

Internet Usage in Purchasing Comparison of U.S. and European Practice

Prof. Dr. Sidney Davis

Southern Polytechnic State University, Marietta, USA

Prof. Dr. Rudolf Large

HTW Saarland – University of Applied Sciences, Saarbrücken, Germany

Prof. Dr. Richard Halstead-Nussloch

Southern Polytechnic State University, Marietta, USA

Prof. Dr. Zoltán Kovács

University of Veszprém, Veszprém, Hungary

Saarbrücken

2003

Edited by:

Prof. Dr. Rudolf Large

HTW Saarland – University of Applied Sciences

Department of Business Administration

Waldhausweg 14

D-66123 Saarbrücken

Phone: ++49 681 5867-579

Fax: ++49 681 5867-504

Rudolf.large@htw-saarland.de

http://www.htw-saarland.de/fb-bw/personal/professoren/large/index_html

Summary

The analysis of internet usage in purchasing examined in this paper establishes a quantitative baseline for comparing such behavior in the USA, Germany and Hungary. In some instances these differences are large. In the USA, for example, the internet is used most significantly as a communications media; in Germany as a way of gathering information used in the purchasing process; and in Hungary for data interchange. Generally internet usage in the three countries is similar. Nevertheless, the data shows that there are significant differences between countries in the frequency of e-commerce usage. There are some internet users that can be classified as minimal users as well as those that can be classified as price searchers or communicators.

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Keywords

Internet, world wide web, purchasing, supply management

1 Purpose and Research Objectives

There is wide recognition that Internet usage is one of the most important new developments in purchasing and supply management. The impact of this technology was highlighted in a recent article that noted Business-to Business e-commerce sales are expected to reach \$2.7 trillion by 2004.¹ Dale Neef in a recent book on e-procurement noted "B2B commerce will fundamentally restructure the way in which an organization purchases goods resulting in significant process efficiencies and permanently lower costs".² Clearly, the Internet offers new opportunities for easy and frequent communication between suppliers and their customers.

However, much current popular supply chain literature focuses on how to use the Internet as a purchasing mode. From a research perspective however, a more critical question is the nature of the communication issues that can be handled more successfully via the Internet versus traditional mode.³ Media richness theory leads us to the view that Internet communication would be commonly restricted to communications with a low degree of equivocality such as routine transactional issues because the level of complexity imbedded in the written communication mode is low.⁴ A recent study investigating how well information systems supported the supply chain found limited impact of the Internet on the way firms currently communicate within the supply chain.⁵

On the other hand there is some research available comparing the usage of traditional modes and the internet-based mode in purchasing. One such study is the survey of Boyle and Alwitt,⁶ which showed that communications based on Internet technologies center on information gathering, whereas traditional modes are used for transactional tasks. This was followed by an investigation of communication behavior in Canada that found that only 2.0% of strategic and 2.9% of the tactical communications were conducted by e-mail.⁷ Face-to-face meetings and telephone were strongly preferred for strategic communication.

The pace of Internet purchasing, while relatively small compared to the total annual volume of B2B buying, has increased significantly in the last several years. One of the Institute for Supply Management's (ISM) latest reports on "eBusiness" reported that "during the second quarter of 2002, purchasers increased their use the Internet...with respondents reporting purchasing 10.0% of their indirect materials and 6.6% of their direct materials over the Internet."⁸ It is important to note that survey respondents were limited to domestic U.S. firms so that no international comparisons

¹ Deeter-Schmelz, Bizzari, Graham, and Howdyshehl (2001).

² Neef (2001).

³ Daft, Lengel and Tevino (1987).

⁴ Daft and Lengel (1986), D'Ambra, Rice and O' Connor (1998), Suh (1999).

⁵ Edwards, Peters, and Sharman (2001).

⁶ Boyle and Alwitt (1999).

⁷ Larson and Kulchitsky (2000).

⁸ Institute for Supply Management and Forrester Research (2002).

were developed. In addition to the ISM/Forrester study, research by Ginter and Lalonde also showed similar results.⁹ They found that approximately 4% of company orders in 1999 were placed using the Internet compared to 10% in 2000.

While these studies provide insight into domestic (United States) Internet and other mode usage in purchasing, the scientific knowledge of mode selection and Internet usage in Germany and other European countries is limited. In a recent Dutch study, van Weele, Claessen and Lakemond showed that only 9.3% of the companies have experiences in using e-auctions, 5.8% have experience with electronic market places and 15.1% with e-procurement systems.¹⁰ There is a widely held view that the U.S. behavior presages Europe's Internet usage in the future, although international differences in mode usage have largely been ignored in research. It is to address this research gap that this survey of U.S. German and Hungarian practice in internet-usage and supplier communications was conducted. Hungary was selected as an example of the transition economies of Central and Eastern Europe. Germany was included as an example of a technically advanced European economy.

This study has four major research objectives related to comparing multi-country firm purchasing behavior.¹¹ These are:

- Comparing internet usage with the use of traditional mode.
- Identifying independent factors that determine level of internet-usage.
- Identification of internet-user-types actively purchasing for B2B.
- Identification of organizational characteristics of firms actively using the internet for B2B purchasing.

2 Data Collection

Since the main focus of this paper is to conduct a comparative study, identical instruments were used in each of the three countries surveyed. These instruments were constructed along the lines suggested in the previously cited paper by Boyle and Alwitt dealing with internet usage in the plastics industry.¹² Their 5-point scale of frequency (1 = never, 5 = very often) of internet usage was adopted with a slight modification.

Also, because this research is exploratory in nature, factor and cluster analysis was used to assist in classifying variables by detecting structural relationships between them. Standard ANOVA techniques using SPSS 10.0 was employed to evaluate the impact of nationality on mode usage.

In the United States, 300 individuals, selected randomly from the membership of the Institute for Supply Management, were mailed survey questionnaires. A total of 37

⁹ Ginter and Lalonde (2001).

¹⁰ van Weele, Claessen and Lakemond (2003).

¹¹ Large, Kovács, Davis, and Halstead-Nussloch (2002), Large, Kovács, Davis, and Halstead-Nussloch (2003).

¹² Boyle and Alwitt (1999)

completed instruments were returned. Two cases were excluded because incomplete data, giving a U.S. response rate of 11.6%. In Germany the same questionnaire (written in German) was distributed to 325 members of regional working groups associated with the Bundesverband Materialwirtschaft Einkauf und Logistik (Germany's primary national association dealing with supply management issues). A total 115 respondents returned filled questionnaires. As a consequence of initial review and quality checking, 3 cases were excluded. Instrument response rate for the German portion of this study was 34.5%. A similar pattern ensued in Hungary with the same instrument (written in Hungarian) distributed to 350 purchasing managers whose names were selected from a University of Veszprém mailing list and a membership list of the Hungarian Logistics Association. 120 respondents returned completed questionnaires. Quality checking resulted in the dropping of 5 cases, giving a response rate of 32.9%. The total sample consisted of 262 cases with an overall response rate of 26.9%.

Respondents were asked to identify the industry sector in which they were employed. The overwhelming share of them reported that they were associated with a manufacturing operation. This was fairly consistent regardless of nationality. Table 1 displays a complete profile of this respondent characteristic. Association with the service sector was a distant second followed closely by public sector activities and then by trade.

Industry Sector	U.S. %	Germany %	Hungary %	Total %
Manufacturing	67.6%	84.7%	50.5%	67.6%
Trade	8.8%	1.8%	10.8%	6.6%
Service	11.8%	10.8%	28.8%	18.8%
Public	11.8%	2.7%	9.9%	7.0%
Total	100.0%	100.0%	100.0%	100.0%

Table 1: Respondents by industry sector.

Respondents were also asked to provide an indication of organizational size (Table 2). Rather than inquire as to annual sales volume, data that is often considered confidential, especially in closely held firms, they were asked to provide information about organizational size by number of employees. Respondents are less well matched based on this dimension. Respondents employed by organizations of less than 100 persons represent 38.1 percent of those interviewed in Hungary, compared to 17.9 percent in Germany and 11.8 percent in the United States. Such differences, particularly in Hungary, reflect the industrial structure of that country which is of small size with very few industries employing more than 5,000 persons.

Number of Employees	U.S. %	Germany %	Hungary %	Total %
<100	11,8%	17.9%	38.1%	25.9%
100 - 999	41.2%	39.3%	40.7%	40.2%
1.000 - 4.999	26.5%	25.0%	16.8%	21.6%
5.000 - 10.000	8.8%	5.4%	0.9%	3.9%
> 10.000	11.8%	12.5%	3.5%	8.5%
Total	100.0%	100.0%	100.0%	100.0%

Table 2: Size of respondent's firm by number of employees.

It is interesting to note in Table 3 that there appears to be significant differences in the job responsibilities identified by respondents when stratified by country. In the U.S., for example, almost 83 percent identified themselves as either managers or staff compared to about 53 percent in Germany and 77 percent in Hungary. The difference is even more pronounced when the respondent group is limited to just staff. While it is possible that this result reflects how interview instruments were distributed, it is plausible that it may be more acceptable in the U.S. for managers and staff members to complete such questionnaires compared to Germany or Hungary, where more precisely defined responsibilities require that higher levels of management complete external queries like survey research.

Level of Organizational Responsibility by Job Title	U.S. %	Germany %	Hungary %	Total %
Corporate Officer	0,0%	5.4%	13.4%	8.2%
Director	17.2%	41.1%	9.8%	24.3%
Manager	37.1%	21.4%	48.2%	35.1%
Staff	45.7%	32.1%	28.6%	32.4%
Total	100.0%	100.0%	100.0%	100.0%

Table 3: Respondent level of organizational responsibility.

The organizations represented in the respondent pool show significant differences based on the types of products purchased (Table 4). Organizations in the U.S., for example, are much more likely acquire products specifically manufactured to buyer specification when compared to either Germany or Hungary. On the other hand, purchasing departments in Germany are much more likely to order products manufactured by a supplier according to joint engineering (relation-specific goods).

Product Type	U.S. %	Germany %	Hungary %	Total %
Raw Materials/Standard Parts	21.9%	25.5%	40.8%	31.5%
Supplier Catalog Items	31.3%	16.0%	23.3%	21.2%
Products manufactured according to engineering drawings/specs of buyer (buyer-specific goods)	43.8%	35.8%	31.1%	34.9%
Products manufactured by supplier according to joint engineering (relation-specific goods)	3.1%	22.6%	4.9%	12.4%
Total	100.0%	100.0%	100.0%	100.0%

Table 4: Respondents by type of product purchased.

3 Results

3.1 Communication Mode Used in Purchasing

One of the first survey questions posed dealt with the communication mode respondents used in carrying out their purchasing tasks. Their responses are displayed in both Figure 1 and Table 5. Figure 1 presents a graphic depiction of national differences in mode choices being made. Responses were based on a five-point frequency scale (1 = never, 5 = very often).

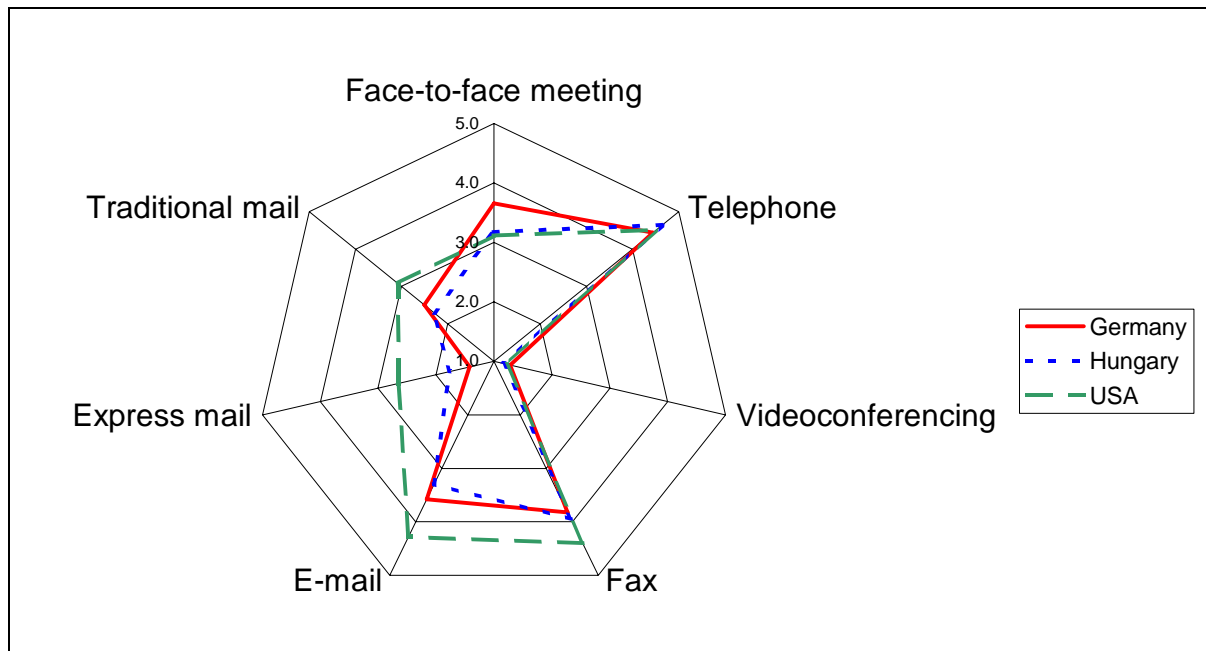


Figure 1: Cobweb graph of mean value of responses to question on communication mode used in purchasing.

Communication Mode	U.S. Mean	Germany Mean	Hungary Mean	Total Mean	Significance
Face-to-face meeting	3.1	3.7	3.2	3.4	0.000
Telephone	4.5	4.4	4.6	4.5	0.076
Videoconferencing	1.2	1.3	1.2	1.2	0.445
Fax	4.4	3.8	3.9	4.0	0.013
E-mail	4.3	3.6	3.3	3.6	0.000
Express mail	2.6	1.4	1.8	1.7	0.000
Traditional mail	3.1	2.5	2.3	2.5	0.001

Table 5: Mean value of responses to question on communication mode used in purchasing.

Our not so surprising findings indicate that the most frequently used communication mode in purchasing is still by telephone phone followed by fax. Germans tend to use face-to-face meetings significantly more frequently than their counterparts higher in the U.S. or Hungary. The use of electronic mail has now surpassed the use of more traditional "snail-mail" and express mail methods of communication.

To provide further insight into reasons respondents gave for mode selection, we used a catalog of ten communication related purchasing tasks developed by Boyle and Alwitt to show differences in mode usage.¹³ Face-to-face meetings were mainly held to resolve conflicts related to purchasing assignments. Germans also used such meetings to gain general product/purchasing information. Hungarians used face-to-face meetings with relatively greater frequency to place orders. In general, fax is the most frequently used mode for placing orders and to request price quotations. Germans use the mode fax more frequently to check inventory status and send product specifications.

3.2 Internet Utilization

3.2.1 Purchasing Issues Addressed Via Internet Utilization

Internet utilization to support purchasing activities has been significant in all three countries that are part of the survey research undertaken. This penetration amounted to 94.3%, 85.7% and 81.7% in the U.S., Germany and Hungary respectively. More important however, is the way this technology is being used to manage purchasing responsibilities within organizations. This study utilizes a 10 item list of purchasing tasks devised for the investigation carried out by Boyle and Alwitt.¹⁴ These items appear in Table 6. Table 6 also contains a comparison of respondent usage frequencies along with values reported in the Boyle and Alwitt study that focused exclusively on the plastics industry in the U.S.

¹³ Boyle and Alwitt (1999).

¹⁴ Boyle and Alwitt (1999).

Communication Issue	U.S.	Germany	Hungary	Total	p	Boyle/ Alwitt
Gain General Information	3.79	3.89	3.95	3.90	0.690	3.26
See Catalog of Products	3.13	3.63	3.10	3.33	0.010	3.06
Receive Technical Advice	3.24	2.98	2.93	3.00	0.438	3.32
Request Price Quotations	2.61	2.73	2.87	2.77	0.536	2.46
Send Product Specifications	2.48	2.47	2.68	2.56	0.510	2.61
Check Inventory Status	2.55	2.31	2.04	2.24	0.116	2.26
Resolve Problems/Conflicts	2.24	2.23	2.63	2.39	0.083	2.10
Check Order/Shipping Status	3.00	2.22	2.19	2.32	0.006	2.17
Place an Order	2.52	1.98	2.40	2.24	0.034	2.00
Submit Bid Requests	2.06	1.94	2.92	2.36	0.000	1.96

Table 6: Purchasing task purpose addressed via internet.

Survey results are relatively the same as those found in the Boyle and Alwitt study. Gaining general information appears to be the most frequently used purchasing purpose associated with internet use. This was consistent in all three countries that are part of this investigation. This is followed closely by purchaser's examination of product catalogs, receiving technical advice, and requesting price quotations. It is interesting to note the similarity between the U.S., Germany and Hungary in respondents' assessment of the frequency with which the internet is used to address purchasing tasks. The final steps in the purchasing process, that of placing orders and the submission of bids, appear to be the least amenable, for the moment, for management via the internet. These results are also consistent with work done by Bogaschewsky and Kracke.¹⁵ Their assessment based on interviews with 52 procurement managers that the internet is being used primarily as means of identifying suppliers of need products or services along with gathering information on new products or services that are available.

Table 6 also contains the result of a between country analysis of variance test for each of the communication tasks identified. German procurement managers appear to use the internet much more frequently than either their U.S. or Hungarian counterparts in order to see catalogs of products. U.S. purchasing managers use the internet to check order or shipping status with significantly greater frequency than either the Germans or Hungarians. While of least importance use among the 10 purchasing tasks, the Hungarian purchasing managers interviewed used the internet with relatively greater frequency than either managers in the U.S. or Germany to submit bid requests.

¹⁵ Bogaschewsky and Kracke (1999).

3.2.2 Utilization of Internet Technologies

The most frequently used technical capacity of the internet is for receiving and sending e-mail messages. There is also no statistical difference in the extent to which this technical capacity differs by country. Respondents in each country also reported frequent web browsing and utilization of web search engines. In both these instances, however, there were statistically different usage rates with respondents in the U.S. having the highest usage frequencies (Table 7).

Internet Technology	USA	Germany	Hungary	Total	p
Receiving E-mail	4.82	4.45	4.53	4.54	0.108
Sending E-mail	4.73	4.42	4.50	4.50	0.252
Web Browsing	4.41	3.84	3.65	3.84	0.001
Search Engines	4.39	3.84	3.54	3.80	0.001
Virtual Markets	2.36	2.47	1.98	2.25	0.018
Newsgroup Participation	2.55	2.06	2.05	2.13	0.116
Virtual bidding Systems	1.53	1.68	1.99	1.79	0.040
FTP Use	1.55	1.43	1.77	1.59	0.077
Chat Facilities	1.31	1.32	1.51	1.40	0.246
Telnet	1.39	1.15	1.44	1.31	0.036
Videoconferencing	1.39	1.19	1.17	1.21	0.158

Table 7: Internet technologies used in purchasing.

There is a large drop-off in usage rates after the "big four" (sending/receiving e-mail, web browsing and search engine utilization). Using the internet's capacity for virtual markets, for example, had a score of 2.36 in the U.S. Crudely interpreted, this would be perhaps no more than 2 times a year. The use of such capacities as virtual bidding systems, telnet and videoconferencing are infrequently if ever used.

3.3 Use of Factor Analysis in Determining Internet Usage

3.3.1 Identification of Significant Factors

Identifying factors that comprehensively and efficiently address internet utilization behavior is based on the use of 21 work and service related indicators. The first 10 indicators contained in the interview instrument asked that the respondent identify ways in which the Internet was used for purposes of communication. Examples include "Place an order" and "Receive technical advice". The last set of 11 indicators deal with the frequency with which specific Internet technologies and services were used to assist the respondents at their workplace. These services include the use of tools such as "Sending e-mail" and "Participating in newsgroups". A full listing of all 21 items are displayed in Table 8.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Check order/shipping status by internet	0.812	0.149	0.020	-0.045	0.200	-0.029
Resolve problems/conflicts by internet	0.810	0.118	0.038	-0.077	-0.036	0.024
Check inventory status by internet	0.803	0.002	0.138	0.121	0.253	0.005
Send product specifications by internet	0.687	-0.039	0.212	0.254	-0.033	0.154
Receive technical advice by internet	0.599	-0.001	-0.008	0.347	-0.003	0.195
Place an order by internet	0.586	0.122	0.380	0.068	0.067	0.248
Request price quotations by internet	0.571	-0.013	0.584	0.162	-0.093	0.128
Receiving e-mail	0.116	0.947	0.072	0.081	-0.014	0.065
Sending e-mail	0.111	0.943	0.069	0.091	-0.018	0.072
Submit bid requests by internet	0.475	0.069	0.645	0.054	-0.204	0.217
Using virtual bidding systems	0.113	-0.012	0.640	0.167	0.276	0.289
Using virtual markets	0.049	0.001	0.633	0.459	0.312	-0.021
Participating in newsgroups	0.044	0.202	0.593	0.035	0.265	-0.032
See catalog of products by internet	0.102	-0.099	0.196	0.765	-0.025	-0.015
Gain general information by internet	0.284	0.169	0.047	0.661	-0.147	0.211
Browse around web pages	-0.055	0.475	0.096	0.626	0.322	0.061
Using search engines	0.053	0.425	0.131	0.590	0.324	0.001
Using Chat	0.054	0.020	0.075	0.073	0.722	0.174
Using videoconferencing	0.130	0.000	0.207	-0.007	0.698	0.035
Using telnet	0.170	-0.055	0.071	0.050	0.167	0.793
Using FTP	0.078	0.195	0.154	0.074	0.054	0.768

Table 8: Determination of principal components using factor analysis.

Factor Identification	Eigenvalue	% Variance	Cummulative % Variance	Factor Interpretation
Factor1	6.091	29.01	29.01	E-commerce
Factor2	2.493	11.87	40.88	E-mail-Communication
Factor3	1.866	8.89	49.76	Price Search
Factor4	1.365	6.50	56.26	Information Search
Factor5	1.209	5.76	62.02	Feedback-communication
Factor6	1.038	4.94	66.97	Data Interchange

Table 9: Interpretation of identified factors.

Associated with each indicator is a 5-point frequency scale. While the use of these indicators does capture the phenomena of internet utilization, some of them describe overlapping behavior. As a consequence of these overlaps, factor analysis was used to extract a more manageable set of vectors that underlay the data collected on respondent internet utilization behavior. Using the Principal Component Extraction

method along with varimax rotation resulted in defining 6 principal factors (Table 8) such that 67% of the variance can be explained (Table 9).

The interpretation of each of the factors can be established by examining and sorting each of them on the basis of factor loadings size using factor loads of 0.50 or larger as the grouping criteria. Factor 1, for example, can be interpreted as encompassing an e-commerce function. Factor 2 clearly deals with e-mail communication while factor 3 reflects price searching behavior. Respondent information gathering functions are encompassed by factor 4. Using chat rooms and videoconferencing reflect synchronous interaction between the respondents and other persons such as suppliers and customers. Thinking of these activities as feedback communication activities helps us characterize factor 5. Factor 6 loadings reflect the use of telnet and FTP functions and identifies respondent data interchange activities. Table 9 summarizes both the interpretation given to each of the factors as well as the share of total variance explained by each of them. In summary, these results successfully describe respondent's behavior with respect to internet utilization.

3.3.2 Influence of Nationality on Internet Usage Factors

A surprising result emerges when stratifying the identified internet usage factors by country (see Table 10). There is the expectation that the data would show that there would be significant differences in e-commerce utilization between countries. That is not the case. The factor proxy for such usage is very near zero, with the largest frequency occurring in Hungary.¹⁶

	Germany	Hungary	USA	Significance
E-commerce	-0.047	0.045	0.006	0.846
E-mail-communication	-0.181	-0.018	0.598	0.002
Price search	-0.086	0.169	-0.248	0.101
Information search	0.229	-0.212	-0.050	0.018
Feedback-communication	0.063	-0.187	0.373	0.031
Data interchange	-0.282	0.401	-0.356	0.000

Table 10: Impact of stratification by country on internet usage factors using ANOVA.

The use of e-mail communication in facilitating purchasing is far greater (and statistically different) in the USA than either Germany or Hungary. This confirms the data presented earlier in Table 5 that compares communication media use frequencies in facilitating purchasing. Significant differences also appear in the information search, feedback-communication and data interchange factors.

¹⁶ Since SPSS calculates standardized factor scores the mean value for each factor in the sample is zero. Negative values indicate a lower frequency of usage when compared to the total group.

3.4 User Types Based on Cluster Analysis

Using country stratification associated with internet usage factors provides import insight into procurement manager behavioral differences as they go about fulfilling their job responsibilities.

It is also possible that, irrespective of country, that a typology of internet user types can be identified. The supposition is that procurement managers use the internet in significantly different ways and for significantly different purposes. Cluster analysis was used to determine if, indeed, this a priori assumption is reasonable.

The factors identified in the previous section, excluding feedback communication and the data interchange, were used in this analysis. The excluded factors were omitted because of low response variance (from the minimal value of 1) that could lead to significant distortions in cluster analysis results. The quality of the analysis can also be substantially influenced by outlying data points. Therefore a single linkage procedure was used to check the data for outliers. This procedure identified no such outlying data points. While this study is based on a sample size 262 cases, there were both missing values for some questions as well as respondents who did not use the internet at all. Because of these omissions, a total 189 cases were used to calculate factor scores.

Standard analytic procedures pointed to use of four clusters. Table 11 displays the results of the four cluster solution. Only two of the F values exceed the value of 1. Based on these results it is possible to say that there is within group homogeneity.

	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
	F-Value	t-Value	F-Value	t-Value	F-Value	t-Value	F-Value	t-Value
E-commerce	0.320	-0.478	0.441	-0.707	0.555	-0.191	0.614	0.958
E-mail	0.731	-2.145	0.237	0.470	0.127	0.283	0.378	0.189
Price Searching	0.614	-0.095	0.412	-0.588	0.415	1.096	0.897	-0.215
Information Searching	1.003	-0.153	0.916	0.278	0.385	0.464	1.043	-0.525

Table 11: Identification of internet user types using cluster analysis.

The use of t-Values help in providing an interpretation of user types associated with each cluster. Positive t-values indicate that a variable in the group in comparison with the total sample is over-represented. For example, survey respondents who carry out e-commerce activities predominate in cluster 4. For classification purposes we can therefore identify respondents in cluster 4 as e-commerce types. On the other hand, respondents who communicate frequently via e-mail and use the internet for information searching appear to be less likely to make purchases using the internet. For purposes of classification, these respondents can be termed communicator types (cluster 2). While communication plays a role in the third cluster, the dominant factor is price searching behavior. These respondents can be termed price searchers (cluster 3). This type of purchaser performs price comparisons on the web but uses traditional media to place the order. Respondents that fall into cluster 1, as evidenced

by the consistently negative t-values for all internet user types, make infrequent use of the internet for any purpose. These respondents can be termed minimal users. Table 12 summarizes the classification of respondents based on the clusters that have been identified.

Cluster	Internet User Type	Respondents n = 189	Frequency
1	Minimal User	24	12,7%
2	Communicator	57	30,2%
3	Price Searcher	45	23,8%
4	E-commerce User	63	33,3%

Table 12: Frequency of internet user types.

Table 13 displays a cross-tabulation of respondents by user type and country. Both actual and expected number of respondents are presented in each cell. Based on the results of a Chi-square test, between country differences exist at the 10 percent level of significance.

		U.S.	Germany	Hungary	Total
Minimal User	Number Identified	1	12	11	24
	Expected Number	3.4	10.3	10.3	24.0
	% of User Type	4.2%	50.0%	45.8%	100.0%
	% of Country Total	3.7%	14.8%	13.6%	12.7%
Communicator	Number Identified	13	28	16	57
	Expected Number	8.1	24.4	24.4	57.0
	% of User Type	22.8%	49.1%	28.1%	100.0%
	% of Country Total	48.1%	34.6%	19.8%	30.2%
Price Searcher	Number Identified	4	20	21	45
	Expected Number	6.4	19.3	19.3	45.0
	% of User Type	8.9%	44.4%	46.7%	100.0%
	% of Country Total	14.8%	24.7%	25.9%	23.8%
E-commerce User	Number Identified	9	21	33	63
	Expected Number	9.0	27.0	27.0	63.0
	% of User Type	14.3%	33.3%	52.4%	100.0%
	% of Country Total	33.3%	25.9%	40.7%	33.3%
Total	Number Identified	27	81	81	189
	Expected Number	27.0	81.0	81.0	189.0
	% of User Type	14.3%	42.9%	42.9%	100.0%
	% of Country Total	100.0%	100.0%	100.0%	100.0%

Table 13: Frequency distribution of user types by country comparison.

Some of the between country differences are easily recognized by examining the cross tabulated data. There are also some interesting differences between the actual and expected values associated with each country for each user type. Respondents classified as Communicators have higher than expected representation in both Germany and the USA. In Hungary, on the other hand, has a higher than expected number of respondents classified as e-commerce users. The same is true for Germany where about 26 percent of the respondents are expected to be in this user group. Survey results indicate that about one-third of the respondents can be classified as e-commerce users. Minimal user types are found in significantly higher proportions than expected in both Germany and Hungary. While actual and expected values for American respondents are close in value, the small number of total U.S. respondents indicates that this result should be used with caution.

4 Conclusion

The analysis of internet usage in purchasing examined in this paper establishes a quantitative baseline for comparing such behavior in the USA, Germany and Hungary. In some instances these differences are large. In the USA, for example, the internet is used most significantly as a communications media; in Germany as a way of gathering information used in the purchasing process; and in Hungary for data interchange. The data suggests that e-commerce internet uses are used most frequently in Hungary, although no statistically significant between country differences could be established.

There are some internet users that can be classified as minimal users as well as those that can be classified as price searchers or communicators. Within the price searcher group are internet users that complete actual orders by more traditional means. These results affirm the work of Kersten who see the internet as important in the procurement preparation phase of purchasing.¹⁷

Generally internet usage in the three countries is similar. Nevertheless, the data shows that there are significant differences between countries in the frequency of e-commerce usage. In Germany, for example, about 26 percent of country respondents could be classified as a e-commerce user while based on the total sample it was expected that about 1/3rd would so classified. If this user type is the prevailing one in the future, then German firms need to embrace such usage in a more significant way. Based on the data used, it is clear that only a portion of procurement managers in Germany use the potential of the internet as fully as is possible. In the USA about 1/3rd of that country's respondents are classified as e-commerce users.

Additional research should shed light on this particular issue. Such research will include more extensive measuring models and the inclusion of other European countries. It will be interesting to understand the causes of the positive developments taking place in Hungary with respect to e-commerce usage and comparatively

¹⁷ Kersten (2001).

frequent occurrence of the minimal user, communication user and price searcher user types in Germany.

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