A Welfare Analysis of Standards Competition: The Example of the ECMA OpenXML Standard and the ISO ODF Standard

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Abstract

The paper's objective is the analysis of some of the fundamental economic efficiency considerations of parallel standards, in order to thereby enrich the discussion and also the decision process regarding the transfer of the ECMA OpenXML standard into an ISO standard parallel to the already existing ISO ODF standard, producing rather fundamentals than specific technical aspects and arguments. The following questions are central to the analysis: How should multiple parallel existing standards, which exist in the same technological area, be fundamentally evaluated in terms of theoretical-static welfare, and most importantly with respect to their dynamic effect on innovation and competition? How can these questions be evaluated, in particular in the area of standardisation of open document formats? How is the standardisation of open document formats to be evaluated with respect to their effect on innovation and competition – in particular in the downstream markets and therewith from the point of view of the medium-sized software industry?

From a general economic welfare perspective it is superior to select only one specific standard within a static model. In contrast, the much more realistic dynamic models present a set of efficiency improvements generated by a competition between standards, which counterbalance the static efficiency gains caused by an intermediate decision for a specific standard. Based on several economic models a number of parameters are identified that have to be taken into account in the decision for or against a competition between competing standards. If one ultimately summarises the parameter characteristics in the concrete case of competition between the ODF and the OpenXML standard, one clearly finds characteristics in the majority of the parameters that do not speak for an immediate decision for either of the two standards at the current time.

The results from the qualitative welfare analysis have shown that nothing speaks against maintaining the standardisation competition between the existing ISO-ODF standard and the OpenXML standard. However, the competition in downstream markets for software applications has to be assured, e. g. necessary rights and technical information for the implementation of the OpenXML standard should be available. Fundamentally, the acceptance of the OpenXML standard parallel to the ISO standard would be an efficient strategy to further integrate formal and consortia standardisation and to hold the standardisation competition under one institutional roof. In addition, the idea of a standardisation competition between the two formal standardisation organisations should be further pursued, as the considerations presented made clear that even in the dynamic contexts significant welfare gains can thereby be realised.

1. Starting Position, Questions and Objectives

The starting position for the analysis is that within the framework of the so called Fast Track Process for ISO (International Organization for Standardisation), the ECMA (the former European Computer Manufacturer's Association, since 1994 the European association for standardizing information and communication systems) proposed that the ECMA OpenXML Standard, a file format for office application packages based on XML from Microsoft for data and file transfers between office application packages, be implemented as the official ISO standard in addition to the ODF standard (Open Document Format for Office Applications), which was already specified by OASIS (Organization for the Advancement of Structured Information Standards) and published by the ISO, for the open exchange format for office program files. While a large consensus exists for this proposal within ECMA, there are numerous reservations to this proposal from a number of ISO members.

The following analysis has the objective of analysing some of the fundamental economic efficiency considerations of parallel standards, in order to enrich the discussion and decision process rather with fundamentals than specific technical aspects and arguments. The following questions are central to the analysis:

1. How are multiple parallel existing standards, which exist in the same technological area, to be fundamentally evaluated in terms of theoretical – static welfare, and most importantly with respect to their dynamic effect on innovation and competition? Which conclusions can be drawn on from historical examples of parallel existing standards?
2. How can these questions be evaluated, in particular in the area of standardisation of open document formats?

Since there is some confusion regarding the term standard, we have to define our terminology. A standard represents an agreement in respect of the standardisation of products, procedures or practices. Whereas in the English language usage no further differentiation exists, in German, but also French, one differentiates between standard and norm. Norms are published by formal standards organisation based on a strict consensus process. These formal standards organisations now also publish standards, which are not developed by consensus. In the theoretical economics literature, which is dominated by the English language, the differentiation between standard and norm or formal standards has not been made for a long time. In the meantime, initial work now focuses on the difference between formal standardisation or standards and industry or consortia

standardisation or on company specific de facto standardisation. In the following, the term standard will be used, because the development process is for the analysis of secondary importance.

In the following chapter, the relevant theoretical literature will be looked at, before any significant parameters for a comparable welfare analysis, which targets the still to be defined total economic optimum, will be chosen. This analysis framework will be applied to the current situation in a final step, before a concluding assessment is given in the last chapter.

2. Review of the Theoretical Literature

A general classification of a situation in which two incompatible technological standards compete with each other, and another situation, in which a competition arises within a technology or a standard after the agreement on one standard, emerged in the theoretical literature first (Besen, Farrell 1994)[1]. In the industrial economic models upon which the theory is based, it is basically assumed at first that standards in competition are not compatible with each other, which makes a "market decision" on one of the two standards for the complete development of the network externalities[2] necessary.[3] The theoretical models do not only focus on the analysis of the type of coordination of standard setting processes, but in the meantime also on the economic efficiency assessment of the standard's selection.

These earlier models have basically presupposed that no stable equilibrium in the competition between two incompatible standards is possible, and by the workings of network externalities a dominant standard would emerge, which would possibly capture the market at 100% in the long-term. The example of the success of the VHS format over the competing Betamax Technology is often cited. Because the decision of a network is not only based on the actual number of users, but rather also on the expectations with respect to the market results, within a short period of time the entire population of all users can decide on a specific standard. In effect, the rivaling standard loses its attraction very quickly and thus disappears from the market, if the users, who originally decided on it, do not have to incur a high cost of change (only low sunk costs, which means non compensable or realisable investments). Not only the technical advantage of a standard is decisive, but also the expectation generated with respect to the future usage development (Farrell, Saloner 1985; Farrell, Saloner 1986; Katz, Shapiro 1986; Katz, Shapiro 1992).

Ultimately, the proliferation of a standard is dependent on its path to a large extent. This means that the actual market result is not only determined by the behaviour and the preferences of the actual customers and the property characteristics of the current product generation but rather in particular by the usage decisions in earlier periods or in the phases in which the entire market

[1] The overriding concept of technological dominance is not discussed, since the theoretical welfare aspect does not play a role in these investigations (Suarez 2004).
[2] One decides between direct network externalities, which occur in such a way that a telephone with the increasing number of communication partners gains in value, and indirect network externalities, which arise in such a way that the value of hardware, such as computers or DVD players increases through the increasing diversity of software and DVDs.
[3] For certain network goods, such as credit cards, for example, it makes a lot of sense to not decide on one "network", rather for two or even multiple.

selected one of the two standards. These processes are not easily reversible, since strong network externalities through a large user base are not necessarily compensable by a predominantly superior technology.

Since the company, which holds the "winning standard" anticipates a strong and long-term monopoly position, the incentives and with this also the endeavours to win this "winner takes all" game, are intensely pronounced.[4] The investments of the competitor, in order to win the standardisation game, can exceed the expected return several times over.

The alternative to a competition between two incompatible standards is the competitors' settlement on one standard or on compatibility between standards (David, Greenstein 1990). Should it come to this decision, then the competition between incompatible standards becomes a competition within a standard, which is bound by the competition parameters of price, quality, product characteristics and services.

The decision between the cooperative and the non-cooperative solution depends on how great the differences are with respect to the company profits to be expected and the tactical options in the respective subsequent competition combination. There is a strong concentration in the literature on strategies and tactics with which one can win this "game" or this "standard's war" (Besen, Farrell 1994; Shapiro, Varian 1999; Stango 2004).

Should one assume that it is conditional on sufficient heterogeneous preferences (Berg 1988) or so-called local networks, which are based on a very biased distribution of network externalities [5], but which achieve a coexistence of varying standards, there is always the ability to build a converter, adapter or network bridge in order to promote the development of network externalities (Berg 1989; David, Bunn 1988) and, on the other hand, to nonetheless avoid the direct price competition through various standards (Baake, Boom 2001). An additional thread in the literature concentrates on the dynamic dimension of the problem in which the adoption decision by the user with respect to a new technology (Farrell, Saloner 1992; Seifert, Varé 2007) or the change from an old to a new technology or standard is examined (Andreozzi 2004; Choi 1996; Choi 1997).

[4] It does not necessarily have to do with a proprietary standard, rather it can also be an open standard, which is fundamentally useable by all competitors in the sense of a formal norm, to which, however, proprietary technology or services are offered by one single provider.

[5] The total size of the network is of less importance precisely in networks with frequent and intensive interaction with only a few participants (Birke, Swann 2007), so that over the long term, for all intent and purposes, multiple standards or networks could be developed and established at the same time.

2.1 Static Welfare Consideration

Basically, the theoretical welfare consideration aims to maximise the overall welfare of the consumers, the so-called consumer surplus as the difference between the individual amount one is willing to pay and the actual price paid, and the manufacturers, the so-called producer surplus, which is created from the difference between the price to be obtained and the actual costs incurred. In the classical market models with increasing marginal cost, the welfare optimum is achieved when the price is equal to the marginal cost. In markets with network externalities and strongly falling marginal costs, this is not the case, so that the lowest possible prices and with that the highest possible number of users or usage intensity should be sought after.

The theoretical welfare analysis of competition between standards or within a standard has been given little regard until now (Cabral, Kretschmer 2006). In a static context, one distinguishes between competition within a standard and competition among two more or less incompatible competing standards.[6] From Berg's (Berg 1988) simple model, one can infer that for strongly pronounced user preferences for compatibility or for network effects and with this high user or participant numbers in one standard[7], a better ability to substitute both goods or standards and high fixed costs for the production of a second standardised technology is welfare optimal, simply in order to pursue one standard. The loss of welfare with the division of the population into two camps due to dual standards, and with that lower network effects and higher average costs in the production of two standardised technologies, could not be compensated through the increased diversity, for which there is only a slight preference.

Conversely, for a lesser ability to substitute standards-based products, which arises from a relatively wide distribution of user preferences, a lower preference for compatibility and a relatively low fixed production cost for a second product class based on another standard, it can be absolutely welfare optimal, if two incompatible standards coexist in the market.

In addition to the heterogeneity of the preferences, the demand for product compatibility and the additional production costs, the price setting relationship for competition within a standard in comparison to the price competition for competition between two standards is to be taken into consideration in a welfare analysis. Since a normal competitive price setting based on marginal

[6] Since the adoption behaviour is fundamentally dynamic, the difference in the static and dynamic refers to whether the standards considered do not change or continue to develop and that the knowledge of the quality of the standards changes over time.
[7] Economides and Flyer (1998) conducted simulation calculations and underscore these results.

costs in the sense of the static welfare theory due to the higher fixed costs and network externalities is not employed, then, for a simple welfare comparison, the number of users realised or the growth of adopters and also the usage intensity must be drawn on for the approximate size. In a static model framework, the competition within a standard will be assessed higher as a rule from an economic welfare perspective and will therefore drive higher user numbers.

The trade-off caused by the realisation of maximum network externalities through the existence of a standard and the consideration of heterogeneous user preferences can be cancelled out by the development of a converter. Welfare gains can be realised for a relatively low cost for the one-time development of the converter and the ongoing conversion costs, since the network externalities are now based on the number of users of both standards and will even attract additional users as well.

2.2 Dynamic Welfare Consideration

Although relatively robust results can be derived from within a static welfare analysis, it does not correspond to the reality of fast changing technologies and standards and must therefore be expanded by a dynamic dimension, which affords valuable insight and corresponding decision parameters.

In a simple dynamic model based on Arthur's base model (Arthur 1989) for the standard selection of a technology and assuming uncertainty with respect to the technological superiority of one of the two standards, Cabral and Kretschmer (2006) show that dependent on the time preference of the social planner, either the competition between the standards should end immediately and that the standard that is currently most widespread is decided on or that one adheres to a standardisation competition long enough that all potential users have decided on one standard.[8] If the social planner assumes that it concerns a standard with a relatively long life cycle, then the cost of a wrong decision is relatively high, so that he would decide on a relatively long experimental stage, since the higher experimental costs can be easily counterbalanced by the lower chance of a wrong decision. It even makes sense to support the not so widespread technologies or standards somewhat. These findings by Cabral and Kretschmer are fundamentally covered by David's (David 1987) advice: "one thing that public policy could do is to try to delay

[8] Whereas the previous models refer to standards in general, Cabral and Kretschmer (2006) focus explicitly on formal standardization processes.

the market from committing". If it has to do with the opposite, with a technology with a relatively short expected life cycle, then the cost of a drawn out standardisation competition cannot be justified and the so-called impatient planner must immediately make a decision on the currently widespread standard.

Although Cabral and Kretschmer (2006) have taken into consideration important parameters of the decision problem between the standardisation competition and the immediate decision for a specific standard with the expected life cycle and the uncertainty with respect to the technical superiority of a technological alternative, they disregard in their analysis that both alternative technologies or standards will continue to develop over time (Cabral et al. 2006).

Through this, the decision problem acquires another dimension, which refers to the setting of the corresponding incentives for the further development of both standards. Cabral and Salant (2007) point out in their model that a decision for one standard made too early will reduce incentives for investment in the further development of that standard and will thereby generate a "free-rider-configuration" because the respective non-innovative company will profit from the further development of the competitors. As long as the quality and thereby the willingness to pay for the enhanced standard more than compensate for the increased production costs, it is efficient from a theoretical welfare perspective to hold on to a second standardisation and thereby to another technology and to only make the final decision at a later time.[9]

If the delays are only used by the competing alternative technologies in order to better position themselves in the standardisation competition, then, however, there is no increase of welfare as measured by an immediate decision for the one or the other standard, since the loss of welfare through not fully utilised network externalities and possible delayed adoption decisions by the user oppose a welfare increasing efficiency gain.[10] A remedy, in order to prevent a drawn out use of tactics, is the weakening of the intellectual property rights for the competing technologies by means of broad options for potential licensees (Farrell 1989; Farrell 1995). The conditions of standardisation institutions or standardisation bodies for free or moderated licensing of patent claims covered in formal standards could, for example, be considered.

[9] In the case that this should actually concern a proprietary standard, the strong dependency on the provider of the winning standard, who could then exploit his monopolistic position through a welfare decreasing monopoly price setting, would speak against an early standardisation.
[10] Since it concerns various technologies, the likelihood of inefficient duplicated research is rather low.

In addition to the improvement of the technology in question through standardisation, the opportunity or the incentive to develop and to improve the converters, adapters and other options for the attainability of compatibility between the alternative technologies also increases through the delay of the standardisation decision, in order to thereby compensate the risk of the defeat in the standardisation competition. In this context, the work of Seifert and Varé (2007) is to be mentioned, which determines the optimal implementation time from the company's perspective dependent on the market position, whereby the quicker and larger number of users attained through this is welfare increasing.

In the static welfare considerations, but also in the dynamic model, the user preferences are not addressed or assumed to be constant. However, the change of user preferences is an important parameter for the welfare analysis. One can indeed assume that the accepted further development of both standards from Cabral and Salant (2007) reflects the changes in user preferences. However, the argument regarding the information asymmetry raised by Cabral and Kretschmer (2006) can also be considered here. Not only an uncertainty about the superiority of both technological standards considered exists with this, but also with respect to the future development of user preferences. Consequently, their argument can also be carried forward to the latter uncertainty, whereby it likewise speaks for a maintaining of the standardisation competition from a theoretical welfare perspective, if it concerns a relatively long technology cycle, because in this case the loss of welfare through the selection of the "wrong" standard is relatively high in comparison to the not fully utilised network externalities during the longer decision phase.

The arguments presented for the welfare analysis have concentrated on the competition between the standards so far. However, many standards, such as in the mobile phone area and for operating systems, represent platforms, on whose basis the so-called downstream markets develop.[11] It is basically argued that these base and platform standards should be open and useable for free for the companies in the downstream markets, in order to not incur any welfare losses. The incentives are thus greatest to offer the corresponding complementary products and services and with that to realise the so-called indirect network externalities.[12] If one now asks the question about the welfare effects on the downstream markets for two competing and non

[11] One can refer here fundamentally to the large amount of literature in the context of the hardware and software paradigms, which represents a similar economic problem.
[12] See also direct vs. indirect network effects Clements (2004).

compatible standards[13], then one concludes that in the case of a relatively small total market size, the indirect network externalities will be weaker, since the number of users for a platform and therefore the product diversity is lesser and with that a smaller number of companies will enter into the downstream markets. In contrast to this negative aspect, two platforms will create a correspondingly higher diversity in the downstream market and in the case of sufficiently more heterogeneity of the user preferences compared to the solution with one platform, will therefore generate an increased welfare. The models from Clements (2004) and Church and Gandal (1992) basically show that the welfare maximum, which means whether there should be one platform or two platform standards, are heavily dependent on very specific model assumptions. Fundamentally, however, it is to be noted that a combination, in which one of the platform standards is closed and managed as proprietary, is to be seen as rather critical for the overall welfare, since through this a strong efficiency loss through the monopoly effect on the corresponding market will be triggered, which could also contribute to the displacement of the competing open platform standards.

If one summarises the discussion of the welfare analysis, the trade-off between the so-called static and dynamic efficiency will be essentially clear. One can argue that in a static environment it is fundamentally advantageous from a welfare perspective to decide on one standard. The many dynamic models, which are closer to reality, contrast the static efficiency gain from the immediate decision on one standard with numerous efficiency improvements, which could be gained through maintaining the standardisation competition. One has to then consider the characteristics of the following parameters identified in the preceding analysis in order to undertake a comprehensive qualitative welfare comparison between the immediate settlement on one standard and the prolongation of a standard competition:

- Preference for network effects
- Local network effects
- Heterogeneity of the preferences
- Cost of the development and maintenance of standards
- Uncertainty regarding the technical quality
- Length of the life cycle
- Development potential (incl. converter)
- Uncertainty regarding future user preferences

[13] Fundamentally, one can also look at the situation in the upstream markets. However, we assume here that upstream markets do not play a role in the development of the base standard, because they will develop all components from the respective companies themselves.

3. Qualitative Welfare Comparison

The above-mentioned eight parameters were identified based on the review and the discussion of the theoretical literature on the comparison between the agreement on a standard and the configuration of a standard competition and will now be used for the following welfare analysis. We will limit ourselves to a qualitative welfare analysis, since the description of the various models chosen, often with very restrictive assumptions, only allows for the quantitative determination of the welfare changes by means of individual parameter variations. A model, which integrates all of the defined parameters, cannot, in principle, be designed or solved meaningfully. Therefore, it will be discussed separately in each case how the various characteristics of the eight parameters have a qualitative influence on the total welfare. A general assessment can then be derived from these separate analyses by drawing on the specific case of the ODF and the OpenXML standards and regarding whether, at present, the parallel ISO standards are preferable to the existing situation.

First to be considered is the preference for network effects, which means the significance of other players using a technology, which allows for collaboration or communication. If this preference is more pronounced, then a standard is to be agreed upon in order to achieve an efficient welfare solution. However, this argument can be countered in that the loss of welfare through non-agreement or based on the decision for multiple standards is low if it has to do with a large market with very large numbers of users.

Within the framework of the differentiation of the network effects, the fact must be taken into account in the meantime that a given user would value the usage of the same standard more highly if the other users are more closely known to him than if he did not know the other users. These so-called local network effects have permitted several mobile phone providers with somewhat different technologies to prevail long-term in the mobile phone market, whereas in the presence of only undifferentiated network effects only one competitor would ultimately prevail. Therefore, if there are no local network effects present, it is most efficient from a welfare point of view to have only a single standard. Should we, however, observe local network effects, several standards are by no means detrimental to welfare.

While local network effects present one dimension of heterogeneous user preference, a second dimension of the heterogeneity of the preferences also exists. One must assume that all users do not have identical preferences with respect to technology and thereby the related standards. The

preferences are differentiated on the basis of quality requirements or even on the basis of the desired complexity of the functionality. The larger the range of preferences, the more likely it is that efficiency is created by rather multiple standards, which correspond to the heterogeneous user preferences.

For the last argument, which plays a role in the static consideration, the cost of the development and maintenance of standards is to be mentioned. Should fixed costs be very high, it does not make much sense from a static welfare perspective to develop multiple standards at the same time and to maintain them after their implementation.

The previous parameters are derived from the welfare analyses in a static model framework. Should one expand the welfare analysis to dynamic dimensions or even to uncertainty aspects, then the following parameters are to be taken into consideration. In the static consideration, one basically assumes complete information with respect to the technical properties of the standards observed. This is, however, not the case, especially in the early adoption phase.[13] As a rule, an uncertainty exists regarding the technological quality of the competing standards. The higher the uncertainty, the longer the configuration of a standardisation competition will be sustained. This uncertainty decreases with the duration of the standardisation competition, so that the risk of making a wrong decision is reduced.

The implication of a wrong decision depends on the length of the expected life cycle of a standard. If this is rather short, then the loss of welfare is low. If one assumes a relatively long lasting standard, however, then the chance of loss of welfare by a wrong decision is reduced if one allows parallel standards over a longer period and does not decide on a specific standard.

The further development of the observed standard, which is disregarded in the static model, is important for the dynamic welfare examination. Should one impute the observed standard with a high development potential, the perpetuation of the standardisation competition then generates strong incentives to improve the quality and the functionality of the standards. One should decide on a specific standard immediately only when a significant development potential is represented, since no welfare increase is to be expected through an efficiency improvement, which could compensate the loss of welfare through the existence of a second standard. With respect to the development potential, it should be mentioned that with the perpetuation of the standardisation

[13] In spite of formal competition for the decision regarding the correct standard, even suboptimal decisions can be made, as is shown by the origins of the MP3 standard.

competition, the incentives also increase to develop or to improve possible converters, which ultimately make even a coexistence of multiple standards welfare optimal.

In addition to the further development of the technology on the supply side, one cannot lose sight of the future development of the preferences from the user side. If even more uncertainties about future user preferences are constituted here, then a decision made too early for a specific standard can lead to loss of welfare, because the discrepancy between the quality and functionality offered and demanded can then be significant. Consequently, a risk reduction through the maintenance of a standardisation competition is advisable from a welfare perspective.

The results of the qualitative welfare discussion are summarised in the following table. In the following chapter, the eight parameters are discussed concretely using the example of the OPF vs. OpenXML decision to derive an assessment that encompasses all parameters.

Table 1: Relevant parameters for a welfare analysis, its characteristics and the corresponding welfare efficient solution

Parameter:	Characteristic	Welfare Efficient Solution
Preference for network effect	high	one standard
	low	multiple standards
Local network effect	high	multiple standards
	low	one standard
Heterogeneity of the preferences	high	multiple standards
	low	one standard
Costs of the development and maintenance of the standard	high	one standard
	low	multiple standards
Uncertainty with regard to the technical quality	high	multiple standards
	low	one standard
Length of the life cycle	high	multiple standards
	low	one standard
Development potential (incl. Converter)	high	multiple standards
	low	one standard
Uncertainty regarding future user preferences	high	multiple standards
	low	one standard

4. Qualitative Empirical Examination of the Critical Parameters in the Case of ODF vs. OpenXML

Before we analyse the welfare implications of the current and as yet undecided standardisation competition between ODF and OpenXML on the basis of the eight parameters, we will consider an historical case, in which it has still not been decided which standard is preferred, or rather in which we will observe the coexistence of two parallel standards for an unspecified period of time. This deals with the two mobile phone standards, CDMA (Code Division Multiple Access) and GSM (Global System for Mobile Communications) (Cabral, Kretschmer 2006; Cabral, Salant 2007).[14] While the European countries decided on GSM in a more industrial policy instead of technically motivated standardisation process (Pelkmans 2001), the United States intentionally did not decide on one specific standard so that CDMA only prevailed against the alternatives such as TDMA (Time Division Multiple Access) over the long term. Consequently, Europe initially observed a faster diffusion of mobile telephony and a less problematic mobile calling across borders. In the meantime, a similar diffusion rate has been achieved in the United States and a cross border mobile phoning is also possible across state borders. In addition, the CDMA is the basis for the current mobile phone standard in Europe as well as in the United States. The example makes it clear that the waiving of static efficiency can, for all intent and purposes, be compensated in the long term through dynamic efficiency gains due to technological superiority.

Based on the eight parameters identified in the literature overview, which were a basis for a qualitative welfare analysis in the second phase, in this chapter the available information for ODF and OpenXML standards for the eight parameters will now be determined and assessed accordingly, so that one can determine the respective welfare implications for or against competing parallel standards from this and thereby ultimately come to an overall assessment of the welfare effect of a standardisation competition in comparison to a current decision for the ODF standard.

Fundamentally, the preference for network effect with respect to a comprehensive documentation format is relatively high. However, the loss of welfare through the existence of two at least partially compatible documentation standards due to the almost unending size of the relevant market can be assessed as relatively low.

[14] The VHS – Betamax conflict is of little value for our analysis, since in a relatively short period of time a standard prevailed here. Rather, the development of Apple vs. IBM computers should be looked at.

From the extreme size of this market alone, one can infer the existence of a strong local network effect, since, similar to the mobile telephony, the majority of players, individuals as well as organisations, only exchange documents with a relatively small subset of the entire market. From a welfare theoretical point of view, this strongly pronounced local network effect speaks little for the establishment of a single standard in this entire global market. Rather, the existence of more than one and even several documentation standards can be thoroughly efficient.

In addition to the heterogeneous intensity of the interaction, i.e. the documentation exchange, with the potential users of the documentation format and thereby the existence of local network externalities, both existing standards reflect a clear heterogeneity of user preferences given the intensely different complexity, which is also manifested in the very clearly different documentation range (600 vs. 6,000 pages). From a static efficiency standpoint one thus concludes that only a single standard for a documentation format is not welfare optimal in comparison to two or even more standards.

Ultimately, the cost of the development and maintenance of standards are held as important parameters in the consideration of efficiency. Since both standards exist already, it deals simply with the arising maintenance costs, which are rather negligible for the fundamental decision based on the welfare consideration of one or two standards.

With respect to the dynamic efficiency consideration of the uncertainties mentioned with regard to the technical quality of both competing standards, the extensive promotion and publication by Microsoft, but particularly that of IBM, makes it clear that the question of technological superiority cannot be answered at the current time. Consequently, in view of these large uncertainties, a decision on one of the two standards is impossible and standardisation competition should be kept or even forced.

A further parameter emphasised in the dynamic efficiency analysis is the length of the expected life cycle of the standard considered. Since the subject of the documentation format, in particular, was broached because it deals with the assuring of the long-term access to and the processing of documentations, a relatively long life cycle, similar to that of the mobile phone standard, can be assumed. Consequently, the negative welfare effect of a quick decision for an inferior standard in comparison to the welfare gain generated by the decision for the technically superior standard is relatively high. It is efficient from a dynamic welfare perspective not

to decide on the standardisation competition until later, when the likelihood for a wrong decision drops significantly.

An additional important parameter in the dynamic welfare analysis is the development potential of the competitive standards. The higher this potential is estimated, the more it makes sense from a theoretical welfare perspective not to decide immediately on a standard, rather to maintain the competition and thereby be able to utilise the possible technical advances of both standards significantly due to a delayed decision.[15] The improvements already made to both standards considered and the respective criticism voiced about them is a strong indication that both standards hold further potential for improvement, which can be developed effectively and efficiently through the maintenance of the standardisation competition. In addition, the continuation of the standardisation competition also leads to the efforts, which have already begun, to develop converter solutions and thereby be able to further reduce the incompatibilities, which exist to some extent. With respect to these parameters, all indications speak for maintaining the standardisation competition and to not yet make a decision in order to realise further welfare gains through this.

As the last parameter, the uncertainty of the future user preferences is to be discussed. Although the fundamental preferences are already known, a certain degree of uncertainty still exists, in particular in the public sector, which will be reduced only after a certain experience period with both existing standards. Therefore, nothing speaks against a certain continuation of the standardisation competition from this perspective.

The most important results of the qualitative welfare discussion will be once again summarized in the following table.

[15] The selected standard would certainly also continue to be developed, however a significantly stronger technical enhancement of both standards is created by the competitive drive generated through the standardisation competition.

Table 2: Relevant parameters for a welfare analysis, its characteristics in the OPF vs. OpenXML case and the corresponding welfare efficient solution

Parameter:	Characteristic	Welfare Efficient Solution
Preference for network effect	higher	one standard, but welfare loss relatively low with more than one standard
Local network effect	medium	tends to be more than one standard
Heterogeneity of the preferences	medium high	preference for single applications vs. complex usage and simple vs. sophisticated user
Costs of the development and maintenance of the standard	low	standards already exist
Uncertainty with regard to the technical quality	high	controversy regarding the quality of the standard shows the high uncertainty with regard to the technical quality
Length of the life cycle	high	standards are very likely to have a long lifespan, in particular when they are implemented into the public administration
Development potential (incl. Converter)	high	already further developments of both standards incl. a converter solution
Uncertainty regarding future user preferences	medium	enhancement of user preferences in the private and public sector

If one ultimately summarises the parameter characteristics in the concrete case of competition between the ODF and the OpenXML standard, one can clearly find characteristics in the majority of the parameters, which do not speak for an immediate decision on one of the two standards at

the current time. A weighting of the eight parameters was not, in fact, undertaken, but even if one weighed the preference for network externalities, which ultimately speaks for one single standard, somewhat heavier than the other seven parameters, one can argue from a theoretical welfare viewpoint of the overall assessment against deciding already now on one of the two standards.

Even if the qualitative welfare analysis speaks for the maintenance of the standardisation competition, in the following concluding assessment, specific implementation requirements, which must be fulfilled, will still be addressed, so that the targeted standardisation competition will also lead to the desired positive welfare effects.

5. Summarised Assessment

The results from the qualitative welfare analysis have shown that nothing speaks against a maintenance of the standardisation competition between the existing ISO-ODF standard and the OpenXML standard. Up to now, however, no statement has been made on the actual implementation of an efficient standardisation competition. At this time, the ISO-ODF standard is competing with the OpenXML standard, which has been adopted by the ECMA. One could argue that this form of competition is sufficient in order to be able to achieve the efficiency gain of a standardisation competition. There are already many configurations in which formal standards compete with more or less informal consortia standards. Since the affected document standards are, however, also very heavily implemented in the public sector, the fact that in public procurement currently only the formal standards are referenced and consortia standards are not used as a reference is to be noted. Discussions are ongoing in the European Commission, which is considering an equalisation. However, for the promotion of the standardisation competition and in order to prevent friction between the situations in the public and private sectors, an equalisation as well as an ISO-OpenXML standard should be considered. This path can only be taken, however, if it is assured that necessary rights and technical information for the implementation of the OpenXML standard will be available. If this were not the case, significant welfare losses could occur as a result, since in the downstream markets, which draw on the OpenXML standard, no competition would emerge between the more medium-size oriented companies, but rather a market dominance by Microsoft. However, in the entire welfare analysis, competition in the downstream markets is assumed. Because of the market dominance in the downstream markets based on the OpenXML standard, the competition would ultimately also be affected in the market segment based on the ODF standard. This would result in further welfare losses.

The mentioned requirements regarding the user rights are assured in the case of the OpenXML standard on various levels. Via the standardization within ECMA the OpenXML standards has to be conform to the IPR (Intellectual Property Rights) rules of ECMA. An ISO 29500 (OpenXML) standard has to obey the IPR policy of ISO. Furthermore, Microsoft has committed itself regarding the Intellectual Property Rights to the Open Specification Promis (OSP) (http://www.microsoft.com/interop/osp/default.mspx) as well as to a covenant not to sue (http://office.microsoft.com/en-us/products/HA102134631033.aspx). In addition, Microsoft makes the specification of the historic binary formats available to its partners and competitors via a loyalty free license (http://support.microsoft.com/kb/840817/de). Finally, the collaboration of important competitors, like Novell, in the standardisation process within ECMA as well as the

already realised implementation of the OpenXML standard by competitors confirm that the above made requirements regarding user rights and technical information seem to be fulfilled.

Regarding the (for the implementation of the OpenXML standard required) information the standardisation process within ECMA makes sure that the OpenXML standard is documented very lengthy and detailed compared to its original version. Further improvements will be realised during the various phases of the fast-track procedure within ISO.

Fundamentally, the acceptance of the parallel OpenXML standard as an ISO standard would be an efficient strategy to further integrate formal and consortia standardisation and to hold the standardisation competition under one institutional roof. This strategy allows also to make reference to former consortia standards in public procurement processes and technical regulations. Furthermore, small and medium enterprises can be involved more effectively and efficiently in formal standardization processes than in most standardization consortia. Further, the idea of the standardisation competition within the formal standardisation organisations should be pursued, since the considerations presented made clear that even in the dynamic contexts, significant welfare gains can thereby be realised.

Finally it must be noted that formal standardisation processes should not be misused by competing companies as an instrument of their competition. Technically and economically superior solutions should be chosen in standardisation and the implementation should respect the agreed upon regulations on intellectual property, with the standard being withdrawn in the case of non-compliance. Standardisation solutions should not, however, be rejected because a competition policy problem could potentially occur at a later time. For the solution of these downstream problems, the competition authorities are ultimately responsible and not the standardisation organisations.

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