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A novel model for extending international co-operation in science and education

DE BOER Sirp J.[1], QIU Ji-zhen (邱济真)[2]

([1]*International Management Section, University of Twente, Enschede, The Netherlands*)

([2]*International Programs Office, Zhejiang University, Hangzhou, 310027, China*)

E-mail: s.j.deboer@utwente.nl; IPQ-qjz@sun.zju.edu.cn

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Abstract: In September 1994 the University of Twente, the Netherlands, and Zhejiang University, China, decided to cooperate in the field of science, education and management. After several visits of delegations from both sides it was considered worthwhile to explore further opportunities for mutual cooperation. The directors of international cooperation on each side jointly commissioned a project to investigate the potential in a systematic way and to establish further contacts where appropriate. This paper reports on the results of the research cum matching project.

To reveal promising matches between multiple departments of both academic institutions a matching model for universities was designed. The study was carried out along two parallel lines. In the research line the theoretical framework was developed into a model for international university co-operation. Moreover, an analysis was carried out on internal, external and cultural aspects resulting in a set of thirty four influencing factors.

In the matching line a total of seventy interviews were held in order to identify promising matches between units at both universities. This line resulted in eleven promising matches for further co-operation.

The novel model appeared useful in analyzing the variety of factors and in developing matches between both universities. In the further implementation of the model the issues of "level of co-operation" and "top-down versus bottom-up" need to be addressed in more detail.

Key words: International co-operation, Universities, Matching, Science and education
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INTRODUCTION

International cooperation is a hot topic in the world today and networking across borders has become part of society. In the private sector the number of international alliances is growing; while in the world of higher education the need for international linkages and exchanges is being recognized as well.

In order to keep pace with the changing and ever expanding frontiers of knowledge and technology universities are actively seeking for partners. With other universities they can accomplish goals they could not accomplish by themselves. The intention to cooperate is expressed easily but the question is whether it will truly develop into an inter-institutional relationship with multiple linkages on departmental levels.

The University of Twente (UT) in Enschede, the Netherlands, and Zhejiang University (ZU) in Hangzhou, China, have established a relationship which has been formally confirmed with a general agreement on September 7, 1994, during a visit of the president of the University of Twente to Zhejiang University. Both presidents agreed to establish cooperation and exchanges in all academic

areas of common educational and research interests; to build a basis for friendship and cooperative research and educational exchange between China and the Netherlands, expressing their commitment to the provisions of the United Nations' Charter. The Memorandum should facilitate exchanges and cooperative initiatives between the two universities in the area of research, education and technology transfer.

In subsequent years a number of visits were paid by persons and delegations from one university to the other and vice versa. Specific discussions on cooperation have taken place, in particular, in the fields of management, telecommunications, polymer science and engineering, chemical engineering and civil engineering, students exchange and training for small & medium-sized enterprises. As Zhejiang University and the University of Twente are both quite technical universities, more matches between faculties should be possible.

The International Programs Office of Zhejiang University and the Graduate School Twente agreed to have a project executed by two junior researchers in order to broaden and deepen the mutual relationship on scientific as well as management level. The researchers were assigned to conduct a systematic survey at the University of Twente and Zhejiang University that would reveal more promising matches.

This initiative particularly implies a systematic overview of current scientific and institutional expertise, the international cooperation experiences and the intentions with regard to mutual/international cooperation.

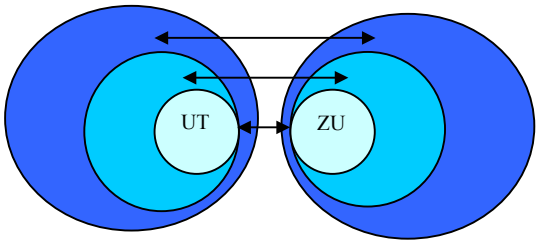
The core of this article is to develop and implement a new way to extend international university co-operation. The article first describes the theories used to develop the framework. It then discusses the methodology applied, followed by the findings. The conclusions present the issues concerning the implementation of the model.

THEORETICAL FRAMEWORK

Matching

The first major characteristic of the novel model is that extending international co-operation is considered as a matching activity, in which entities, usually two, are brought together as the first step of co-operation. Matching is still a relatively new concept in the academic world. So far no matching model for universities has been developed. This section presents a model that will serve as a tool to arrive at promising matches between two academic institutions.

A generic model from Public Administration theory is used as a starting point. Each university has its internal organization operating in its context, i.e. the external environment. Both the internal organization and the external environment are strongly influenced by culture. In view of the considerable differences in culture between both countries and both universities, the conceptual model includes an extra culture layer. In developing cooperation between both universities; the cultural layer needs to be penetrated as well (Fig.1). According to this model, matching incorporates three levels. The factors found at the three levels are used as leads to identify critical factors in establishing cooperation.



○ Internal organization: focus on the internal structure of the universities in question;
● External environment: the environment creates both opportunities and limitations for cooperation;
● Cultural environment: Chinese and Dutch business culture influence behavior and expectations;
⟷ Indicating differences

Fig.1 Conceptual matching model

The following internal factors are analyzed: the organization's strategy, departmental goals, internal structure, available staff and skills, management style and the educational system in which the university operates (based on the McKinsey 7 S-model). These factors can either promote or obstruct international cooperation. Matching usually

happens on the level of discipline: academics working in the same field speak the same language even if they have different cultural backgrounds.

Their personal opinion should be taken into account as a consequence of the relatively autonomous position an academic holds within the structure. This seems to be the best guarantee for ensuring commitment of the participants. Involvement of 'the administration' to facilitate and support the matching process is highly recommended to gain support and finance.

Besides internal factors, external factors have profound effect on the operations of institutions. The universities are facing five environmental challenges (Sporn, 1999). The changing role of the state has forced universities to develop partnerships with the private sector. The national governments have taken a step back and universities are expected to be more self-sufficient and obtain finance from other sources. Not only for this reason it is highly recommended to engage a private firm (or firms) in the development of joint projects. This meets the growing demand from the private sector, which has showed interest in contract research and training. Email and Internet will shorten the physical distance, a characteristic of international cooperation. It enables universities to keep close contact regardless their position in different time zones.

Cultural differences exist between Dutch and Chinese business etiquette. This working paper focuses on the development of a relationship between a partner from the West and the Far East. Cultural understanding of each other's background will facilitate the cooperation process (A+ 2002). Some factors which are especially important in Dutch-Chinese business relations are building personal relationships, face, 'guanxi', patience, English language skills, status and hierarchy. The institutional culture at both universities is analyzed accordingly.

Process

Another major characteristic is that the international co-operation of universities is considered to be a process, in which the co-operation moves from one stage to the next. The process presents the generalized flow of activities that typically appears in cases that managers face when they are aiming to realize synergy as a result of cooperation. This process of building, operating and developing cooperation, in particular joint ventures, is described in six stages of which matching forms one of the first steps in the initiating stage (Fig.2).

Stage 1: The initiating stage

In the initiating stage a promising partner is identified and approached. Mutual needs need to be defined like access to new networks, acquired knowledge and/or human resources. It is people who are responsible for the cooperation and who keep the process going; therefore matching should focus on connecting people.

Stage 2: The negotiation stage

After the identification of a matching partner a memorandum of understanding is signed, forming the foundation for further discussions. Professional knowledge becomes more important during this stage as the project proposal is focusing more and more on a specific field of expertise.

Stage 3: The approval stage

When the parties reach the commitment stage, agreements are made, reflecting the results of the negotiations that the parties had gone through and expressing trust in the cooperation (Klein Woolthuis, 1999). Both parties should have the intention to share costs, revenues and risks of the cooperation (Maljers, 1995). Agreements have to be made on the share of supplied resources like funding, human resources and other facilities as well as the time schedule (Groote *et al*., 1995).

Stage 4: The build-up stage

The build-up stage is characterized by the deve-

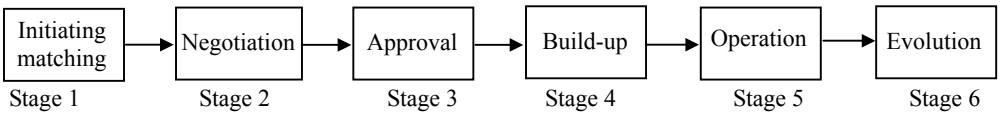


Fig.2 The stages of cooperation (based on Campbell, 1991)

lopment of the project plans. Preparations are made before the projects get started.

Stage 5: The operational stage

In the operational stage several projects are started and carried out. Activities are executed that are necessary to reach the goals agreed upon in stage three (Campbell, 1991).

Stage 6: The evolution stage

If successful and both parties are satisfied with the results both can decide to launch more joint projects. Faulkner (1995) states that 'A collaboration is the most flexible form…for it has no limitations or certain prescriptions. It can start on a minimal basis but deepened and broadened by introducing new projects over time'. Often mutual dependencies are created that will make a contract extension desirable for both partners (Campbell, 1991).

Feasibility

A third model used is a theory on assessing the feasibility of projects, implying that an international co-operation activity is considered a project. In order to determine the feasibility the following criteria result from adapting Groote's classification (1995):

Time: whether the participants were able to spend time on the development of a joint project;

Funding: whether funding was available (private or public resources);

Commitment: whether enthusiasm and motivation, necessary to make the project a success, was present;

Contact: whether it concerned a newly created contact or the participants already knew each other;
Experience: the international experience of the participants (have they studied and/or done research abroad).

METHODOLOGY

In line with the terms of reference agreed by both parties (University of Twente's Graduate School and Zhejiang University's International Programs Office) the study was carried out along two parallel lines. In other words, research and matching have been executed simultaneously and have reinforced each other.

The research line consists of developing a framework to represent the situation at hand, see previous section. The models have been used to collect relevant data from literature as well as from the interviews. In total around 70 interviews were held, lasting between 15 minutes and 2 hours. The results of the research line have been summarized in an adapted Strengths-Weaknesses-Opportunities-Threats (SWOT) overview.

The matching line used the stage model as a framework. This model, together with relevant findings from the research line, has been used to carry out the actual matching. The matching operation started by approaching nearly all University of Twente (UT) professors asking them whether they were interested and if yes, what their goals, experience and questions were. At the end of two months an overview was made of the most promising partners at the UT. This overview formed the start of interviews at Zhejiang University (ZU), where its International Programs Office arranged meetings and provided interpretation assistance where required. During the period at ZU the researchers frequently contacted parties of UT by email in order to ask clarification and advice on further matchmaking. At the end of the two months at ZU a total of eleven matches were completed of which four were based on already existing contacts and seven were newly created links. The resulting eleven joint projects were presented to the respective UT and ZU professors as well as to the principals of the matching project at each university.

FINDINGS

Influencing factors

The research line of the study addressed the internal factors, resulting in a total of 10 strong factors (of which 6 applied to both UT and ZU), and 9 weak factors (of which 4 applied to both universities). The analysis of the cultural and the external factors (Fig.1) resulted in 7 opportunities (5 applying

to both universities) and 8 threats (of which 3 applied to both universities) (details are included in De Boer *et al*.(2004)). These factors have been used in conducting the interviews that focused on identifying matches. The factors found can be summarized in the following major issues in international university co-operation:

1. Motivation, time & funding

Both parties have to be willing to take the cooperation to the next stage and invest time, energy and money, otherwise contact might get lost, commitment might drop and the development of a joint project will stop. Investments occur on an equal basis.

2. Networking and geographical distance

The importance of frequent visits in this perspective cannot easily be overrated: it forms a solid foundation for it takes friends longer to give up. Constant networking and face-to-face contact are means to tackle the geographical distance.

3. Centralization and politics

To facilitate cooperation it should be clear for professors how to start a project. All the information on the requirements, visas for example, can be provided by a central organ like the IPO at Zhejiang University. In the case of a decentralized organization structure of the university it is more worthwhile to organize contacts at departmental level. Information on cooperation projects can be made public on web sites of the departments. Easy access (not too many pictures or moving images) will enable foreign partners to gain insight in the fields the department is active in and whom to contact.

4. Language & attitude

From earlier study and/or research experiences abroad, Chinese professors have become familiar with the English or German language and have gained interest in international cooperation. Directly speaking to each other in a common language creates understanding. Besides, it is necessary that both sides are exposing a flexible attitude and are willing to meet the other in the middle.

Promising matches

The matching line of the study resulted in 11 projects (Table 1), of which the feasibility was assessed using the five criteria (see theoretical framework above).

The projects ranged from joint research, conferences, exchange of PhDs, training programs to internships in companies. From an analysis it followed that four of the identified projects are based on existing contacts and seven are new matches. However, all participants have experience in international cooperation. Previous working experience with Chinese or European/Dutch partners lowered the threshold to get involved in new projects. On the Chinese side many professors studied abroad (Belgium, Germany, the United States) and this motivated them to keep contact with the West. A period spent abroad also added to their knowledge of English. All participants spoke English quite well.

Table 1 Eleven projects and their feasibility (+: quite promising; −: limited potential)

No.	Feasibility	Project
I	+/-	Ph.D. project for Applied Mathematics
II	+	Project for Ph.D. exchange in Chemical Engineering
III	+	Virtual Library project
IV	+	Executive Management training course
V	+/-	Seminar “WTO - new trade opportunities for Chinese companies”
VI	+/-	ZU/Nokia –UT/KPN (2+2 project)
VII	-	Joint Research on Cement Hydration Technology
VIII	+	Exchange of Professors in Financial Management
IX	+/-	Polymer Science Conference – Joint Organization
X	+/-	Polymer Science Conference in Germany – Lecture
XI	+	Management of Technology: Joint Conference, Publications, and Internships

E-mail is frequently used to get in touch with partners. If it was not for the professors' quick answer these projects could not have been started. If potential partners were unreachable by e-mail they could not be involved in a project proposal and the match failed.

Funding for the projects was most often supplied by both sides. This involves and creates commitment from both parties. Money was always a critical factor; extra funding for the projects was usually necessary. Therefore it was tried to include private sector partners as well. The majority of projects involved companies from the Dutch and Chinese side. In many projects they are the target group of a training program or conference. With China having a more open policy, Chinese companies have the ambition to extend their activities to Europe and are eager to learn more about it.

As a further analysis it is relevant to analyze what kind of projects are running and in what fields matching was successful. The table below (Table 2) displays the results of the executed matching. Project XI was split into three parts (a, b, c) as it actually consisted of three joint activities.

From the overview it can be concluded that not all projects were from different departments. Seven departments were involved on both sides, which were mainly active in the field of Business or technical subjects like Chemical Engineering.

Lectures (4) are a very popular form of co-operation, followed by joint research projects (3). Both are less-committing projects than the other forms. This is seen as a great advantage when the development of a relationship is still in an early stage. If both parties have become familiar with each other and a foundation of trust is laid, participants are ready to make more commitments.

The exchange of PhD students and holding joint conferences are each mentioned twice. More contact and more time is necessary to organize these kinds of projects. Training programs and the arrangement of internships are less popular forms but their importance can grow in the future if the opportunities for corporate contacts in both Business & Science Parks are fully used.

CONCLUSION

The implementation of the model, consisting of the conceptual matching model (Fig.1) and the stages of co-operation model (Fig.2) has been carried out along two parallel lines.

The research line resulted in 4 major issues in international university co-operation. The underlying factors, emerging from the SWOT analysis, have been used to focus the interviews. Similarly, the matching line resulted in items and points of attention in the research. The simultaneous execution of both lines of the study has been to the benefit of both research and matching.

The projects developed are relatively 'light' cooperation projects meaning that it is the first step in building a cooperative relationship and not strongly committing both partners. If both parties have become more familiar with each other and a foundation of trust is present, participants are ready to make more commitments. The importance of cor-

Table 2 Overview of projects and involved departments

Department	Lectures & seminars	Joint research	Exchange of PhDs	Conference	Training	Intern-ships	Total
Applied Mathematics			I.				1
Chemical Engineering	IX.	VII.	II.	X.			4
Library		III.					1
Management School	V.	VI.			IV.		3
Financial Management	VIII.						1
Technology & Management	XI a.			XI b.		XI c.	3
Total	4	3	2	2	1	1	13

porate contacts will grow in the future when both Business & Science Parks are fully realized.

It is concluded that this novel model has resulted in promising matches, i.e. projects considered worthwhile and feasible by respective parties in both universities.

Two implementation issues emerged. The projects are on the level of research/teaching groups (defined as units within faculties/department). It is assumed that the "personal level", i.e. the lowest level of co-operation, is implied. However, more emphasis and research on personal contacts and co-operation seems justified in future research.

Another assumption to be studied further concerns the mechanism of "bottom-up" and "top-down" approach. In a way this study project is an example of "top-down" (the central units in both universities commissioned this study), while at the same time the approach has been "bottom-up" (the interviews were held with professors).

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