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ST. MATTHEW ON A SIDETRACK: THEORIES OF CUMULATIVE ADVANTAGE AND THE BOOK DISSEMINATION OF TWO FINNISH LEARNED SOCIETIES BEFORE WORLD WAR II

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The paper deals with the international dissemination of scholarly publications in a peripheral country before World War II. Many studies have indicated that scientific success accumulates to few prominent scholars, institutions and countries, while the actors with modest premises are left on the margins of the scholarly community. Robert Merton called this phenomenon the Matthew effect in science. Some scientists regard this effect as a pathology, whereas others consider it inevitable and advantageous. Merton himself considered that there are some countervailing processes which limit the Matthew effect. The hypothesis of this paper is that in a peripheral country like Finland, the noncommercial distribution of scholarly publications, may have served as one counterforce to the Matthew effect. The focus is on the exchange of publications which was a dominant way of distributing scholarly publications at the time. The development of the exchange relations of two Finnish learned societies indicates that the exchange balanced the competition for scientific success between major and minor countries. The exchange could open contacts with the established scientific centres, but also with young societies in small or peripheral countries. Contacts with the established scientific centres were often not as profitable as those with smaller institutions which concentrated on similar research problems.

Key words: the Matthew effect, scholarly publishing, exchange of publications, learned societies, Finland.

THEORIES OF CUMULATIVE ADVANTAGE

The huge increment of scientific production in the twentieth century has aroused interest in the regularities and mechanisms of scientific work and, especially, scientific success. In the book classic *Little Science, Big Science*, Derek J. de Solla Price examines various mathematical models presenting scientific production, citations, etc. Most of the figu-

res describe a skewed distribution, like Alfred J. Lotka's *inverse square law,* which states that the number of people producing n papers is proportional to $1/n^2$, i. e. for every 100 authors who produce but a single paper in a certain period, there are 25 with two, 11 with three and so on. The distortions are remarkable in citations, too. About 35 percent of papers are not cited at all, 49 percent are cited only once, and 1 percent receive six or more citations [19, 38–39, 105–107].

Mathematical models of cumulative advantage in science are grounded on human behaviour. The equally good work of a renowned scientist tends to get more credit than a paper by his unknown colleague for many reasons. For instance, it is easy to remember the famous name, and hence he becomes cited. An outstanding scientist seems to guarantee the quality of the research, which increases the prospects of obtaining funding. Similar mechanisms affect the success of journals and institutions. Renowned universities attract eminent scholars who, in turn, increase their glory. Journals with high impact factors are prone to receive the best articles, etc. To describe this phenomenon, the sociologist Robert Merton introduced a concept called the *Matthew effect in science*. It is based on the Gospel of St. Matthew (25:29): *For unto everyone that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath* [15, 447–450; 14, 85–89, 164–170; 9, 60–61].

Manfred Bonitz and his colleagues have found the Matthew effect in nations as well: a minority of countries expecting a high number of citations per scientific papers gain more citations than expected, while the majority of countries expecting only a low number of citations achieve even fewer than expected. The expectations are based on the impact factor of the journals of respected countries. Bonitz has divided the nations into the Left World (the countries that are prone to lose citations) and the Right World (the winners). Only a small minority of the countries belong to the Right World: Switzerland, Denmark, the Netherlands, Sweden, the United Kindom, Germany, Finland, the USA and Ireland [2, 407–422; 3, 208–212].

Cumulative advantage is not restricted to science. The Pareto law in economics and, most recently, the network theory of Albert-László Barabási describe similar phenomena. Barabási introduced the concept of scale-free networks where some nodes act as highly connected hubs, whereas others have few links. In a growing network, each new node attracts new links at a rate proportional to the number of links it already has. In other words: *the rich get richer*. Barabási and his colleagues have perceived this mechanism in various networks, from intracellular biochemical reactions to human-created networks like the World Wide Web [1, 62–64, 87–88, 181–189; 20].

The Matthew effect, unjust as it may seem, has been regarded as advantageous, because it allocates credit in proportion to contribution. For instance, Louis Pasteur's supreme standing is surely due to the many

lives saved as a consequence of his discoveries. Besides, flourishing scholars, institutions and nations are models which are to be emulated by all those who aspire to scientific success [21, 165-167; 3, 22]. Nevertheless, in the light of the Matthew effect, the future of a young scientist in a minor university in a peripheral or poor country does not seem too rosy. How can anyone with minor premises progress or even manage in the field of research, if success accumulates to those who already have the lion's share? Robert Merton himself was concerned about the suppression of talented people [16, 613–616]. The case of Gregor Mendel, the father of genetics, who lived and published his paper in a small Moravian town and was doomed to oblivion for decades by his contemporaries, has also been discussed in many papers [14, 93–98; 15, 358; 19, 73].

Even though the question of justice is bypassed, another interesting problem still remains. If the processes of accumulating advantage and disadvantage are truly at work, why are there not even greater inequalities? For instance, there are Nobel laureates who were not educated at Harvard or in some other outstanding university. Merton responds that there are some countervailing processes which limit the Matthew effect. These counterforces may, for example, be government subsidies directed to minor institutions to level out the distribution of resources. Nevertheless, according to Merton, the countervailing processes that close off the endless accumulation of advantage have not yet been systematically investigated [16, 617–619].

EXAMINING THE COUNTERFORCES OF THE MATTHEW EFFECT: PERSPECTIVES, METHODS AND MATERIALS

At the beginning of the nineteenth century, Finland was a part of Russia – a peripheral nation with only one university whose aim was mainly to educate civil servants and clerics. In the light of the Matthew effect, the future of Finnish science and scholarship would not have seemed promising. Nevertheless, in Bonitz's division (the 1990s situation), Finland is ranked in the Right World, i. e. among the successful countries. Obviously, various factors have affected the success of Finnish scientists – state subsidies to the universities and learned societies, specialisation in certain disciplines, international contacts, etc. This paper examines the international networks created by the exchange of learned publications and their influence on the development of Finnish science and scholarship.

The scholarly publishing has recently aroused wide discussion focused on the Open Access journals and their impact on the equality of the scholarly community [17]. Nevertheless, the historical background of the noncommercial distribution of publications has not been researched. The purpose of this paper is to discuss how the exchange of publications affected the prospects of a peripheral country. The hypothesis is that the noncommercial distribution of scholarly publications may have served as a counterforce to the Matthew effect.

Before World War II, there were three ways available for disseminating publications: selling, donating or exchanging them. Commercial distribution was not widely used among Finnish learned institutions at the time because of the difficulties of finding suitable booksellers. Besides, the state subsidies freed societies from compulsion to sell books and journals. Donations, instead, were an important channel. All publications were regularly sent to the corresponding members of the societies and occasionally to schools, libraries and private individuals daring enough to request them free of charge. The most extensive means of distributing publications was exchange [12, 53–56, 87, 90–93]. An exchange relationship not only provided a steady channel to distribute Finnish journals internationally, but was also an important means of acquiring foreign literature [4, 282–289; 6, 9–10].

The material of this study consists of the exchange relations of two Finnish learned societies. The Societas pro Fauna et Flora Fennica (SFFF) was the first scientific society in Finland, founded in 1821. It pursued zoological and botanical research [7, 10]. The Finnish Antiquarian Society (FAS) was founded some fifty years later and represented the humanities – archaeology, ethnology and history of art [22, 20–23]. Both societies were very active in initiating exchanges.

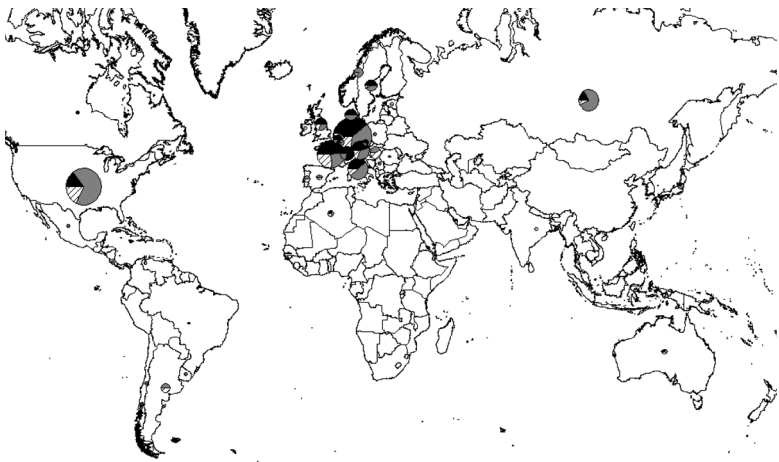

Figure 1. Exchange relations of the Societas pro Fauna et Flora Fennica 1821–1914 (total 344). The exchange partners are categorised according to the political situation of the interwar period, to be able to compare the situation of new states before and after the war. (The only map available for the author at the time of writing represents the political situation of the year 2008.) Black slices indicate that the initiator to exchanges is the SFFF, grey show the initiatives by a foreign partner, while striped slices indicate that the initiator is unknown

Figure 2. Exchange relations of the Finnish Antiquarian Society1870–1914 (total 173). Black slices indicate that the initiator to exchanges is the FAS, grey show the initiatives by a foreign partner, while striped slices indicate that the initiator is unknown

Their exchange relations are categorised and presented in thematic maps. The list of exchanges is based on the minutes and letters of these societies.

EXCHANGE RELATIONS OF THE SOCIETAS PRO FAUNA ET FLORA FENNICA AND THE FINNISH ANTIQUARIAN SOCIETY

If the scholarly networks are scale-free, every new society should try to connect itself with the prestigious institutions, for instance, with the national academies of science, occupied by the leading scientists. At the time, the scientific centres were in the United Kingdom, France and Germany, Germany being closest to Finland both geographically and culturally. Nevertheless, the division into central and peripheral countries is not stable and valid for all disciplines. For instance, Sweden was peripheral both geographically and with regard to the number of its learned institutions and journals, but in the second half of the eighteenth century it flourished as the home country of the great Linné [13, 212–217].

The exchange relations of the SFFF and the FAS before the First World War seem to confirm the Matthew effect and the theory of scale-free networks. At least, most of the exchange propositions made by the Finnish societies were directed to the centres of the scholarly world: Germany, France and the United Kingdom, whereas these countries seldom proposed exchanges themselves, the institutions in the United Kingdom being the most passive. Instead, the Finnish societies received offers mostly from other scholarly peripheral countries like Russia and the United States.

Figure 3. New exchange relations of the Societas pro Fauna et Flora Fennica 1915–1939 (total 377). Black slices indicate that the initiator to exchanges is the FAS, grey show the initiatives by a foreign partner, while striped slices indicate that the initiator is unknown

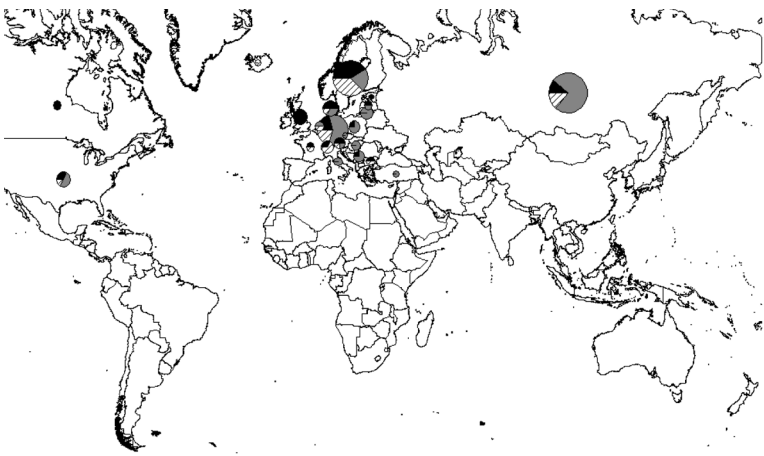

Figure 4. New exchange relations of the Finnish Antiquarian Society 1915–1939 (total 131) Black slices indicate that the initiator to exchanges is the FAS, grey show the initiatives by a foreign partner, while striped slices indicate that the initiator is unknown

The situation seems quite different in the maps presenting the interwar period. The share of incoming foreign propositions grew and offers were now received from scientific centres, too. Furthermore, the Finnish societies directed their interests to new areas proposing exchanges with American, Asian, African and Australian institutions. Altogether, it is obvious that these two societies had become respectable publishers which aroused interest in many countries.

What kind of factors affected on this development? The political situation had changed radically after the First World War, having an influence on the scholarly community, too. In the 1920s, France and the United Kingdom boycotted German and Austrian scientists and institutions, excluding them from international organizations [11, 84–86; 18, 115–118]. Due to the ruined economy of their country and their isolated position in the international scholarly community, Germans were keen to initiate new exchange relations with Finnish societies. Exchanges were now possible even with the institutions that had declined a Finnish exchange offer before the war, like the Botanischer Garten und Botanisches Museum Berlin and Deutsches Archäologisches Institut. The political effects were visible in the Soviet exchanges, too. The Soviet Union recreated its scholarly institutions in the 1920s, and they sought foreign models for their scientific projects [8, 174–176]. The new institutions were very active in promoting exchanges. In the humanities, however, the number of exchanges diminished in the second half of the 1930s, whereas the SFFF received exchange offers until the eve of the Winter War in 1939.

Political consideration cannot, however, explain all the exchange offers the Finnish societies received during the interwar period. Rather, the explanation should be sought in the content of the scholarly publications. In the nineteenth century, the national objectives had dominated the activities of these societies; the journals of the SFFF often included lists and descriptions of plants or animals in various parts of Finland, and the journals of the FAS, respectively, descriptions of antiquities. Most of the papers were written in Finnish or in Swedish. After the First World War, both the SFFF and the FAS began to promote publishing in foreign languages, and the peer review practices were tightened. The majority of papers in *Acta Societatis pro Fauna et Flora Fennica* now appeared in German, sometimes also in English or in French. The FAS decided to exploit the old research tradition of Finno-Ugrian archaeology and launched a new international journal *Eurasia Septentrionalis Antiqua* whose aim was to gather under its wings the results of the research in Russian, East European and North Asian archaeology and ethnography. The effort, though economically unsuccessful, brought the FAS an international standing [10, 3–10].

CONTACTS WITH THE SCHOLARLY WORLD

Even though it was obvious that the SFFF and the FAS could build for themselves wide

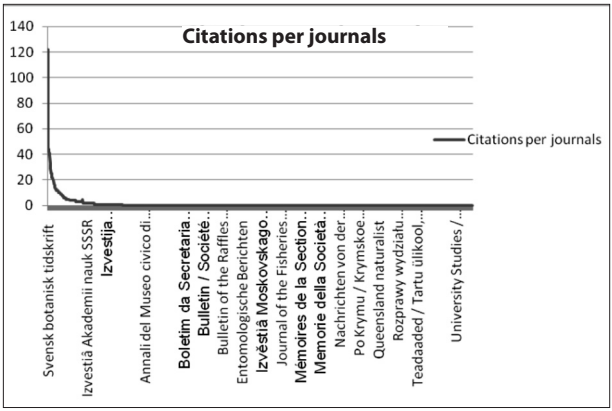

Figure 5. Citations to the exchange journals in the Acta series of the SFFF (total 1466 journals)

international networks, the question remains whether these contacts were useful. This problem is examined with citation analyses in the articles of *Acta Societatis pro Fauna et Flora Fennica, Acta Botanica Fennica, Acta Zoologica Fennica* and *the Journal of the Finnish Antiquarian Society* during the interwar period. The journal list analysed includes all exchange periodicals received, also annual reports and proceedings. Only bibliographical material and various indices and directories were excluded. Citations of the journals that were not received in exchange are counted in a separate list.

At the first glance, it seems that the results of analyses confirm the Matthew effect. The citations were heavily concentrated on a few journals, and the majority

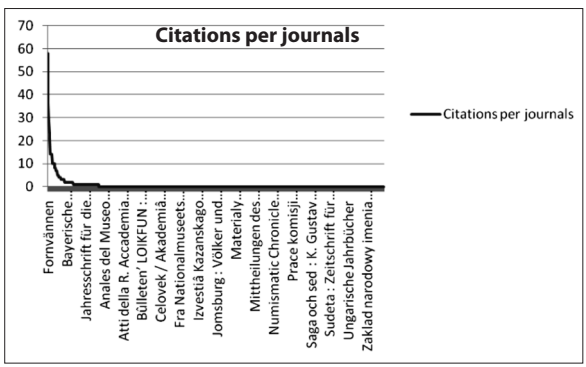

Figure 6. Citations to the exchange journals in the Journal of the FAS (total 735 journals)

Figure 7. Ten most cited journals in the Acta Series of the SFFF (EJ = Exchange Journal)

Svensk botanisk tidskrift / Svenska botaniska föreningen (EJ)	*122*
Botaniska notiser / Lunds botaniska föreningen (EJ)	*98*
Archiv für Zellforschung (Leipzig, Engelmann)	*65*
Zoologische Anzeiger (Jena, Elsevier)	*62*
Annals of botany (Oxford, Oxford University Press)	*52*
Berichte der Deutschen Botanischen Gesellschaft	*49*
Biologisches Zentralblatt (Jena, Fischer)	*47*
Biological bulletin / Marine Biological Laboratory, Woods Hole,MA (EJ)	*45*
Entomologisk tidskrift / Entomologiska Föreningen i Stockholm(EJ)	*44*
Jahrbücher für wissenschaftliche Botanik (Berlin, Borntraeger)	*43*

of the exchange journals were never cited. Hence, it seems that these peripheral Finnish societies could establish exchange relations only with institutions publishing irrelevant literature. It should be noted, however, that the journal lists include publications which could be used otherwise. For instance, the annual reports and proceedings offered an opportunity to scan what was going on in other institutions. The lists also include titles that appeared for only a short period and titles that were received only from the end of the 1930s and hence did not have time to be cited.

A closer look at the most cited journals indicates scientifically valuable contacts. The top ten list of the Acta Series of the SFFF included more commercial than exchange publications. The two most cited journals, however, were Swedish publications received in exchange. The Biological Bulletin was published in the United States. Hence, almost half of the most cited – all of them exchange journals – were not published in the scientific centres. Swedish journals were important because information on plants and animals in the neighbouring area was crucial for Finnish research. The Biological Bulletin supported limnology, which was a new and growing branch of study, in the land of a thousand lakes [5, 130]. The share of German journals, however, is remarkable. These journals were published by commercial publishers, and they represented more modern branches, such as cell biology. It is noteworthy that English or French journals were not among those most cited.

The top ten list in biological research arouses slight suspicions about the Matthew effect, given that the success did not accumulate only on the established scientific centres. The most cited papers in the Journal of FAS notably indicate that in archaeology and ethnography St. Matthew was driven onto new

Figure 8. Ten most cited journals in the Journal of the FAS (EJ = Exchange Journal)

Fornvännen / K. Vitterhets-, historie- och antikvitetsakademien (EJ)	*58*
Aarbøger for nordisk oldkyndighed og historie / K. Nordiske oldskriftselskab (EJ)	*36*
Материалы по археологий Россий / Археологическая Коммиссия (EJ)	*28*
Verhandlungen der Gelehrten Estnischen Gesellschaft (EJ)	*23*
Fataburen : Nordiska museets och Skansens årsbok (EJ)	*21*
Aarsberetning / Foreningen til Norske Fortidsmindesmaerkers Bevaring (EJ)	*14*
Antikvarisk Tidskrift för Sverige / Kungl. vitterhets, historie och antikvitets akademien (EJ)	*14*
Kongl. Vitterhets-, historie- och antiqvitetsakademiens månadsblad (EJ)	*14*
Отчеть Императорской Археологической Коммиссии (EJ)	*14*
Prähistorische Zeitschrift / Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte (EJ)	*14*

tracks. Among the citations of the Journal of the FAS, only one German publication can be found. All the others represent more or less peripheral countries: Sweden, Denmark, Norway, Russia and Estonia. Again, internal factors within disciplines explain the citations. Archaeological and ethnographical research partly focused on the Scandinavian cultures and partly on the Finno-Ugrian peoples. Hence, it was understandable that most important information was published in the countries interested in the same cultures. It is worth noting that the Antiquarian society received all important journals by exchange. Commercial publishing houses did not have as large a share of humanities journals as they had of scientific ones.

CONCLUSIONS AND DISCUSSION

Thematic maps of the exchange relations indicate that it was possible for a peripheral learned society to arouse international interest and disseminate publications widely. The prerequisite was that they had publications of good quality to offer, but even political and economic trends could have a favourable effect on the prospects of a small country. The citation analyses, for their part, indicate that exchange of publications could serve as a counterforce to the Matthew effect. As a method of disseminating publications, it balanced the competition for scientific success between major and minor countries. When the bill for a printing house was paid, a society had many copies available for exchange, and it was not necessary to concentrate only on the most famous and prestigious publishers as was the case when a library purchased commercial journals.

Further studies should, however, be conducted to compare the international success of these actively exchanging societies with the institutions that preferred commercial distribution. The author of this paper is writing

a dissertation on the same subject, in which she will make these comparisons and analyse the exchange relations in greater detail.

Furthermore, it would be interesting to know how the Finnish journals came to be cited in foreign publications. Unfortunately, this is a laborious task because no citation indices are available for the interwar period. Nevertheless, even in the light of the material published in this paper, it is obvious that exchange could open contacts with the established scientific centres but also with young societies in small or peripheral countries – contacts which could be very profitable for both parties and lead St. Matthew onto a sidetrack.

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ŠV. MATAS ŠALIKELĖSE: PRANAŠUMO KUMULIACIJOS TEORIJOS IR DVIEJŲ SUOMIJOS MOKSLO DRAUGIJŲ KNYGŲ SKLAIDA PRIEŠ ANTRĄJĮ PASAULINĮ KARĄ

JOHANNA LILJA

Santrauka

Straipsnyje nagrinėjama tarptautinė mokslinių leidinių sklaida periferinėje valstybėje prieš Antrąjį pasaulinį karą. Daugelyje tyrimų nurodoma, kad mokslinę sėkmę akumuliuoja keli žymūs mokslininkai, institucijos ar šalys, o kuklesni veikėjai lieka mokslinės bendrijos pašaliuose. Robertas Mertonas vadino šį reiškinį Mato efektu moksle. Terminas grindžiamas šv. Mato evangelija (25:29): *Kiekvienam, kas turi, bus duota, ir jis turės su perteklium, o iš neturinčio bus atimta ir tai, ką jis turi.* Kai kurie mokslininkai traktuoja šį efektą kaip patologiją, tačiau kiti mano, kad jis yra neišvengiamas ir naudingas. Pats R. Mertonas teigė, kad Mato efektą riboja tam tikri priešingi procesai.

Šio straipsnio hipotezė sako, kad tokioje periferinėje šalyje kaip Suomija nekomercinė mokslo leidinių sklaida gali veikti kaip Mato efektą mažinanti jėga. Dėmesys telkiamas į leidinių mainus, t. y. vyraujantį to meto mokslo leidinių tarptautinės sklaidos būdą. Duomenų šaltinis – dviejų Suomijos mokslo draugijų mainų santykių dokumentai: *Societas pro Fauna et Flora Fennica* veikė zoologijos ir botanikos tyrimų srityje, o Suomijos antikvarų draugijos veikla apėmė archeologiją, etnologiją ir meno istoriją. Jų mainų santykiai grupuojami ir pateikiami teminiuose žemėlapiuose (1–4 pav. Juodi plotai nurodo, kad mainų iniciatorė buvo Suomijos draugija, pilki – užsienio partnerių iniciatyvos, o dryžuoti žymi nežinomus iniciatorius). Taip pat analizuojamos šių draugijų leidžiamuose žurnaluose esamos citatos, siekiant nustatyti, ar mainais gauti periodiniai leidiniai atitiko mokslininkų poreikius.

Mainų santykių teminiai žemėlapiai rodo, kad periferinė mokslo draugija galėjo sukelti tarptautinį susidomėjimą ir plačiai paskleisti savo leidinius. Tam reikėjo, kad būtų gera jos siūlomų leidinių kokybė, bet teigiamą poveikį mažos šalies perspektyvoms taip pat turėjo politinės ir ekonominės sąlygos. Pavyzdžiui, silpna Vokietijos pozicija tarpukario laikotarpiu skatino Suomijos draugijų tarptautinę tinkloveiką. Dviejų Suomijos mokslo draugijų mainų santykių medžiaga rodo, kad mainai išlygino mokslinės sėkmės konkurenciją tarp didelių ir mažų šalių ir leido sukurti ryšius su įsitvirtinusiais mokslo centrais, taip pat su naujomis draugijomis mažose ir periferinėse šalyse. Dažnai ryšiai su stipriais mokslo centrais nebuvo tokie naudingi kaip ryšiai su mažesnėmis institucijomis, sprendžiančiomis panašias problemas.

Įteikta 2009 m. gruodžio mėn.