

Balázs Hámori

Trust, Reputation and Identity in the Electronic Markets

Trust, being the prerequisite of even the simplest exchanges, has a particular importance in electronic markets. The author uses a game theory model as a starting point to shed light on how occasional partners can bridge the mutual lack of information relating to each other's strategy by applying a mixed strategy, and on how they can improve their pay-off by applying trigger or tit-for-tat strategies in the case of repeated games. As buyer-seller relationships are mostly incidental on the Internet, innovative trust-building solutions are needed to diminish risks. Such a mechanism is e.g. the institutionalization of buyers' solidarity in reputation-building and -destroying actions. In principle, buyers can form an opinion on the utility of a piece of software or other knowledge-product if they possess it, but there is no sense buying it until they are convinced of its utility. Nevertheless, other buyers' experiences published on the Internet put an end to this contradiction. The buyers' solidarity works; certain buyers – recommending to buy, or dissuading from buying – help others in making their decisions. The intermediaries (from auctioneers to certifying institutions) make use of their own reputation to contribute to the elimination of the partners' mutual mistrust. The study also deals with the special limits of developing trust in electronic transactions, with special regard to possible changes to the partner's identity.

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Ever since markets have existed, trust had been a key-factor in their operation and in the changes of the *transaction costs*. As McKnight and Chervany formulate it: "Trust is crucial wherever risk¹, uncertainty², or interdependence exist. These conditions flourish

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¹ Risk: Well-defined probability can be assigned to given outcomes.

² Uncertainty: when even the probabilities of the occurrence of given outcomes are not known (neither a priori, nor on a statistical basis).

in many settings, and certainly exist in the relationship between e-commerce vendors and customers. Trust has been found to be important to e-commerce." (McKnight & Chervany [2001] p. 1)

One area of e-commerce – the so called B2B (business to business) transactions³ – is carried out through closed information systems and among business partners who know one another well⁴. In B2C (business to consumer) there is also an area in which the buyer regularly buys from the same seller (e.g. he/she regularly buys books from Amazon.com). It is obvious that this type of trade does not raise the problem of trust as acutely as the "open" segment of e-commerce, the greater part of B2C or the commerce of the C2C type (consumer to consumer⁵) which is the subject of our study. We will deal with the open e-markets⁶, particularly with those *distributing digitalized products through delivery and payment on the Internet*.⁷

Similarly to traditional markets, a lot of the different sources of risk make transactions uncertain in electronic markets too; however, some of these *risks are higher* in this new form of commerce. The partners are *unknown*, the agreements are *less regulated* in the transnational transaction space than in traditional markets and the contracts are never completely closed and do not cover all details. The *postponed carrying out* of promises and the *spatial distance between partners* make changing sides possible. The real value (utility) of the intangible⁸ products (so called experience goods⁹) distributed on the Web

³ There is still a rather great confusion of terms around e-business. We try to use (at least in this paper) unambiguously the concepts which have not always had the same meaning in their frequent applications. E-commerce is the distribution of products and services on the Web by applying internet-technologies. E-business comprises e-commerce, but it is a much wider notion than e-commerce. It includes all operations and procedures which help economic actors make the best of the possibilities provided by information technologies and Internet for business purposes (business purposes are interpreted here in the widest sense of the word).

⁴ This may explain why the volume of B2B trade is estimated today at USD 1 trillion (in the English original it is 1 trillion, thus this is not a misprint), while Americans spent scarcely 120 billion dollars in 2004 in the on-line retail trade. (E-commerce ... [2004] p. 9)

⁵ The greater part of C2C trade is carried out in a certain kind of electronic flea market. Private individuals, who wouldn't dream of offering their used goods for sale or pouncing on them as buyers without this possibility, buy second-hand articles for billions from one another on the auction sites, the most successful of which is eBay.

⁶ Typically such an e-market is the so called electronic market-place. Similarly to the classic market, this is a place where sellers and buyers meet and exchange goods. The difference is that the space of transaction is not a given geographical place, but the cyber space.

⁷ Currently, a significant proportion of on-line transactions concerns tangible products. On business sites, in Internet shops everything can be found from foods to cars. The Classic Shop of a www.sternesammeln.de offers e.g. more than 5 millions (!) products. Nevertheless, due to tangibility, in the case of the traditional physical products distributed on the Internet uncertainty is less than in the case of so called experience goods.

⁸ In our opinion not only purely information goods are experience goods, but also knowledge-intensive products in general. Peter Drucker terms knowledge-demanding physical products "packaged knowledge". (Drucker [1993] pp. 166-167) Trust is mostly just as determinant in the case of the trade in these products as in the case of the software downloaded from the Internet.

⁹ „Economists say that a good is an experience good if customers must experience it to value it. Virtually any new product is an experience good, and marketers have developed strategies such as free samples, promotional pricing, and testimonials to help consumers learn about new goods. But information is an experience good every time it's consumed. How do you know whether today's Wall Street Journal is worth 75 cents until you've read it. Answer: you don't." (Shapiro & Varian [1999] p. 5)

is rather uncertain¹⁰. Under these conditions exchange is very hazardous. In our study we focus on the possibilities of diminishing risks and strengthening trust in transactions and partners. Can traditional trust-producing institutions be applied on the Web, or does the new type of commerce require new institutions?

Uncertainty is always greater if the system someone tries to forecast or control is more complex. Market-places developing dynamically on the infinite Web are complex systems whose regulation, survey and secure utilization raise many questions, which are still unanswered. In fact, even the simplest market transaction includes the element of uncertainty or risk. Thus, trust is needed in any transaction.

Amartya Sen mentions the case of the baker and the buyer to illustrate that exchanges would fall flat without trust. The baker would bake bread if the buyer paid first, while the buyer – for fear of performance missed – would be unwilling to pay before receiving the bread. This is a real trap, there is no way out without trust. (See *Sen* [1993] p. 104)

Exactly such *extensive* and *complex business relations* are typical on the Web. According to some analyses, on-line commerce is more secure and more reassuring than off-line trade (Noglows [1995]; Vu & Syence [1999]). Nevertheless, economic actors think that on-line transactions are more risky than traditional business. This is understandable if we compare the structure of the Web and that of the traditional markets. While the continuously increasing number of traders doing business on the Web and the infiniteness and global character of the Net act against trust, trust is more important in the virtual world than it has been in the industrial societies. This is particularly true in the case of the electronic trade of so called knowledge-goods (software and other intellectual products). Namely, in the case of these goods, the owners of the knowledge (producers or sellers) are in a position of power against their partners, and the uninformed party (customer) is vulnerable. (Of course, information asymmetry exists on the side of the seller as well. Sellers exposed to the chance of not receiving the counter-value for their correct service or perfect product, are also vulnerable. But we are considering here the problem of trust from the perspective of the customer.) And now let's look at the trade between partners meeting each other accidentally on the Web.

Knowledge is power: the buyer not knowing the product and the seller knowing the product

Let's have a closer look at the frequent case in which the transaction between the seller and the buyer is non-recurring.

¹⁰ *Yamato and Ohta* – extending the definition of *Whinston* [1997] – refer to the same goods as “information goods:” „Information goods are those goods whose quality cannot be judged before purchase. Neither advertisements, nor product specifications provide sufficient judgment standards. Experience in using such goods is necessary to assess their quality. However, since consumption of goods is completed after the consumer sees the goods and understands them, transactions do not function effectively. We characterize these information goods by the impossibility of prior evaluation. *Yamato & Ohta* [2001] p.4 – *My Italics B.H.*) advertisements, nor product specifications provide sufficient judgment standards. Experience in using such goods is necessary to assess their quality. However, since consumption of goods is completed after the consumer sees the goods and understands them, transactions do not function effectively. We characterize these information goods by the impossibility of prior evaluation. *Yamato & Ohta* [2001] p.4 – *My Italics B.H.*)

Consider a game with two players: E – the seller knowing perfectly his/her own experience good, and V – the uninformed buyer, and two strategies for each of them (A_1 , A_2 and B_1 , B_2 respectively). We identify A_1 with cheating, and A_2 with correct behavior, B_1 with controlling (i.e. to an implicitly supposed cheating) and B_2 with trust, i.e. neglecting control. Let us suppose that incorrectness meant that the seller handed over a good of a lower quality than promised earlier to the buyer, who had been previously unable to judge the quality of the good. So the seller's (E) full income¹¹ – if we suppose that fraud has occurred – is Y , from which the undue part of the income resulting from the fraud is F . The seller's expenses (in addition to the reimbursement of the buyer's loss, F) – if he/she is caught – must be proportional to the amount of the sum wheedled. So, if E cheats and is caught, the fine imposed is dF ¹² – we regard d and F as given. Let's suppose that the value of the originally announced good (i.e. the sum that the good of the announced quality represents for the buyer) were U . (This is the value of the good if the seller does not cheat.) " b " is the buyer's control-related expense. We suppose that $b < dF$ (i.e. the fine for fraud must be higher than the costs of control.) We also suppose that $F > b$, i.e. the potential loss of the buyer were greater than the cost of control¹³. (This is also a logical presumption, since otherwise the buyer would not control.) And finally, $Y > F$. This means simply that the price of the product must be higher than the cheated sum, i.e. Y income that the seller receives for the good does not completely result from the swindle, but that some real performance also lies behind it. In other words, the real value of the good is not 0. In the following we give a summary of the most important pieces of information characterizing the above described game, i.e. the payoffs of the two players in different combinations of their strategies are:

		Buyer	
		Controls (B_1 strategy)	doesn't control (B_2 strategy)
Seller	cheats (A_1 strategy)	$Y-F(1+d); U+dF-b$	$Y; U-F$
	correct (A_2 strategy)	$Y-F; U-b$	$Y-F; U$

It follows from our presumption that

$$Y > Y-F > Y-F(1+d),$$

$$U+dF-b > U > U-b > U-F > 0.$$

Let's examine first the Nash-equilibrium! It is easy to check that on the set of pure strategies there is no Nash-equilibrium. Therefore we introduce mixed strategies:

¹¹ He/she receives this higher sum for his/her good if - by trading on the buyer's ignorance – he/she succeeds in selling the product of lower quality at the price of a product of high quality and the problem of quality is not discovered.

¹² We are thinking of fines imposed by the court in addition to damages awarded, such as counsel's fees and the buyer's experts' fees, quality control etc. In accordance with the provisions of Hungarian law this fine goes to the state. But we can also suppose that it were allotted to the buyer as a kind of recompense. Some Hungarian researchers propose a revision of the current legal rules in the interest of the correctness of business relations (Mike– Nagy [2004])

¹³ Here we are thinking of costs such as experts' fees, quality control etc.

Let p be the probability that E chooses A_1 (i.e. cheats) and let q be the probability that V chooses B_1 (i.e. decides to control). In this case the payoffs for E and V (marked by M_E and M_V respectively) are

$$M_E = p[q(Y-F(1+d)) + (1-q)Y] + (1-p)[q(Y-F) + (1-q)(Y-F)], \quad (1)$$

$$M_V = q[p(U+dF-b) + (1-p)(U-b)] + (1-q)[p(U-F) + (1-p)U], \quad (2)$$

We maximize both players' payoffs functions according to their decision-variable.

The players' expected equilibrium payoffs

$$M_E^* = Y - F \quad (3)$$

$$M_V^* = U - \frac{b}{1+d} \quad (4)$$

These values don't justify the change of strategy.

The above model describes a strategy applied in the case of a one shoot game, but in many cases players meet not once, but several times. Let's consider now the case of permanent partners. Players do business with each other an infinite number of times. We suppose that they could observe each others' previous strategy in these transactions¹⁴, i.e. in the n^{th} turn they were fully aware of the partner's strategy applied in the course of all previous transactions. Then they can choose the following solution. They choose a non-equilibrium pair of strategies leading to Pareto-optimal outcome (i.e. the seller is correct and the buyer does not doubt this). In the case of this strategy the seller's payoff is not lower and the buyer's one is higher than it would be in Nash equilibrium. ($Y-F$, or U). They employ this strategy in the first game and continue to employ it until the other player deviates from it. If he/she deviates from it, his/her partner returns to the strategy leading to the Nash equilibrium. This is the well known *trigger* strategy. It is easy to see that it is not worth deviating from it, thus, the trigger strategy is an equilibrium strategy.

Its more indulgent variant – in spite of its threatening name – is the tit-for-tat strategy. In the first turn of the game the players apply a non-equilibrium pair of strategies leading to Pareto-optimal outcome, as we saw in the case of the trigger strategy (i.e. the seller is correct and the buyer does not doubt it). But in accordance with the tit-for-tat strategy, the partner should always do in the n^{th} turn what the partner did in the previous turn. Thus, if the partner stands by the strategy which brings about Pareto-optimal outcome (the seller was correct and the buyer did not control), the his/her opponent also applies this advantageous strategy. But if the partner deviates from it, the other will behave adequately. (If the seller cheated in the previous turn, the buyer

¹⁴ It is also conceivable that the players are not able to observe each others' previous steps; as if they contacted accidental partners. But we will not deal with this case here.

would control, if the buyer controlled in the previous turn, the seller would cheat in this turn.) This strategy is more indulgent than the trigger because the partners punish here, i.e. deviate from the advantageous strategy only as long as the partner does. But as soon as the partner returns to the "right path", they also return to the starting point (i.e. the seller will be correct and won't punish the buyer any longer. Or, if the seller had cheated but returned to the correct behavior, the buyer would also return to the strategy of "non-controlling" in the following turn.

In the case of permanent partners' meeting, equilibrium can occur if the partners apply trigger (or tit-for-tat) strategies. Both strategies can lead to $Y - F$, U payoffs respectively. But this possibility is given only in the case of permanent partners. In the case of an accidental transaction only $Y - F$, $U - b/(1+d)$ payment is attainable as could be seen above. Thus, incidental meetings *deteriorate unambiguously the efficiency of the market*. Therefore external *confidence-strengthening institutions* are needed in the transactions. In the following we will show which institutions can fulfill this function in e-commerce.

Macro- and microtrust

The economic actors – from the merchants of the ancient agora to the agents of the virtual market-places – have always sought ways of diminishing risks, i.e. of increasing *security*. The four basic mechanisms of diminishing risk are as follows: 1. development of the *technical security* of the transactions, 2. development of the *legal institutions guaranteeing the correctness* of the transactions, *offsetting losses* resulting from the dishonesty of the trading parties (or from other reasons) and *applying sanctions*, 3. development of *social mechanisms* which – even in the case of the imperfectness of the former two mechanisms – diminish risks to a tolerable degree (Klang [2001]) and support the formation of 4. *personal trust* between partners. This last factor is significantly different from the first three factors. English and many other languages¹⁵ indicate this difference by a separate word making a distinction between "*confidence*" which means general faith in the smooth functioning of the technical infrastructure, in the fundamental mechanisms of the market system, in the legal institutions regulating them or in the social conventions, and "*trust*" which reflects a firm belief in the *personal* reliability of the given business partner(s).

Personal trust is a complex phenomenon.¹⁶ Perhaps its most important factors are *reliability*¹⁷ and *benevolence* (Doney [1997]). The *assumption of reliability* means that the buyer is convinced that the seller does his/her work professionally and *efficiently*. The *assumption of benevolence* means the trust of the buyer in the seller's *goodwill*. Thus, the trust between persons or organizations combines two significantly different beliefs in

¹⁵ So, e.g. this distinction exists in Russian, too.

¹⁶ This may explain why it is that in three big explanatory dictionaries (Websters, Random House, Oxford) the number of the definitions of trust is significantly higher (9, 24 and 18 respectively) than of cooperation (3, 2, 6) and confidence (in Hungarian: trust in the functioning of the legal system) (6, 8, 13). Trust has on average 17 definitions, while its synonyms have 4.7 definitions. (McKnight-Chervany [2001]) p. 2) Thus, this phenomenon cannot be easily grasped; it can be defined by using competence, predictability, benevolence, goodwill, honesty, reliability, integrity, credibility etc.

¹⁷ "Credibility" is written in the original article, but this word has been adopted by finance and macroeconomic for describing another phenomenon. Therefore we use here reliability.

one concept: the assumption of the seller's *competence* and *goodwill* (Ganesan [1994]). Similarly, the seller's trust placed in the buyer also has two aspects: the assumption of the buyer's *solvency* and *willingness to pay*. So, the mutual trust between partners is equally connected with objective *possibilities* and subjective *intentions*.

In some languages (including Hungarian) there are no separate words for personal trust and institutionalized confidence, so it is appropriate to call general trust placed in the functioning of the market system *macro-trust*¹⁸ and, trust existing between people *micro-trust*. The purpose of the contractual guarantees and their state-controlled observation is to *render interpersonal trust unnecessary*. Thus, there is a certain kind of possible substitution¹⁹ between so called *macro-trust* (confidence) and *micro-trust* (trust) relating to concrete market actors. But this substitution is not limitless. In practice it is difficult to find a transaction that would be based only on one of the two kinds of trust. *Micro-trust existing between parties* – in contrast with the institutional guarantees of trust – involves lower expenses (or there are no monetary costs).²⁰ So – *ceteris paribus* – the greater *micro-trust* is, the lower transaction costs are.²¹

The above indicated mechanisms of macro- and micro-trust contribute significantly to the *calculability of the transactions*, which is the indispensable precondition of adequate market decisions. At the same time *micro-trust* placed in individuals seems to contradict the logic of the market economy which is based on considering personal relations²² (moreover, *micro-communities*) in isolation. But as contracts are never perfectly closed, only *micro-trust* – foreign to the logic of self-regulating markets – may fill the gaps and diminish or eliminate remaining uncertainties. Regarding Sen's dilemma, there is no way out except to develop *micro-trust* between the baker and the buyer. Trust is not only the indispensable condition of the transaction, but also the key-factor in their efficiency. As Arrow put it:

"Now trust has a very important pragmatic value, if nothing else. Trust is an important lubricant of a social system. It is extremely efficient; it saves a lot of trouble to have a fair degree of reliance on other people's word. Unfortunately this is not a commodity which can be bought very easily. If you have to buy it, you already have some doubts about what you've bought. Trust and similar values, loyalty and truth-telling, are examples of what economist would call „externalities“. They are goods, they are commodities; they have real, practical, economic; they increase the efficiency of the

¹⁸ Others use "institutionalized trust" as opposed to personal trust (*micro-trust*) which has not been formally institutionalized. See article under publication by László Tóth about macro- and micro-trust. (Tóth [2004])

¹⁹ The possibility of substitution exists between the different elements of macro-trust as well. As Brenner writes: "As long as people traded within a relative small and stable community, norm established through kinship and religion ethnic ties and guided people's expectation and offered mutual protection. When people traded with strangers market institutions (formal contracts, warranties, insurances etc.) as well as governments took over these roles..." (Brenner [1994] p. 148)

²⁰ Of course, if we interpret costs in a wider sense, not simply as monetary costs, *micro-trust* also involves costs, since the building of interpersonal trust in order to belong to a collectivity that is the fundament of interpersonal trust, may sometimes require self-denial, pushing self-interest into the background.

²¹ In his book Reuven Brenner [1994] describes how diamond merchants of New York work without any transaction costs by shaking hands. Most of trade is in the hands of the local orthodox Jewish community. (Brenner [1994] p. 148)

²² According to the classic statement, neither the butcher's nor the brewer's benevolence is necessary to get lunch or dinner in the market economy. But this is only partly true since some degree of trust (i.e. the assumption of benevolence) is indispensable even in the case of so simple transactions.

system, enable you to produce more goods or more of whatever values you hold in high esteem. But they are not commodities for which trade on the open market is technically possible or even meaningful" (Arrow [1974] p. 23)

The basic mechanisms of trust on the Web

Mechanisms diminishing risks similar to the ones above described are needed in the electronic markets, too. But the weight and the forms of the particular mechanisms differ significantly from the ones characteristic of traditional markets. In the beginning the problem of trust was simplified to the technical guarantees of payment by card and to the protection of privacy. (Hoffman and others [1999]) The economic actors must trust in the payment system and in the smooth functioning of the information infrastructure. The purpose of the efforts directed to the development of technical security was a) to prevent the loss of the data relating to the transaction, b) to preclude unauthorized access to it, c) to ensure continuous functioning of the information infrastructure and to minimize "breakdowns".

Though considerable measures have been taken to ensure the technical security of the transactions, complete security doesn't exist. It is obvious that there is a "security-gap" in every transaction that can be attributed not so much to technical as to economic causes. The excessive development of technical security is not rational as the sums spent on it are not proportionate with the profit to be expected. "Therefore, within the framework of the information security, emphasis was laid on *handling risks*²³ instead of their *elimination*." (Papp [2003] p. 516)

Specialists and governmental organizations have always dealt intensively with the *technological security* of electronic transactions. But only the significant progress of technical security made it obvious that *technology is not the most important factor* from the viewpoint of trust. Stable legal institutions have not been (and could not be) established in the electronic market which is a scarcely ten-year-old phenomenon. Regulation is still in its infancy.

As virtual (intangible) goods raise first of all the problem of intellectual property, the extension of the existing sophisticated legal institutions to transactions carried out on the Web seems to be obvious. But as Barlow²⁴, writes: "Intellectual property law cannot be patched, retrofitted, or expanded to contain digitalized expression. We will need to develop an entirely new set of methods as benefit this entirely new set of circumstances."²⁵ However, *Douglass North's* witty remark – sailors become pirates if society offers incentives promoting piracy and pirates become merchants if society

²³ Firms try to develop a risk-proportionate security system, which means, that the points which are the most important from the perspective of the continuous course of business are most protected.

²⁴ Cited by Shapiro –Varian [1999] p. 83.

²⁵ On the other hand Shapiro and Varian say that the principles relating to intellectual property do not change. „ What has changed is that the Internet, and information technology in general, offers new opportunities and challenges in applying these principles.” (Shapiro – Varian [1999] p. 95) We could say that the old principles should be implanted into a radically new environment, or that new principles should be elaborated; in any case, the challenge which the national and international legal systems could not really meet, is significant.

incites commerce²⁶ – can be applied to these markets, too. But the bureaucratic state regulation cannot keep abreast of the pirates. A good example of this is that electronic market segment which distributes only virtual products, i.e. the music market:

Trade on the Internet has produced two main effects in the music industry. 1. Music-lovers began to buy from on-line traders which led to price-competition and the ruination of the traditional music shops; 2. the weight of music put *illegally into circulation* has grown. In a short while entire music libraries could be accessed on the Web. The next step was the development of browsers focusing on the MP3 format. But the increasing circulation of MP3 has been *mostly illegal* and has *violated copyrights*. The introduction of security standards became vital in this industry. The music industry could reply to these challenges only with difficulty. Though the procedure developed by IBM in 1999 (EMMS) which was able to compete with MP3 made secure on-line distribution of music possible, its coding remained a sensitive point. Though musicians and the music industry have struggled vigorously against forgery, illegal distribution remains the greatest problem of this industry, being closely related to the Internet (Rao [1999]). Thus, macro-trust is problematical on the Internet both from the perspectives of technological security and legal regulation.

Speaking in general terms, the regulation which operates in traditional markets cannot be implemented in its entirety on the Web. Therefore participants in the market cannot count definitely on the existing institutions of macro-trust. For example, regarding data management, it is a question as to whether the necessary conditions can be implemented on the Web. The response to this question is often negative. The *usual methods of control* applied in traditional commerce work only to a limited extent in the virtual world.

A good example of this is the rule that clients must be aged 18 or over. It is, however, impossible to control the age of those entering the electronic market in the same way as teenager customers in a bar. It is a good omen that eBay introduced a new system for checking new clients that at the same time follows the changes of address of old clients as well. However, creditworthiness is not examined, only the client's name and internet address is checked. So, the risk of meeting swindlers when entering eBay is still very high (cf. Eggert [2003]).

In addition to this, legal regulation itself is also problematic in the case of these global markets, since the transactions to be regulated are outside states' national territories. The difficulties result from a particular paradox: namely, the legal institutions and other trust-strengthening mechanisms are mostly attached to *place* and *time*, while the Web is a "*space without place*" and transactions are not limited in time (24/7).

In addition to this, if a legal dispute occurs, both parties wish to apply the law of their own country. (And what is worse: if one party considers that legislation should be the effective one which is more advantageous for him.) The asymmetry of information which puts sellers into a more advantageous position may be more problematic, if sellers turn their information obligation to their advantage by exploiting the divergence of legal institutions and the difficulties of law enforcement in cyber space without state borders. If a lonely buyer – staring the seller out – counted only on macro-trust

²⁶ Cited by Drobak [2000] p. 279.

institutions (which are still rather undeveloped on the Web²⁷) in the hope of preventing abuses, it would not get him/her very far. The infiniteness of the Web makes mapping of the environment of transactions difficult. Before the age of the Internet, purchases concentrated in a geographically well-defined circle. Consumers could have a fairly precise picture of the technical guarantees and the legal environment as well as of the *non-written social rules* and of the partners' *reliability*. As opposed to this, electronic markets – simply by reason of the difficulties or impossibility of getting these important pieces of information – raise Sen's problem mentioned in the introduction particularly sharply: to avoiding the partner taking advantage of his/her position, the buyer demands pre-delivery, while the seller requires pre-payment, two things which are impossible to carry out simultaneously.

An escape from this pitfall may be offered by the alternative *trust-building institutions* which are developing on the Web.

Alternative trust-building institutions

Traditional trade has also had its *independent trust-building institutions* (different institutions for resolving conflicts, different organizations of authentication and certification) established by the economic actors. Trust-building institutions can improve the coordination of the market and make transactions more secure by offering an *option* to state-initiated solutions. Many effective alternative trust-building institutions have already been established on the Web in spite of the short time which has passed since its emergence.²⁸ Independent (not state-owned) *trust-building institutions have more opportunities to flourish in electronic commerce* than in traditional transactions. In many cases they can replace slow and bureaucratic state-owned institutions (which have mostly only nationwide competence) which are not compatible with the structure of the Web.

Reputation-building and -destroying institutions: recommendation and dissuasion

Buyers' solidarity is a new possibility in the electronic market to diminish risks and increase the security of transactions.

E.g. in the first days of 2003 Intuit Inc. enraged the whole Web as its TurboTax software had given trouble to some buyers, who immediately e-mailed their complaints to different Internet forums. The speed of the spread of the critical remarks plunged the enterprise into crisis and may serve as a case study to illustrate the dynamism of trust-building (or in the given case trust-destroying) actions. In the same month the sites of Extremetech.com, CNET.com, Slashdot.org and others which permitted the publication of product evaluation were inundated with the objections of furious customers. (Thompson [2003])

²⁷ Both individual countries and transnational entities like EU are making more and more resolute efforts at regulation.

²⁸ Unbelievable though it may seem, electronic market-places appeared no more than ten years ago; their origin can be traced back to the foundation of eBay in 1995. E-commerce (based on catalogues published on the websites of producers and sellers), is not much older, though the two phenomena are often confused in common usage.

The buyers call the attention of their potential fellow sufferers to Lemon-award winning products. This mechanism has always worked in a limited circle, but due to *buyers' isolation* and to the slow spread of information, it could not cause significant damage to the "guilty" enterprises. What is a new phenomenon is that now millions of customers can be diverted from buying a given abortive product. *Buyers' electronic reputation-building and destroying actions*²⁹ have given the economic actors plenty to think about. A series of actions has been organized on the Web for "blackballing"³⁰ "not-adequately behaving" producers and traders.

As opposed to traditional markets where the buyers' indignation or praise has not had a significant impact on price formation, *reputation-building and destroying actions have directly influenced prices* in the electronic market. Yamamoto and Ohta emphasize that price formation has two stages in the case of experience goods. Reputation, which is a key-factor in the calculation of prices of experience goods, is formed in an information-sharing process taking place in buyers' communities. The real value of a good, a value that the individual would not be able to judge before (and maybe even after) purchasing it³¹, is formed in this process. This is shown by the above-mentioned authors' table (which we have slightly modified):

Table 1

Price setting of experience goods distributed on the Web

Market of tangible goods	Knowledge-community	Knowledge-market
$P = h(V)$	$R = i(V)$	$P = f(R)$ $R = i(V)$
Prices are fixed on the basis of the value of the good (or on the basis of the costs)	Reputation forms on the basis of the value of the products	Price depends on the reputation. Reputation is based on the value of the goods.

The introductory chapters of economics course-books still include the statement that *buyers are atomized*, and a great number of buyers are not able to enforce their interests against sellers whose numbers are limited. This is true in the case of the traditional markets in which the development of *buyers' solidarity* has been inconceivable both *practically* and *theoretically*. The fact that due to electronic transactions, buyers are

²⁹ In Hungary we were also able to get a taste of this in a special field, namely in health care, which became involved in a scandal centered around the website www.halapenz.hu. Examples of more universal validity can also be found on the forums of Origo, where buyers regularly exchange experience about mobile phones, school-net (internet-subscription and computers bought for educational purposes in a special government scheme) products etc.

³⁰ Mechanisms developed on the Internet have spread over to the traditional markets. With the help of the Internet, buyers can express their indignation and initiate actions on the traditional markets too, see e.g. the classic case of Intel chip. In 1994 Nicely, a mathematician called the firm and announced that the Pentium chip made a mathematical mistake. The firm – hoping that others would not notice the mistake which could be corrected quietly. But he did not leave it at that and informed his colleagues about the mistake by e-mail. The information was published on the Internet. Later, the big newspapers also dealt with the problem and the firm could not avoid accepting responsibility.

³¹ In the case of such a complex product as software, the individual cannot discover all errors or all ways it can be used. Only the buyers' community is able to make an almost comprehensive evaluation. Of course, this interrelation is true not only in the case of the virtual goods distributed in e-commerce, but also in the case of all experience goods.

no longer isolated has fundamentally changed the *nature of the market transactions*, since the problem of information asymmetry occurs in cyber space in a different way than in traditional trade. The internet and information technologies determine the way information flows in society. A new space for sharing information is forming on the Web that is referred to as “cyber commons” by *Ohta and Ishida* (1998). Cyber communities³² are very important in the evaluation of products and their producers (sellers). Not only buyers, but also experts who are not interested in the transactions themselves give an opinion of the products which contributes to diminishing the information asymmetry. E.g. About.com was built for this purpose. Thus, in electronic cyber space reports on products can be made not only within the framework of buyers’ spontaneous actions, but also in the form of a conscious *mechanism-planning*. E.g. in certain electronic market places buyers’ opinion-sharing is *institutionalized*; moreover, this possibility is extended to sellers’ opinions as well. Information technology has facilitated this to a great extent.

E.g. on eBay, which offers electronic space for auction for private customers, not only the *transactional history of each seller and buyer* is recorded, but also the partners’ satisfaction with the given transactions. Due to this mechanism, the individual actors’ reputations are clearly shown. This system in itself incites the participants to cooperate and contributes to the improvement in the quality of the goods.

A series of studies show that users appraise the seller’s reputation before bidding on eBay. In the case of more than half of the transactions carried out on eBay, users send feedback that helps future buyers to make good decisions. (*Houser & Wooders* [2001])³³ There are communities organized especially for grading goods.³⁴ “The more consumers come to trust the opinions posted on online forums, the less effective traditional advertising will become in influencing consumer behavior.”³⁵ – The New York Times cited the opinion one of the experts on the subject.³⁶ (*Thompson* [2003]).

Amazon.com, perceiving this tendency, decided to delete the budgetary items relating to television advertising and to general advertisements to be published in the written press. The USD 25 millions saved by this was spent on free deliveries connected with orders of overriding importance.

A good example of the opinion-forming role of the cyber community is the case of the movie entitled “My big fat Greek wedding” whose budget was relatively low, so not much money could be spent on advertising it in advance. Nevertheless, due to

³² *Cyber space is a space on the Web where new pieces of information are produced and circulated. The social changes explaining this phenomenon can be summed up as follows: 1. Emergence of an interactive chain of information. Due to this, even an average individual can send and publish information. 2. Overcoming information asymmetry. In the classic business model manufacturers and sellers had more information than buyers, but nowadays this difference seems to be less, owing to easy access to information on the Internet. 3. Establishment of business communities. Communities organized spontaneously have taken over managerial values (tasks). 4. Overcoming geographical and temporal limits. Due to the Web, such communication becomes possible which up till now has been restricted geographically and in time. (Yamato & Ohta [2001] p. 3)*

³³ *But you cannot be entirely sure of the reliability of these feedbacks, since sometimes they are not objective. As in most cases signaling is possible only after a certain interval, distrustful partners make hostile remarks on given actors on the day of expiry. So they cannot reply due to the lack of time. Áron Négyesi drew our attention to this phenomenon.*

³⁴ *E.g. PTP is a virtual community whose members express and share their opinions formed on goods. At the same time they make mutual evaluation, i.e. they evaluate each other as well. (Yamamoto-Ohta [2001])*

³⁵ *These developments fundamentally change marketing as well, but this is not the subject of this article in its narrow sense.*

³⁶ *The statement quoted from the professor of the MIT was made at the conference organized by the Sloan School of Management (Massachusetts Institute of Technology).*

the favorable opinions circulating on the Internet, the movie became a box-office hit (Thompson [2003]).

However, potential buyers should handle these opinions cautiously. It was observed that on sites measuring satisfaction or dissatisfaction with transactions, i.e. where actors gave an opinion of each other, the "targets" of the negative evaluations often shot back. In a given case they give an unfounded negative opinion on their partners for simply returning their negative opinion received earlier. Behind the evaluations of "third parties" there can also be interests, which distort the views on the goods (and their producers). But in spite of these anomalies, the communities of those dissuading others from buying or persuading others to buy certain goods fulfill a useful function in e-markets and significantly diminish the lack of information (the lack of trust) existing in the case of single transactions.

The above-mentioned forms of buyers' solidarity are excellent examples of the fact that new institutions reflecting "postmodern" realities are replacing deficient or rudimentary macro-trust institutions in the transforming economy. The *reputation-building mechanisms* established by these institutions contribute to attaining that level of trust, which is necessary even in the electronic markets. These mechanisms are based on the observation that agent strategies change when we consider that interactions are repeated: the other party will remember past cheating, and changes its terms of business accordingly in the future. In this case, the expected future gains due to future transactions in which the agent has a higher reputation can offset the loss incurred by not cheating in the present transaction." (Jurca – Faltings [2004] p. 2.) Sellers trading successfully on the Web and actors operating auction-sites and offering transaction-histories accept this principle.

What is also a new phenomenon is how *rapidly* these trust-strengthening institutions have been established, in contrast to the general view which measures the time necessary for the formation of institutions in centuries or at least in decades³⁷, or indeed in the case of informal institutions, (traditions, habits, ethical norms, religious instructions) in thousands of years. We think that these statements, which can be traced back to Oliver Williamson, have been superseded in the Internet-economy.

In spite of "digitalized" trust-strengthening mechanisms, trust is still often regarded as a critical factor of e-commerce. (Urban *et al* [2000]) The *lack of trust can be considered friction* in electronic transactions. The Forrester-survey found in 2000 that 51% of companies did not like to do business on the Web, since they did not trust their partners. (Forrester Report [2000]) Many people think that the lack of trust between partners who do not know each other is the greatest obstacle in e-commerce (Jupiter Consumer ... [2001]).³⁸ It is not surprising that besides buyers' solidarity many other *trust-strengthening institutions work* on the Web.

Intermediaries "trading" with trust

The alternative trust-strengthening mechanism – against the macro-trust institutions established (or rather to be established) by state or international organizations

³⁷ Cf. e.g. the lecture of Paul Joskow delivered at the conference of ISNIE held in Budapest (Joskow [2003] pp. 5-7)

³⁸ Cited by Venkatesh – Urban – Sultan [2002]

– is *intermediation*, which is widely used on the Web. “Traditional methods to avoid cheating, involving strong cryptography and Trusted Third Parties (TTP's) that overlook every transaction, are very costly and sometimes even impossible to apply due to the complexity and heterogeneity of the environment.” (*Jurca – Faltings* [2004] p. 2) That fact contradicts *Arrow's* statement quoted at the first section of this paper. In contrast of the above opinion, credibility or reputation can be turned into cash on the Web and is a source of profit for the reliable intermediaries. Most different kinds of trust-building firms, who trade with their reliability and reputation, derive profit from the trust that those trading on the Web have in them, but do not have in their unknown partners, who live perhaps on another continent.

Earlier there were conceptions according to which the rapid technical connection of seller and buyer on the Web would put an end to the intermediaries' function in transactions. The phenomenon is called “disintermediation” (*Gellman* [1996]; *Gates* [1995]). But instead of this, new types of intermediaries appeared in cyber space. “With the advent of the Internet, much of the logistics and aggregating value of intermediaries disappears. However, intermediaries may add new value in terms of saving search costs, communicating trust, providing turnkey solutions, and so forth.” (*Roberts* [2000] p. 36)

These “third parties” are trustworthy in the partners' eyes, as they are not interested in the specific outcomes of the transactions or in the payments relating to them. They are interested only in the greatest number of transactions and in clients' satisfaction.

From the authentication of electronic signatures through the auctioneer's function carried out in electronic stock-markets to intermediaries operating so called “suggestion boxes”³⁹, there is no end of actors of this kind on the Web. It is the task of the intermediaries to resolve the conflict: in cyber space – simply by reason of its infiniteness – it is less possible that two actors will meet again than on the traditional local (or national) markets. “Even though most of the theoretical models proposed by the academic community studying reputation mechanisms assume single shot buyers, we believe that it is more natural to consider that buyers also keep returning to the same business partners (sellers) during their lifetime. Human buyers definitely have this characteristic and therefore software agents that act on behalf of humans should also be modeled in a context of repeated interaction.” (*Jurca & Faltings* [2004] However, interpersonal trust can be established, if the frequency of the transactions is very high.

Limits of trust-development on the Web: uncertain identity

What makes correct behavior possible vis-à-vis a partner at the individual level (independently from the existing legal institutions and the rules of the social game or, from trust-strengthening institutions organized from the bottom)? According to game

³⁹ *The electronic suggestion box replaces the traditional boxes of ideas used mostly by Japanese enterprises, into which workers could drop their anonymous messages written to the management of the firm. Now the same boxes are operated by Internet service providers. If an enterprise subscribes to such a service, its employees may raise their problems or send their suggestions to the operator without giving their names. The operator advises them on what to do in the given situation, or – by guaranteeing anonymity – transmits the message to the director of the enterprise. (Smith [2004]) Suggestion boxes can be used for other purposes as well. The author of this article knows a box in which journalists or authors of theses may test the originality of the titles of their works or receive approval or disapproval regarding individual ideas. In the latter case the function of the box is rather a certain kind of “cure of souls”.*

theory, it is possible if the partners *meet again and again*.⁴⁰ Trust may deepen if the partner reciprocates the correct behavior of the party who makes the first step, and gives proof of similar benevolence. A further factor strengthening trust is the increase in the frequency of the transactions and the stability of the relationship between the parties interested in the transactions (*Dasgupta* [1988]; *Lawler& Yoon* [1996]). Due to its structure, the Web obstructs just this latter possibility, or at least, limits it significantly as compared to the situation prevailing in local business communities.

There is another factor which hinders the development of trust even more: as personal identity *can be changed* on the Web, the economic actors can easily disregard the requirement of correctness. The criminal way to change identity is the *theft of identity*.⁴¹

Identity-theft is the illegal misappropriation of a person's data (name, date of birth, address, ID of credit card, NI number and other personal data) in order to use them in different transactions which result in financial advantage, from renting a car to taking out a loan. This is the most rapidly spreading type of crime in the USA. According to a survey by the Federal Trade Commission made in September 2003, 27.3 million ID thefts had been registered between 1998 and 2002, and the speed of the spread of this type of crime is shown by the registration of 9 million cases in 2002.⁴²

The victims of ID thefts notice some abnormality only after the trouble has happened, i.e. when the ID thief who misuses the stolen pieces of information destroys their creditworthiness. Clients relieved of their identity realize what is happening only when they receive an official notice about their lack of creditworthiness. The American credit banks do not spend the necessary time to check that third parties do not accidentally acquire credit information. So, third parties can have access to account-related information if they have some minimal information.

⁴⁰ "This possibility means that the choices made today not only determine the outcome of this move, but can also influence the later choices of the players. The future can therefore cast a shadow back upon the present and thereby affect the current strategic situation.." (*Axelrod* [1988] p. 244)

⁴¹ ID thieves can acquire pieces of personal information in many ways. *Lawson and Lawford* [2003] mention the following possibilities in their article.

- Personal information can be obtained openly: by the theft of a pocket-book, purse, laptop, bank or credit card statement sent by post; by the theft of the Winchester of a computer from a governmental office or from an enterprise; by the theft of personal pieces of information stored in work records or computer data bases;
- by discovering lost pocket-books, purses, laptops (that are often kindly sent back after making a copy of the information);
- by going through garbage for personal data;
- by acquiring information from sources accessible publicly (Internet, telephone directory)
- by hiring an on-line agent to search for data about a given person electronically;
- by bribing an employee of the firm to transmit customers' personal data;
- by hacking;
- by observing people when they use their PIN code or by acquiring codes with the help of false cash machines.
- ID thieves pass themselves off as Internet service renders/providers, potential employees, market researchers or, moreover, as service renders/providers who prevent ID thefts and demand personal information directly from the individuals for apparently legal reasons.

⁴² The source of the datum is [http://www.bbbonline.org/ID theft](http://www.bbbonline.org/ID%20theft)

⁴³ Experienced hackers go to Internet cafés, libraries and hunt for personal information involuntarily left in PC-s used in public places.

⁴⁴ In the closing paragraph of our article we greatly relied on the thoughts of *András Kiss* and *Norbert Kiss*, which go far beyond those treated here. The ideas of the closing paragraph (and for the most part their formulation as well) are their work.

Thieves can have access to *more personal information and more easily* on the Internet than in the traditional world. E-banking ensures the thieves' anonymity. In spite of this more and more people have used on-line bank services. Customers cannot estimate the risk they undertake by doing this. They do not know how many traces of their data they leave behind on personal and official web-sites (by sending e-mail messages, by registration and use of Internet services).⁴³ Gartner hit the nail on the head when he spoke about a "new era of high-profit, low-overhead crimes." (Cited by Lawson –Lawford [2003] p. 19)

ID theft, which is an exceptional phenomenon in brick and mortar commerce, is a wide-spread form of Internet-crime (Arnold [2002]). ID theft does not stop at the frontiers. It becomes a *continental* and *global* phenomenon. Due to the transnational flow of personal information and global electronic commerce, personal information can be stored and processed anywhere in the world. It is evident that this contributes to the uncertainty of e-commerce and requires institutional solutions. Nevertheless, there are also factors which have an opposite effect.

Though in the global electronic markets the very great number of players (and their uncertain identity) in principle makes it difficult for partners to get to know each other, however the technical possibilities offered by the Web, including the *registration of the parameters of the previous transactions, the possibility of their rapid survey and evaluation* and the lower costs of acquiring information, have just the opposite effect.⁴⁴ (As if people who become partners in an accidental transaction had a long history of cooperation.) Even, if we suppose that a user caught swindling, created a new account on the Web, and continued to trade with its help (covering up his/her "muddy" past), the buyer can have some information on the business-related behavior of the seller. Even in this case (i.e. in the case of a certain change of the seller's identity) the buyer can regard the number of transactions executed previously by the seller as a signal (he/she can use a strategy of doing business only with sellers executing transactions above "n"), but a detailed explanation of this phenomenon could be the subject of a next article.

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