

Product Development under Co-opetition

Eva Lovén

Department of Mechanical Engineering
Linköping University
evalo@ikp.liu.se

Petter Krus

Department of Mechanical Engineering
Linköping University
petkr@ikp.liu.se

Abstract

Cooperation is needed in product development of integrated products. Collaboration implies both cooperation and competition and in most cases the situation can be described as something in between pure cooperation and pure competition, also known as co-opetition. This paper is dealing with product development under co-opetition. The aim is to get a better understanding of the design engineers' challenges. A literature overview concerning cooperation, co-opetition and competition have been conducted. The literature categorized according to the researchers unit of analysis; individual, company and macro level. The result shows that the different situations confront the design engineers with completely different questions.

Keywords: cooperation, competition, co-opetition, product development

Introduction

Different types of cooperation are needed in product development of complex products [1]. Collaboration can implies both cooperation and competition and the situation can be described as something in between pure cooperation and pure competition, also known as co-opetition [2, 3]. There exist much research about cooperation and competition in general terms see for example Johnson and Johnson [4] but there is not that much in product development. In own empirical studies we found different types of cooperative and competitive relationship in product development. Cooperation became critical, when circulating ideas [5] software-partners working with competitors [6] and consultants not working as trainers and with knowledge transfer in simulation and modelling [7]. There is a need to get a better understanding of co-opetition in product development. Few studies focused on all levels (individual, company and macro level) and cooperation/co-opetition/competition. The aim with this paper is therefore to get a better understanding of cooperation, co-opetition, and competition in product development. What demand does these different situations put on the design engineers?

Method

The authors of this paper found different types of cooperative and competitive relationships in own empirical studies in the product development as illustrated in the introduction. With these studies as a base literature was collected from the cooperation, co-opetition and competition area. Then literature was categorized

according to the research articles (books) unit of analysis namely: the categories individual, company and macro level. Together they form a hierarchy of nested systems [8]. In a short paper like this we don't claim to give a comprehensive literature overview. On the contrary we picked some relevant literature for each category.

Cooperation, competition and co-opetition

Cooperation

Cooperation is needed when developing integrated products. Individuals, groups and companies from different domains must cooperate. The first section begins with some literature about cooperation from the macro level and continues with cooperation on a company and individual level.

Cooperation – macro level

At the macro level there is literature on, for example systems of innovation and Triple helix, University-industry-government relations can be considered as a triple helix of evolving networks of communication [9, 10]. Here we mention two researchers Tether's [11] who research on *who co-operates for innovation* and Gibbons et.al. [12] research on knowledge production.

According to Tether [11] firms can engage in co-operation arrangements for innovation with several other types of partners (apart from customers and suppliers). These include competitors, universities, consultants, research institutes, research and technology organisations and other associations. Pressure on funding has encouraged academics into greater collaboration with industry, and a shift from traditional scientific knowledge generation to knowledge production based on problem solving. His opinion is that governments have sought to encourage universities and government research institutes to undertake more industrially relevant research in order to assist the competitiveness of industry (UK). Universities are seen as especially useful for basic and long-term strategic research, particularly in pre-competitive technologies; the sort of research that many firms regard as excessively to undertake alone, using only their own resources.

Gibbons et.al. [12] stated that universities are coming to recognise that they are now only one type of player in the expanded knowledge production process. Firms have to develop new links with universities, government laboratories, and other firms. The crucial element, in the knowledge production game, is the ability to move back and forth between environments, which are at one moment collaborative and at another competitive.

Cooperation – company and individual level

Cooperation exists within and between different companies. Sharing risk and cost, access to new or different markets, obtaining additional resources, gaining access to knowledge and expertise and reducing development time are some reasons for collaboration [13]. But there is also much research showing that a lot of collaboration fails. For example Tidd et. al. [14] stated that collaboration is a risky activity, and less than half achieve their goals. Partner problems, insufficient trust, lack of commitment are some reasons.

Collaboration between R&D and marketing are important see for example Griffin and Hauser [15]. Griffin and Hauser identified barriers to cooperation including

personality, cultural thought worlds, language, organizational responsibilities and physical barriers. In the same manner Karlsson and Lovén [1] found barriers to collaborate within and between mechanical and software companies when developing integrated products. The engineers on the mechanical and software companies had difficulties to understand each other.

On the individual level one can make a design structure matrix (DSM) to understand that the task dependencies can be many [16]. The social psychology can explain the dynamics between individuals and groups.

Co-opetition

Co-opetition –company level

Collaboration implies both cooperation and competition and in most cases the situation can be described as something in between pure cooperation and pure competition, also known as co-opetition see for example Brandenburger and Nalebuff, [2,3] and Dowling et. al [17]. Under co-opetition knowledge shared for cooperation may also be used for competition. There are a large amount of literatures on the company level. Only a few of them have been selected and presented below. Multifaced relationships, role conflict and lack of strategy formulation [17] powerful principles for competitive collaboration [18], value net and elements of the co-opetition game [2,3] and cooperation with rivals [19] are some aspects of co-opetition.

On an organizational level Dowling et. al. [17] could see multifaceted relationship, when a supplier, buyer and/or partner is also a major competitor. Having a competitor, as a partner can be risky and companies in multifaceted relationships stated they experience a conflict of roles. Dealing with firms in multiple roles, if not properly managed may increase uncertainty, reduce stability and create real costs to the firms involved. According to them multifaceted relationships appear to fall into one of three main types:

- Buyers or suppliers in direct competition
- Buyers or suppliers in indirect competition
- Partners in competition. Ex. Competing firms are involved in a partnership such as joint venture, research consortium or licensing agreement.

Firms may be able to manage multifaceted relationships to their advantage either by keeping such interaction separate by division or department, or by centralising and sharing information. How do multifaceted relationships affect strategy formulation? Many of the traditional models assume independent relationships between suppliers, buyers, partners and competitors [17].

Companies that benefit most from competitive collaboration adhere to a set of simple but powerful principles [18].

- Collaboration is competition in a different form. They enter alliances with clear strategic objectives.
- Harmony is not the most important measure of success
- Cooperation has limits. Companies most defend against competitive compromise.
- Learning from partners is paramount.

Managers are too often obsessed with the ownership structure of an alliance and not the rate, which each partner learns from the other they stated. Competitive benchmarking is a tradition in most of the Japanese companies studied, where they collaborate with competitors to learn more about their rivals' competencies [18].

Another approach on cooperation-competition on company-level is Brandenburger and Nalebuff's [2,3] work on "co-opetition" combining cooperate and compete. The "value net" (relations between a company and their costumers, suppliers, complementors and competitors (substitutors)) is a map that prompts the exploration of all the interdependencies in the game. Drawing the value net is the first step toward changing the game. Just realizing that you can change the game is crucial. The second step is to identifying all the elements of the game. According to them, in game theory, there are five parts: players, added values, rules, tactics, and scope – PARTS.

Miotti and Sachwald [19] stated that the literature has amply documented co-operation between rivals, which may give the impression that co-operation with rivals is frequent which is not the case. Co-operation between competitors is risky and should be limited to two types of cases:

- When a particularly strong common interest has been identified.
- Cooperation concerns far-from-market research leading to generic results.

Co-operation with rivals seems to be mostly used to share R&D costs in high-tech sectors – and not to work at the technological frontier. Firms that engage the most in R&D co-operation, including with rivals or distant partners, are high-profile innovators.

Competition

Competition – company level

Birkinshaw [20] concludes that internal competition will never be easy to manage. The following section summaries the article. There are three benefits with internal competition according to the author. Internal competition creates flexibility (you can encourage several divisions to work with different approaches because you don't know which path the future will take). Second internal competition challenges the status quo. Large firms become inertia-ridden over the years. And third internal competition motivates greater effort. There exist two different types of internal competition in large firms. The first is competition between technologies or product ideas. Then it is important to bring the competing units together as soon as possible. The second is competition between business lines. In this case (in contrast with competing technologies) is to allow duplication while they develop their commercial offerings and bring them to market. One example is Internet banking and traditional banking. The article also discuss the risk with internal competition when the individual or team whose technology is not taken forward will see themselves as the "loser" and will either lose motivation or leave the company.

Competition – individual level

The literature below discuss what competition do to us on an individual level [21], the innovations role on competences [22] and achievement motivation that can killing collaborative learning [23].

Kohn [21] studied more closely what competition does to us on an individual level. For example the higher the concentration of competition in any interaction, the less likely it is to be enjoyable and the more likely it is to be destructive to our self-esteem, our relationships, our standards of fairness. He gives also a lot of examples on competition among groups (inter-group competition) and competition among individuals within a group (intra-group competition).

Abernathy and Clark [22] illustrate competitive situations that the innovation can form on an individual level (competence). Innovation is not a unified phenomenon some innovations disrupt, destroy and make established competence obsolete, others refine and improve. Radical innovations change the technology of process, or product, in a way that imposes requirements that existing resources, skills, and knowledge satisfy poorly, or not at all. They don't mention competition directly but there is a competition between new and existing competence.

Achievement motivation is another issue on the individual level, which both Kohn [21] and Biggs [23] mention in their books. Achievement motivation is killing collaborative learning and this damage the learning of those who perceive competition as threatening. Other individuals become competitors, not colleagues, and steps are taken to disadvantage others: key references are hidden, hints are not shared and misleading advice is given [23].

Conclusions and discussion

For over ten years ago Deming [24] wrote that one of the manager's roles is to understand the benefits of cooperation and the losses from competition between people and between groups. This is even true for the design engineers today when developing integrated products. The higher degree of product complexity the higher demands of more cooperation within and between companies and other institutions. Building dynamic networks become important. We found three tricky situations that the design engineers need to handle.

1. Much literature on **cooperation** are positive and unreflective. Our survey shows that cooperation is needed on a macro, company and individual level when developing integrated products. Engineers must manage and bridging academy thinking and also individual engineers from different domains.
2. The literature overview shows that creativity is encouraged of some degree of **co-opetition**. Engineers must create healthy co-opetition environments for people. There are higher demands on the engineers to organize work and choose tools for example. Should the company hide information and only give what's needed.
3. Finally the literature shows that too much **competition** is not good for people. Engineers have a responsibility to see people that "lose" (because they are working on the wrong product) otherwise there is a risk for an unhealthy situation.

As we mentioned in the method section we don't claim that we have given a comprehensive literature overview. For example there is not much research about competition on the highest macro level (universities, companies, governments). The contribution with this paper was to give the whole and not the parts.

References

- [1] Karlsson, C and Lovén, E. 2005. Managing new technology integration: Integrating software in manufactured products. *International Journal of Innovation Management*. 9 (3), 343-370.
- [2] Brandenburger, A.M. and Nalebuff, B.J. 1995. The right game: Use game theory to shape strategy. *Harvard Business Review*. July-August.
- [3] Brandenburger, A.M. and Nalebuff, B.J. 1996. *Co-opetition*. Doubleday/Currency, NY.
- [4] Johnson, D. W. and Johnson, R. T., 1989. *Cooperation and competition: Theory and research*. Interaction Book company, Edina.
- [5] Lovén, E. and Karlsson, C. 2002. Systems of Innovation from a Management Point of View – Information Technology in Manufacturing Companies. *Proceedings of the 11th International Conference on Management of Technology*. Miami USA. March 10-14.
- [6] Karlsson, C. and Lovén, E. 2002. Developing complex products: Integrating software in manufactured products. *Proceedings of the 9th International Product Development Management Conference*. Sophia Antipolis, France. May 27-28.
- [7] Lovén, E., 1999. *Planned Change and Inertia – Integrating Technology, Organization and Human Aspects*. Linköping Studies in Science and Technology. Dissertations No. 562.
- [8] Österlund, J. and Lovén, E., 2005. Information versus Inertia: A Model for Product Change with Low inertia. *Systems Research and Behavioral Science*. 22, 547-560.
- [9] Leydesdorff, L. 2000. The triple helix: an evolutionary model of innovations. *Research Policy*, **29**, 243-255.
- [10] Edzkowitz, H., Webster, A., Gebhardt, C., Cantisano Terra B. R., 2000. The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research Policy*. 29, 313-330.
- [11] Tether, B.S. 2002. Who co-operates for innovation, and why. An empirical analysis. *Research Policy*, **31**, 947-967.
- [12] Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Trow, M. 1997. *The new production of knowledge. The dynamics of science and research in contemporary societies*. Sage, London.
- [13] Von Stamm, B. 2003. *Managing Innovation, Design & Creativity*. Wiley, Chichester.
- [14] Tidd, J., Bessant, J. and Pavitt, K. 2001. *Managing Innovation. Integrating technological, market and organizational change* (second edition). Wiley, Chichester.
- [15] Griffin, A. and Hauser, J. R. 1996. Integrating R&D and marketing: A review and analysis of the literature. *Journal Product Innovation Management*. 13, 191-215.
- [16] Ulrich, K. T. and Eppinger, S. D. 2003. *Product design and development*. Mc Graw Hill, Boston.
- [17] Dowling, M. J., Roering, W. D., Carlin, B. A., Wisnieski, J. 1996. Multifaceted relationships under coepetition. Description and theory. *Journal of Management Inquiry*, **5**, 155 – 167.
- [18] Hamel, G., Doz Y.L., Prahalad, C.K. 1989. Collaborate with your competitors – and win. *Harward Business Review*. January-February.
- [19] Miotti, L. and Sachwald, F. 2003. Co-operative R&D: why and with whom?

- An integrated framework of analysis. *Research Policy*, **32**, 1481-1499.
- [20] Birkinshaw, J. 2002. Strategies for Managing Internal competition. *IEEE Engineering Management Review*. 30(3), 99-109. Also in *California management Review*, 2001, 44(1).
- [21] Kohn, A. 1986. *No contest. The case against competition. Why we lose in our race to win.* Houghton Mifflin Company, Boston.
- [22] Abernathy, W.J. and Clark, K.B. 1988. Innovation: Mapping the winds of creative destruction. In Tushman, M.L. and Moore, W.L. (second edition) *Readings in the management of innovation.* Harper Business.
- [23] Biggs, J. 2003. *Teaching for quality learning at university* (second edition) Open University Press, Philadelphia.
- [24] Deming, W. E. 1994. *The new economics.* Second Edition. MIT CAES. Cambridge.