; production technologist should be reviewer and advisor in question of possibility of making changes, improvements or new solutions..."* A/E *"...there should be no borderline here, our commitment is to cooperate best...; sometimes main constrain is ignorance as to potential problems..."* A/E *"...there should be close cooperation between development department and technologists of production units..."* BR

Source: Own elaboration based on interviews carried out.

Opposite opinion represented among respondents (paradoxically also from production department) is conviction that production units are not interested in implementing innovations because this is additional problem for them. Process deregulation and instability, necessity to learn how to properly conduct modified and/or new processes, constitute additional burden that production workers are not inclined to accept, especially those who do not participate in potential benefits.

Subsequent, third category consists of dysfunctions resulting in from lack of proper communication between individual areas and subjectivity in motivation to undertake research and development work. Respondents indicate that evidence for this are, for example, 24 implementation doctorates carried out in company under research in vast majority by R&D employees. For this reason, production department is reporting doubts as to whether topics thereof, and consequently their research work, are in line with market requirements and while not with other, personal motivations.

During interviewing, respondents were asked about differences in technologists' work specifics and that of development department research staff. Is there clear borderline between work of first ones and other ones? Interviewed persons stated that such borderline is very fluid and in practice impossible to grasp. There were prevailing opinions that there was necessity to cooperate very closely between both employee groups. It was pointed out that technologists do not have research facilities, but in turn, they should have possibility to assess R&D work progress from the point of view of supervised processes and fact that they will be the ones who will be introducing necessary innovations on their installations, constituting result of these works.

5. Conclusions

Taking into account above contents, it can be concluded that goal of work has been achieved. Despite the scarcity of literature items, among which none which refers strictly to discussed issues, causes of dysfunctions that occur in relations between R&D and production departments have been identified. They are primarily based on factors of psychosocial and organizational nature (Goranczewski, 2018). They include:

1. Own work perceiving through prism of importance and emphasizing thereof, while depreciating the work of area constituting the rivalry field. Hence opinions expressed by respondents that production is more important than R&D and vice versa. The consensus was only to referred to R&D location in the organizational structure at the strategic level.

2. Rivalry results in from potential financial benefits that are belonging to individual groups of employees, from which, in opinion of production workers, R&D employees can benefit to greater extent. Taking into account the procedures and internal documents in force in this matter, this is unjustified view, however, it is natural that despite of widespread availability, knowledge thereof is lower in production area than among R&D employees. In addition, there are possibilities to carry out development works which by assumption are greater in R&D department. This results in suspicion emerging among respondents regarding to particularisms or subjective motivations when undertaking research work, especially relative to employees pursuing implementation doctorates. And this is despite of fact that everyone has opportunity to apply for development works, so that not to block potential solutions within range of products, technological or business processes that are good for organization.
3. Lack of communication and cooperation between technological and production offices and R&D employees. Assessment of communication low level stressed by respondents constitutes challenge for improvement in this area. Dialogue, discussion, opinion exchange and arrangements between parties, and above all, economic and technical evaluation of works carried out at every implementation stage (laboratory, piloting, serial production), constant prospect assessment for achieving success through implementation of innovations, these are foundations for improving mutual relations.
4. Author's self-observation, internal documentation analysis and interviews conducted show that technological offices of units, spontaneously, omitting R&D department, undertake research on their own. This applies mainly to product and technological processes as well, what is, as it were, natural consequence of everyday work of technologists. There would be nothing wrong with that, because improving initiatives and innovation activities are priceless for chemical industry enterprise, if it were not for fact that in this case there occur cost multiplication. Emerging of so-called hidden costs (Dahlgaard, Kristensen, Kanji, 2001). Lack of possibility for correct cost accounting in favor of possibility to obtain tax allowance resulting in from innovative activity, so-called Innovative Box mechanism and in consequence thereof – measurable losses (explanations of Finance Ministry, 2015).

To recapitulate, improving activities that could effectively solve problems described in present article should be divided into two groups. The ones are of evolutionary nature, while the others are of radical nature.

1. Evolutionary actions – raising awareness among employee groups, regular meetings and joint teams, one of goals of which would be current information exchange, and building micro-communities around individual research and development projects as well.
2. Radical, organizational actions. Surely most effective, but because of social resistance and ambition particularisms, they are difficult to conduct. This is liquidation of technological offices in production units and transferring technologists employed thereof

to R&D department. Then, technologists become employees of R&D area. There can be no question of information flow lack, especially that respondents indicate that there is no visible demarcation line between work of technologists and R&D research workers. Technologists continue to work on their installations but already as employees of R&D area rather than of production unit. This way, R&D department may function as integrator of technical, product, research and regulatory competences within enterprise.

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