Using Neural Networks to Assess Corporate Image

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ABSTRACT

The purpose of this research is to present a new approach for quantifying corporate image. In this case, CATPAC, a neural network content analysis computer program, is employed to quantify Visa's corporate communications in the form of press releases, annual reports and Internet information. Unlike traditional image research, this study has identified actual corporate communications to be the measured variable. Based on the computer analysis of the most salient symbols, two major areas of content emerged: 1) a product development area and, 2) a state of the business area. These results suggests that Visa is currently conveying two specific corporate images. The first image attempts to identify Visa as a "state of the art" banking product and service provider while the second identifies Visa as the worlds largest banking services provider. The present research has illustrated how neural network analysis may provide image conscious organizations with timely, cost effective image assessments. Neural network analysis has also been shown to improve the reliability and validity of traditional content analysis techniques. Therefore, utilizing neural networks to assess all forms corporate communications provides public relations professionals with a powerful new tool to measure and control corporate image.

INTRODUCTION

Today many organizations are aware of the benefits of developing and maintaining a successful corporate image. According to Gregory (1991), a company's image is highly critical to sales because it's tied in directly to how comfortable customers feel about buying and using a product or service. Just as politicians must rely upon public communication to create reinforce and redefine their personal images, so must organizations use public communication to create or redefine images about their products or services (Goldhaber, 1993).

Gregory (1991), suggests that organizations are affected by their images. For advertising and marketing professionals, corporate image is directly tied to the sale of the organization's product (Moffitt, 1994). Therefore, it is of great value for organizations to know as much about their image as possible from as many publics as they deem important to the well being of their company.

Public image appears to have become the primary target of many large organizations, rather than the by-product of striving for other organizational goals (Danowski, Barnett & Friedland, 1987). Media management and strategic public relations have therefore become the focal point for many image conscious corporations.

Finn (1962) identified the first appearance of the term image within the public relations field in a 1955 article in the *Harvard Business Review*. Soon after this initial citation, the phrase "corporate image" exploded into the fields of both public relations and advertising (Flanagan, 1967). During these early years of image exploration, Bristol-Myers defined image as the picture which an organization creates in the mind of its publics (Bristol, 1960). While many more complex definitions of image exist, no formal theory of image formation has been accepted as communication scientists rely on descriptive definitions of corporate image (Grunig, 1993).

According to Avenarius (1993), communications theorists address image with three preconceived ideas. First, images are considered cognitive constructs that can be developed and changed over time. The second is that an image can be changed by exerting undue influence, which may lead to a domination of certain publics. The third idea is that the most scientific approach to understanding the image phenomenon is perceptual psychology. Avenarius goes on to

suggest that image constructs are directly related to knowledge, attitudes, schemata, stereotypes or anything that occurs with in the human brain. Avenarius (1993) also notes that Haberman and Dolphin (1988) defined image as the product of messages: "Image is the reproduction of the thoughts or feelings of the sender" (p. 15).

Several methods have been proposed for image measurement, including semantic differential ratings (McDougal & Fry, 1974-1975), discriminant analysis (Ring, 1979) and multidimensional scaling (Doyle & Fenwick, 1974-1975). Typically, these methods suggests using the consumer as the unit of analysis as individual perceptions become the empirically measured variable.

According to Horowitz (1970), an image includes memory fragments, reconstructions, reinterpretations, and symbols that stand for feelings and ideas. Thus, images are multidimensional constructs containing cognitive elements (Haedrich, 1993). Since images are cognitive in nature (Bristol, 1960; Danowski, Barnett & Friedland, 1987; Grunig et al., 1985; Haedrich, 1993; Haberman & Dolphin, 1988; Horowitz, 1970; Woelfel, 1991), it makes sense to analyze corporate image with in terms of neural network construction.

The purpose of this research is to present a new approach for quantifying corporate image. In this case, neural network content analysis techniques are employed to quantify corporate communications in the form of press releases, annual reports and Internet information. Unlike traditional image research, this study has identified actual corporate communications to be the measured variable.

Content Analysis

"Content analysis is a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (Berelson, 1952, p. 5). More recently, Krippendorff (1980) defined content analysis as a formal procedure for classifying the qualitative information contained in written and oral materials. While numerous definitions of content analysis exist, researchers seem to agree upon three distinguishing characteristics necessary of any content analysis: objectivity, systematization, and quantification (Kassarjian, 1977).

Content analysis is a multi-step process that requires developing categories for coding thematic content, training coders, coding the material of interest, and statistically analyzing the resultant data. The procedure yields data in a form tractable to quantitative manipulation. Berelson (1952) requires content analysis to maintain, "two kinds of consistency: 1) consistency among analysts - that is, different coders should produce the same results when they apply the same set of categories to the same content; and 2) consistency through time - that is, a single coder or a group of coders should produce the same results when they apply the same set of categories to the same content but at different times" (p. 18). Instead of observing people's behavior directly, asking them to respond to scales or interviewing them, the investigator takes communication that people have produced in the form of newspapers, books and advertisements and asks questions of the communications (Kerlinger, 1986). In this way, content analysis attempts to observe and measure variables.

Neural Networks

Kolbe & Burnett's (1991) empirical review of 128 published content analysis studies identified a general need for improvement in the application of content analysis methods. Kassarjian's (1977) critical guidelines for content analysis research were used to examine each of the 128 content analysis studies.

According to Kassarjian (1977), content analysis must be objective, systematic, and quantitative. The requirement of objectivity stipulates that the categories of analysis be defined so precisely that different analysts may apply them to the same body of content and secure the same results (Berelson, 1952). Objectivity gives scientific standing to content analysis and differentiates it from literary criticism (Kassarjian, 1977).

Systematization requires content analysis to: (1) eliminate biased selections of classification categories to suite the analysts thesis; and (2) examine scientific problems or hypotheses (Berelson; 1952 and Holsti, 1969). This requirements is intended to eliminate any biased analysis in which only those elements in the content applicable to the analyst's thesis are selected (Kassarjian, 1977).

Quantification refers to the process by which qualitative data is transformed into a form amenable to statistical methods (Kassarjian, 1977). This process distinguishes content analysis from a mere critical reading of the text.

CATPAC, a self-organizing Artificial Neural network computer program developed by Joseph Woelfel and Terra Research and Computing (1991), satisfies Kassarjian's critical requirements for content analysis by providing both a complete neural network of the interrelationships among the words of a text and a cluster analysis of the identified words. In this way the text can be precisely interpreted.

CATPAC systematically follows a set of research procedures as part of its content analysis feature, therefore satisfying the objectivity concerns associated with content analysis. Since CATPAC is a computer based neural network analysis program, quantitative analysis may by conducted without any preconceived notions or bias from the researcher. By applying the same research techniques to each analysis, CATPAC satisfies the systematization requirement. CATPAC also satisfies the quantification requirement by providing the researcher with a statistical, neurological, interpretation of the text to include word frequencies and hierarchical cluster analysis.

A neural network consists of neurons, each which may be connected to many other neurons. Similar to the human brain, neural networks contain billions of neurons, each connected to thousands of other neurons. When a neuron is stimulated, it becomes "activated," and sends signals to all the other neurons to which it is connected (Woelfel, 1991).

Neural networks learn by connecting together the neurons which represent any particular pattern. Thus, when a network sees part of a pattern, it can recall the rest of the pattern, even in spite of incomplete or erroneous information, as long as enough of the pattern is there to activate the rest (Woelfel, 1991).

Contingency theory suggests that when two or more neurons are simultaneously active, the connection between them is strengthened. CATPAC's neural network application operates according to this theoretical assumption. Neural network analysis is therefore a method of investigation whereby the association structure in a message source is tested by the content contingencies.

According to Krippendorff (1980), "Contingency analysis aims to infer the network of a source's associations from the pattern of co-occurences of symbols in messages. It presumes that symbols, concepts, or ideas that are closely associated conceptually will be also closely related statistically" (p.114). Contingency analysis counts the frequency of the occurrences of the key terms, however, "Contingency analysis asks how often a given symbolic form appears in conjunction with other symbolic units" (Pool, 1959).

Budd, Thorp and Donohew (1967) suggest that contingency analysis could be a useful procedure for analyzing propaganda, signed editorials, or letters to the editor. Osgood (1957) states, "If there is any content analysis technique which has a defensible psychological rationale it is the contingency method" (p. 55). Contingency theory and neural network analysis should therefore be useful for the analysis of external corporate communications and image identification.

CATPAC

Based on contingency theory, CATPAC identifies the most important words in a body of text and determines their patterns of similarity based on their associations in the text. CATPAC accomplishes this by first assigning a neuron to each major word in the text. Next, it runs a scanning window through the text. The neuron representing a word becomes active when that word appears in the window, and remains active as long as that word remains in that window. Up to *N* words can be in the window at once, where *N* is a parameter set by the user.

As in the human brain, connections between neurons that are simultaneously active are strengthened following the law of classical conditioning (Woelfel, 1991). The patterns of weights or connections among neurons forms a specific representation within CATPAC of the associations among the words in the text. These neurological representations may be modified by changing CATPAC's default parameters which include neurological clamping, threshold, decay rate, and learning rate. This pattern of weights represents complete information about the similarities among all words in the text.

Technically, the pattern of connections between neurons is a complete paired comparison similarities matrix, and so lends itself to the most powerful and sophisticated

statistical analysis (Woelfel, 1991). Among these is the diameter method and cluster analysis automatically performed by CATPAC.

CATPAC goes beyond providing the researcher with objective, systematic and quantitative content analysis. CATPAC has the capacity to handle large amounts of text allowing the researcher to analyze all the text, instead of a sample, thus eliminating potential sampling errors. Unlike traditional content analysis, CATPAC allows for the categories to emerge from the data opposed to the researcher establishing a category system. Consistency among coders is no longer an issue with CATPAC as no categories are predetermined by the analyst (Claffey, 1996). Coder fatigue, another issue present in traditional content analysis, is not present when employing computer based content analysis. Validity concerns mentioned by Budd, Thorp and Donohew (1967), are also satisfied through the use of CATPAC.

While CATPAC has been used in organizational settings, cultural settings, and politics, there are limitations to CATPAC. For example, the data must be virtually free from any typographic errors, spelling errors, or erroneous marks, since the program may identify these marks as additional concepts (Doerfel & Barnett, in Press).

CATPAC has been used by numerous researchers in more recent scholarly investigation. Barnett and Jang (1994) utilize CATPAC to analyze the text of both Japanese and American companies chief operating officers' letters from the companies annual report. Through the use of CATPAC the researchers found the that text of the president's letters are able to differentiate companies by their national culture. Freeman and Barnett (1994) used the program to describe organizational culture as their analysis included newsletters, promotional materials and human resources statements. Doerfel (1995) utilized CATPAC to analyze news articles found in national papers for a study on the effects of politics on news reporting. Kim (1996), used CATPAC in a study which analyzed beliefs and attitudes towards international television manufacturers. Salisbury (1996) went on to suggest the use of CATPAC within a "Total Quality Management" environment, to precisely identify both internal and external customer requirements. CATPAC has been used extensively in a wide variety of applications within the private sector but due to the proprietary nature of this research, many of these studies are not published.

METHOD

The Case

In 1977 BankAmericard, the world's first bank card, was changed in name only to Visa. Since then, Visa International has become the world's largest payment infrastructure comprised of numerous international member banks.

Today, Visa systems transfer funds and rectify charge accounts by processing over 11,000 transactions per minute every day. Visa has also become more than an international payment system as their high-tech product line includes Visa Cash Cards and Visa E-pay products. Visa International projects that by 1998 the annual Visa sales volume will surpass one trillion US dollars (Visa, 1996).

As a large international organization, Visa produces and communicates a multitude of daily corporate messages from Internet communications and press releases to international advertising campaigns. As noted above, these corporate communications are responsible for shaping Visa's corporate image. Since sales, profit margin and corporate image are highly related (Gregory, 1991), it makes sense for Visa to monitor its external communications and assess its corporate image.

Sample

External communication was gathered from Visa International over a six week period. Press releases, Internet communications, and Visa's annual report were compiled and saved as 5,004 lines of ASCII text. These messages communicated from May, 1995 to May, 1996 comprised the qualitative sample. Press releases and Internet information composed 90% of communication analyzed with in this study.

Analysis

The purpose of this investigation was essentially to explore Visa's corporate image. Therefore, no specific hypotheses were formulated beyond the general prediction that there would be multiple images and messages produced by Visa. 278 pages of text (Visa's external communication) was entered into a computer readable form through the use of a scanner and file transformation. Pictures, images, and other graphic representations present on the Internet and

other corporate materials were not analyzed as part of this study. The text was then analyzed using CATPAC.

CATPAC operates as follows. The CATPAC program reads a text file and deletes any list of articles, prepositions, transitive verbs, conjunctions and other words as specified by the analyst that have proven problematic in the past or distort the description of the documents. 191 words were excluded from this analysis. They are listed in Table 1. In this case the text was read twice. The purpose of the first reading was to determine the problematic words for the VISA text.

Table 1 About Here

Next, the program passes a window of specified length through the text and determines if two or more of the frequently occurring words co-occur within this window. In this case, a window of 5 words was used. In other words, the program determined if the two most frequent words occurred within five words of one another. A window of five words was selected because past research has shown that it is sufficiently wide to accommodate the subject-verb-object syntax of English and not too wide to allow words that are not semantically unrelated to appear to be related (referring to the same object). The program then counts the occurrences of the remaining words. The infrequently occurring words are deleted, such that only the number of the most frequently occurring words as determined by the researcher remain. CATPAC performs a hierarchical cluster analysis of the remaining unique words and produces a coordinate matrix for the identified spatial representation. The results of CATPAC's cluster analysis identifies a neurological pattern representative of which symbols organizations are using to communicate their corporate image. These results are a list of the frequencies of the most prevalent words and a description of how these words cluster (Woelfel, 1991).

For this study the number of unique words was initially set at 100. After a preliminary analysis which identified the problematic words for the Visa text, the 58 most frequent words were identified as those most relevant to the image analysis. These 58 words were mentioned at least 49 times each within the Visa text.

The coordinate matrix produced as a function of CATPAC was entered into a multidimensional scaling (MDS) algorithm

for semantic analysis. MDS is the mathematical process for determining the dimensions which underlie the content based on the co-occurance matrix. It is the same process that would be required for converting a matrix of intercity distances to the coordinates (latitude and longitude) from which a map is drawn (Woelfel, 1991).

Neural Network Parameters

While CATPAC provides content analysis research with an unbiased representation of corporate communications, there are several options available to the researcher that may effect the resultant data. Among these CATPAC functions are clamping, threshold, decay rate, and learning rate.

CLAMPING - Choosing to have the program clamp the nodes instructs the program to have the concepts related to one another. Clamping the nodes allows the program to retain the concepts in its perceptual field and therefore, constantly be aware of them. As a result, those concepts which are strongly related to other concepts emerge as such because the links between the nodes are strengthened. If clamping is not chosen, the concepts are not retained in the perceptual field. For this study the clamping option was activated.

THRESHOLD - Each neuron is either turned on, or else it receives inputs from other neurons which it is connected. These inputs are transformed by an activation function. CATPAC can use one of four transfer functions: a linear function varying between -1 and +1, a logistic function ranging between 0 and +1, a logistic function varying between -1 and +1, and a hyperbolic tangent function varying between -1 and +1 (Woelfel, 1991). For the present study, the default logistic function of -1 and +1 was used.

Once the inputs to any neuron have been transformed by the transfer function, they are summed and if they exceed a given threshold value the nodes are activated. Otherwise, they are left inactive. By lowering the threshold it is more likely for neurons to become activated. Raising the threshold, makes activation less likely. The default threshold of 0.0 was used in this study.

DECAY RATE - The decay rate function refers to the rate at which a node loses a proportion of its activation as a function of time due to restoring forces which returns nodes to their resting levels. The decay rate specifies how quickly the neurons return to their rest condition after being activated. Raising the rate turns them off faster.

Lowering the rate keeps them on longer. The decay rate was set at the default setting of .9.

Learning Rate - When neurons behave similarly, the strength of the connection between them is strengthened. The learning rate determines how much they are strengthened each cycle. The learning rate was also set at the default setting of .005.

RESULTS

Word Frequencies

The initial analysis revealed the 58 most frequently occurring words from a total of 9,022 unique symbols and 5,004 lines of text. The 58 are listed in Table 2. Worth noting is that Visa was the most frequent word occurring 1,162 times or 12.9%. card was the second most frequent word, occurring 601 times (6.7%), and customer was third, with 352 mentions (3.9%). Worldwide was the fourth most frequently mentioned term 342 (3.8%). Million and service occurred 309 (3.4%) and 297 (3.3%) respectively. The 36 most frequently occurring words, those with 86 (1.0%) or more mentions, made up 86% of the words in the text (excluding the noise words).

Table 2 About Here

Cluster Analysis

Hierarchical cluster analysis adds concepts until each symbol becomes a part of a single cluster. As a result, cluster analysis may be further subdivided into smaller clusters. This analysis resulted in three large clusters and several smaller clusters. These results are presented in Table 3.

Table 3 About Here

Cluster one represents the majority of the most frequently occurring words. As in past studies, the most frequently occurring symbols become the issues for the remaining clusters. The following six words comprise cluster one:

card	financial
Visa	plus
worldwide	service

This cluster may be interpreted to suggest that Visa is a worldwide financial service organization.

The second cluster focuses on Visa's customers and the Visa ATM network. Cluster two consists of the following eight words:

ATM	payment
customer	Interlink
million	system
network	bank

This cluster communicates messages about Visa's ATM network which includes the Interlink system. Millions of customers are also referenced within this cluster suggesting **Visa** provides millions of customers with network, payment, and banking systems.

The third major cluster focus on Visa's technological developments such as the electron bank card, chip card, and Internet technologies. This cluster consists of the following words:

banking	technologies
electron	percent
fraud	Internet
benefit	check
chip	developing

This cluster may be interpreted to suggest that Visa is developing new banking technologies related to electron banking, chip cards, Internet activities and fraud reduction.

Six smaller clusters were also identified comprising the remainder of the analysis. Cluster four consists of three words: 1) on-line, 2) travel and, 3) information suggesting that Visa is focusing communicating information related to its on-line travel services.

Cluster five consists of: 1) accepted, 2) largest, 3) marketing, 4) electronic, 5) sales and, 6) locations. This cluster clearly identifies Visa as the largest, accepted, electronic, payment network.

Cluster six consists of: 1) new, 2) credit and, 3) program suggesting Visa is promoting its new credit programs.

Cluster seven consists of: 1) global and, 2) business once again suggesting Visa is an international competitor with in the banking industry.

Cluster eight consists of: 1) stored and, 2) value indicating Visa has been promoting the new Stored Value Cash card.

Cluster nine consists of: 1) debit and, 2) transaction referring to Visa's new debit card products.

Worth noting is that NFL (the National Football League) is mentioned 54 times throughout the text. While this term does not significantly cluster with any other symbols, the occurrence of this reference suggests that Visa is currently promoting its new relationship with the NFL.

Once the cluster analysis were computed the co-occurence matrix of the most salient concepts underwent MDS resulting in a multi-dimensional solution. Overall the content analysis of Visa's external communications resulted in four primary dimensions. It is graphically represented in Figure 1 & 2.

Figure 1 & 2 About Here

The results of the MDS present four distinct groupings messages. The first group contains: 1) check, 2) developing, 3) electron, 4) benefit, and 5) banking. This dimension identifies new and emerging Visa products specifically related to the benefits of electron banking.

The second group consists of: 1) on-line, and 2) technologies. This dimension identifies Visa as an organization who has chosen to promote its on-line or Internet technologies.

The third group contains: 1) global, 2) payment, 3) largest, 4) payment, and 5) international. Similar to cluster one identified above, this dimension suggests that Visa is the largest international payment organization.

The final group can be interpreted to suggest that Visa products provide travelers with access to world wide financial institutions. It consists of: 1) products, 2) access, 3) institutions, 4) financial, and 5) travel.

DISCUSSION

Based on the computer analysis of the most salient symbols in Visa's external communication, two major areas of content emerged: 1) a product development area and, 2) a state of the business area. Corporate communications related to Visa product development specifically address new and emerging products such as stored value cards, electron products, chip card products and on-line information. These corporate communications convey an image of Visa as a progressive organization who is concerned with developing "state of the art" banking products and services.

The second major area of content identified Visa's daily operations as the concepts worldwide, largest, financial, service, customer, cardholder, Interlink, global, business, network and ATM, were used. These concepts create an image of Visa as the worlds largest financial network service provider.

In summary, the content analysis of Visa's external communications suggests that Visa is currently conveying two specific corporate images. The first image attempts to identify Visa as a "state of the art" banking product and service provider while the second identifies Visa as the worlds largest banking services provider. Past research suggests that organizations should focus on future activities in their external communications as Visa has chosen to do. Communicating the future success of an organization creates a more favorable climate for investment, sales and overall customer satisfaction.

Limitations and Future Research

It should be noted that only 278 pages of text were analyzed as part of this study. These corporate communications may not be representative of all the messages produced by Visa. Organizations communicate internally and to their customers in other ways besides printed materials, primarily verbally and through television commercials. Customer conversations with sales representatives may leave the impression Visa is not the worlds largest progressive banking service provider. Many of Visa's mediated messages may also focus too much on the past and not on Visa's future success. This analysis did not take these messages into account.

Future research may chose to examine mediated messages to determine if they are consistent with those images being created by the organization in question. This may be

accomplished by conducting in-depth interviews with customers and Visa personnel and submitting them to a computer-based content analysis. The same procedure may be followed with the text of its commercials, focus groups and other corporate communications.

Neural network image analysis will also expand the current sample to other forms of communication to include: internal communication, communication with customers, business communications, and media communications. Including all forms of corporate communication in subsequent image assessments will enable corporations to accurately identify how their corporate communications contribute to their corporate images. Since corporate images change over time, longitudinal image assessments will allow organizations to monitor variations in corporate image.

Additional research may also chose to analyze messages created by various media sources such as magazines, newspapers and trade journals. By doing so, organizations may assess those images being created by the mass media. In this case, organizations will be able to compare these images with those being produced from within the organization.

Comparative research may also be conducted in terms of neural network image assessments. Corporate image pertaining to competing organizations such as Visa, Master Card and American Express may be compared and analyzed to identify variations in message strategies and corporate image.

The present research has illustrated how neural network analysis may provide image conscious organizations with timely, cost effective image assessments. Neural network analysis has also been shown to improve the reliability and validity of traditional content analysis techniques. Therefore, utilizing neural networks to assess all forms corporate communications provides public relations professionals with a powerful new tool to measure and control corporate image.

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TABLE 1

EXCLUDE FILE-VISA CONTENT ANALYSIS

UNITED	THEN	BOTH
NUMBER	NOW	NIETHER
MARKET	HERE	NOR
ISSUED	THERE	ALTHOUGH
VOLUME	CAME	THOUGH
TODAY	INTO	WOULD
ANNOUNCED	DURING	COULD
POINT	THEY'D	SHOULD
STATES	AFTER	ABOUT
AREA	MRS	BECAUSE
ROLE	MISS	BECAME
DATA	MISTER	OFF
INCLUDING	THEY	EXCLUDE
END	MAY	A
CO	SHLL	AN
BILL	DID	ANOTHER
WIDE	DIDN'T	AS
TWO	ISN'T	AT
US	SHE	BACK
BASED	HER	BE
END	HIM	BEFORE
YEAR	YET	BESIDES
VICE	GET	BETWEEN
OVER	KEPT	BY
SAN	GIVE	COME
FRANCISCO	THUS	DO
POS	VERILY	EVEN
WILL	GOES	HE
USE	GONE	HI
MAKE	ECT	HIMSELF
WHO	GOT	IF
WHAT	MID	IN
WHERE	OWN	IS
WHEN	VERY	IT
HOW	EVERY	JUST
WHY	EACH	LIKE
IT'S	SOME	MANY
ITS	MUCH	MOST
THE	ONLY	MUST
BUT	GAVE	MY
ANY	BEING	NO
CAN	WHICH	OF
THIS	HIS	ON
THAT	HERS	ONE
AND	BEEN	OR
HAVE	USING	OUT
FOR	HER'S	SAME
ARE	WENT	SEE
HAS	MADE	SINCE
THEM	UNTIL	SO
THESE	SAID	STILL
OUR	SAY	SUCH
YOUR	TRIED	TAKE
YOURS	TRY	THAN
OURS	EITHER	THOSE
THEIRS	OTHER	THROUGH
THEIR	MORE	TO
WAS	LESS	TOO
HAD	ALL	UP
WITH	ONTO	WAY
ALSO	DONE	WE
FROM	SAW	WELL
WERE	DOES	YOU
WHILE	NOT	

Table 2

WORD FREQUENCIES-VISA CONTENT ANALYSIS

DESCENDING FREQUENCY LIST

WORD	FREQ	PCNT	CASE FREQ	CASE PCNT
VISA	1162	12.9	5752	63.8
CARD	601	6.7	3264	36.2
CUSTOMER	352	3.9	2207	24.5
WORLDWIDE	342	3.8	2204	24.4
MILLION	309	3.4	1701	18.9
SERVICE	297	3.3	1781	19.8
BANK	248	2.7	1383	15.3
FINANCIAL	244	2.7	1593	17.7
SYSTEM	242	2.7	1512	16.8
MEMBER	236	2.6	1569	17.4
PAYMENT	229	2.5	1479	16.4
MERCHANT	226	2.5	1328	14.7
ATM	212	2.3	1282	14.2
NEW	207	2.3	1298	14.4
INSTITUTIONS	193	2.1	1301	14.4
PLUS	181	2.0	1054	11.7
NETWORK	177	2.0	1133	12.6
GLOBAL	162	1.8	1127	12.5
INTERLINK	151	1.7	796	8.8
INTERNATIONAL	149	1.7	919	10.2
TRANSACTION	144	1.6	930	10.3
LARGEST	141	1.6	975	10.8
CARDHOLDERS	133	1.5	902	10.0
PROGRAM	129	1.4	789	8.8
PRESIDENT	125	1.4	816	9.1
ELECTRONIC	114	1.3	715	7.9
ACCEPTED	111	1.2	751	8.3
PERCENT	110	1.2	558	6.2
SALES	109	1.2	709	7.9
FIRST	106	1.2	688	7.6
ACCESS	101	1.1	673	7.5
BILLION	96	1.1	562	6.2
INFORMATION	96	1.1	590	6.5
CREDIT	93	1.0	617	6.8
PROCESSING	87	1.0	530	5.9
BANKING	86	1.0	546	6.1
VALUE	79	0.9	500	5.5
LOCATIONS	76	0.8	521	5.8
PRODUCTS	75	0.8	500	5.5
DEBIT	74	0.8	492	5.5
CASH	73	0.8	437	4.8
FRAUD	68	0.8	335	3.7
ELECTRON	59	0.7	300	3.3
BENEFIT	58	0.6	406	4.5
CHIP	58	0.6	350	3.9
TECHNOLOGIES	58	0.6	402	4.5
TRAVEL	58	0.6	300	3.3
CHECK	57	0.6	325	3.6
INTERNET	56	0.6	345	3.8
MARKETING	56	0.6	339	3.8
NFL	54	0.6	189	2.1
PROVIDE	54	0.6	374	4.1
STORED	54	0.6	342	3.8
BUSINESS	53	0.6	364	4.0
OFFER	52	0.6	364	4.0
DEVELOPING	50	0.6	350	3.9
ONLINE	50	0.6	313	3.5
LEADING	49	0.5	343	3.8

ALPHABETICALLY SORTED LIST

WORD	FREQ	PCNT	CASE FREQ	CASE PCNT
ACCEPTED	111	1.2	751	8.3
ACCESS	101	1.1	673	7.5
ATM	212	2.3	1282	14.2
BANK	248	2.7	1383	15.3
BANKING	86	1.0	546	6.1
BENEFIT	58	0.6	406	4.5
BILLION	96	1.1	562	6.2
BUSINESS	53	0.6	364	4.0
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CARDHOLDERS	133	1.5	902	10.0
CASH	73	0.8	437	4.8
CHECK	57	0.6	325	3.6
CHIP	58	0.6	350	3.9
CREDIT	93	1.0	617	6.8
CUSTOMER	352	3.9	2207	24.5
DEBIT	74	0.8	492	5.5
DEVELOPING	50	0.6	350	3.9
ELECTRON	59	0.7	300	3.3
ELECTRONIC	114	1.3	715	7.9
FINANCIAL	244	2.7	1593	17.7
FIRST	106	1.2	688	7.6
FRAUD	68	0.8	335	3.7
GLOBAL	162	1.8	1127	12.5
INFORMATION	96	1.1	590	6.5
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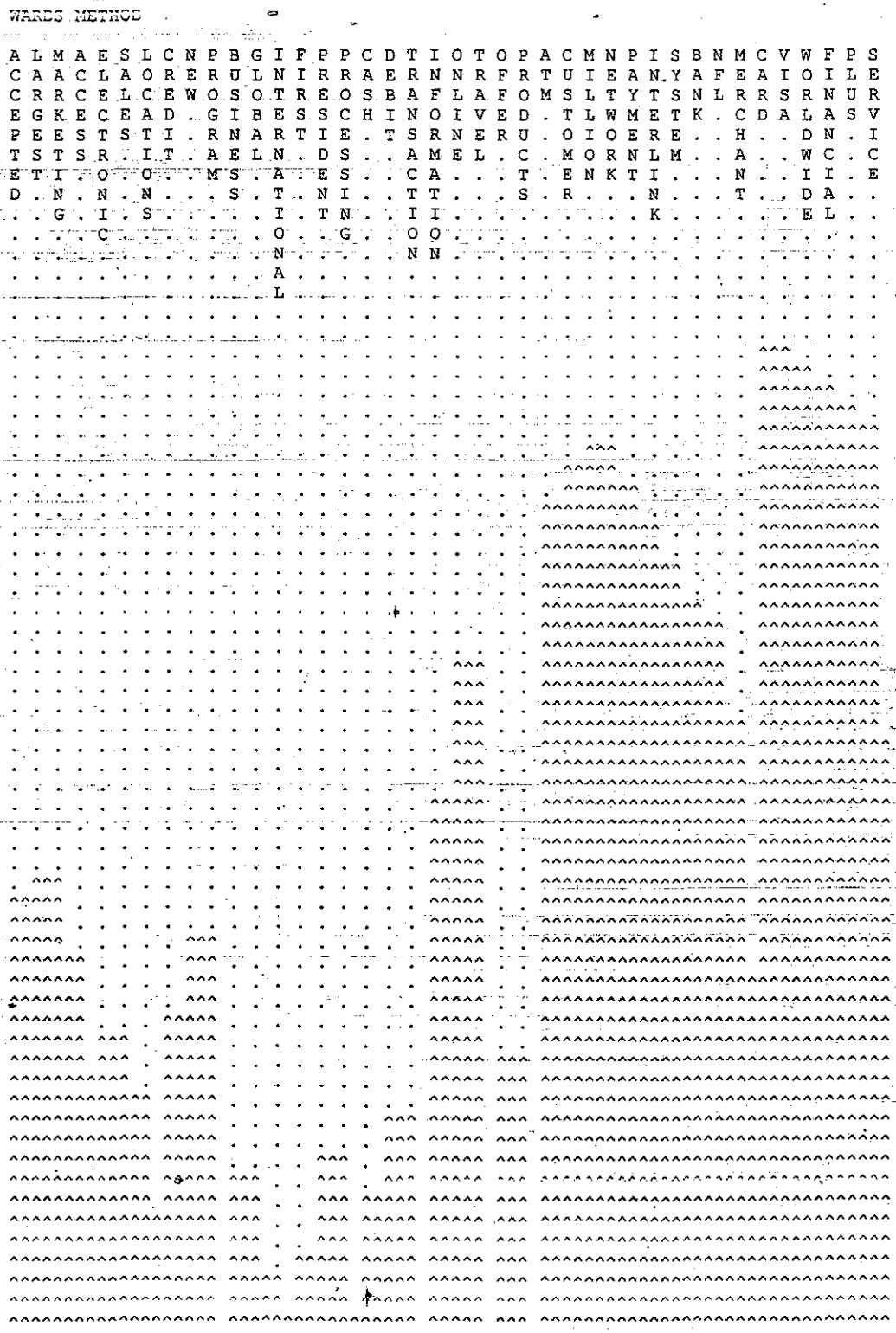
INTERLINK	151	1.7	796	8.8
INTERNATIONAL	149	1.7	919	10.2
INTERNET	56	0.6	345	3.8
LARGEST	141	1.6	975	10.8
LEADING	49	0.5	343	3.8
LOCATIONS	76	0.8	521	5.8
MARKETING	56	0.6	339	3.8
MEMBER	236	2.6	1569	17.4
MERCHANT	226	2.5	1328	14.7
MILLION	309	3.4	1701	18.9
NETWORK	177	2.0	1133	12.6
NEW	207	2.3	1298	14.4
NFL	54	0.6	189	2.1
OFFER	52	0.6	364	4.0
ONLINE	50	0.6	313	3.5
PAYMENT	229	2.5	1479	16.4
PERCENT	110	1.2	558	6.2
PLUS	181	2.0	1054	11.7
PRESIDENT	125	1.4	816	9.1
PROCESSING	87	1.0	530	5.9
PRODUCTS	75	0.8	500	5.5
PROGRAM	129	1.4	789	8.8
PROVIDE	54	0.6	374	4.1
SALES	109	1.2	709	7.9
SERVICE	297	3.3	1781	19.8
STORED	54	0.6	342	3.8
SYSTEM	242	2.7	1512	16.8
TECHNOLOGIES	58	0.6	402	4.5
TRANSACTION	144	1.6	930	10.3
TRAVEL	58	0.6	300	3.3
VALUE	79	0.9	500	5.5
VISA	1162	12.9	5752	63.8
WORLDWIDE	342	3.8	2204	24.4

TABLE 3

DIAMETER METHOD



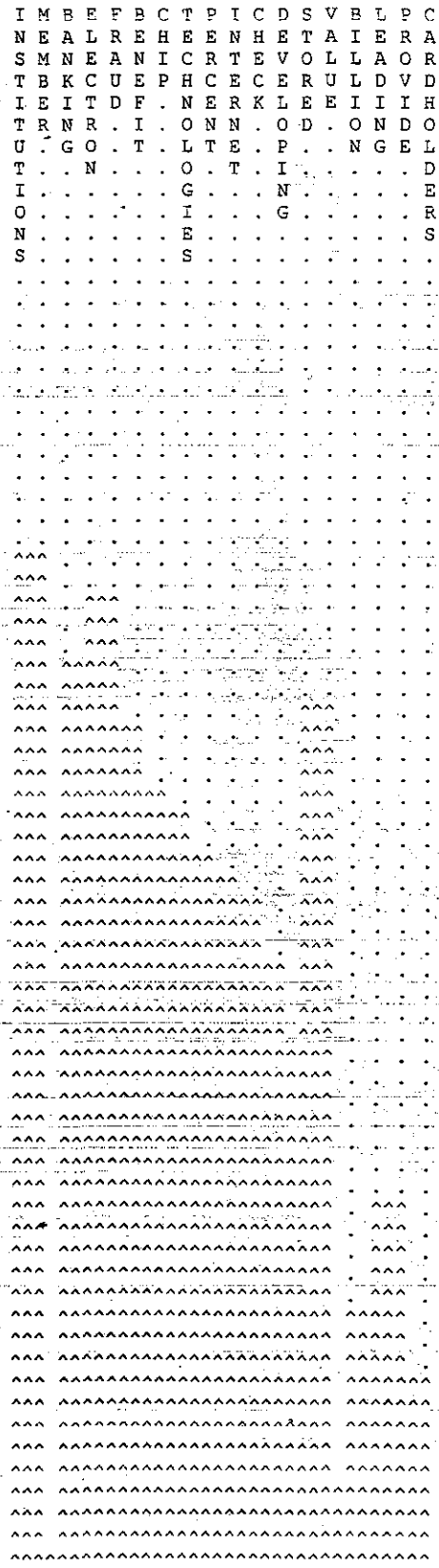
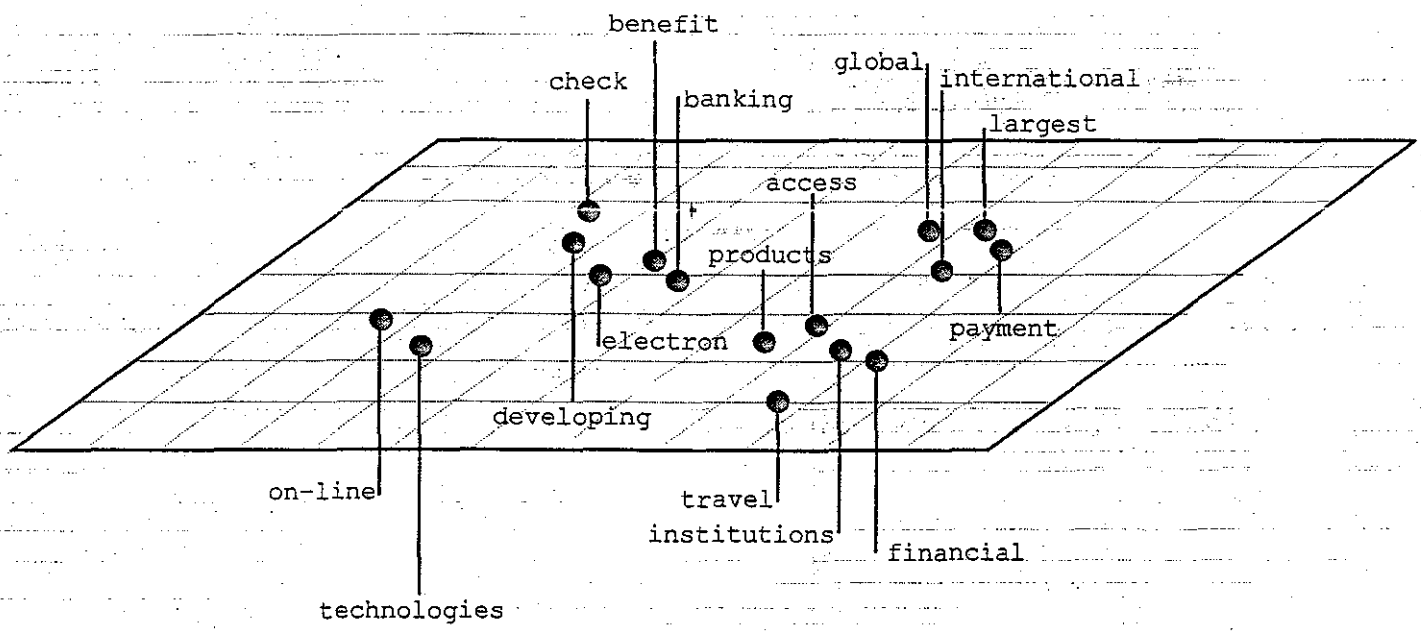

IMBEFBCTPICDSVBLPC
NEALREHEENHETAIERA
SMNEANICRTEVOLLAOR
TBKCUEPHCECERULLDVD
IEITDF.NERKLEEIIIH
TRNR.I.ONN.OD.ONDO
U.GO.T.LTE.P..NGEL
T..N...O.T.I.....D
I.....G...N.....E
O.....I...G.....R
N.....E.........S
S.....S.........

Figure 1

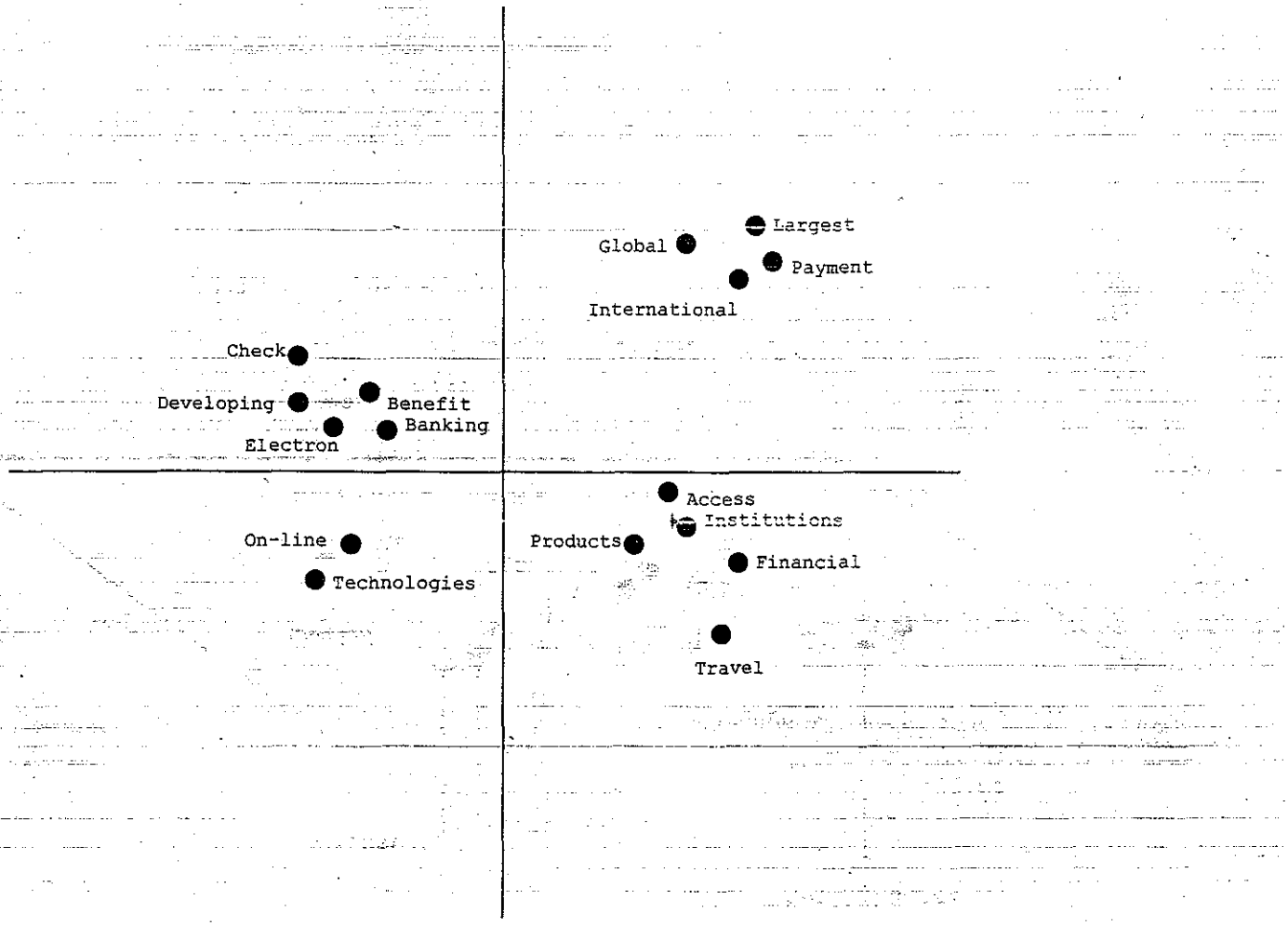
MULTI-DIMENSIONAL REPRESENTATION OF VISA'S EXTERNAL COMMUNICATION



Note* Only selected concepts are presented within this graphic.

Figure 2

TWO-DIMENSIONAL REPRESENTATION OF
VISA'S EXTERNAL COMMUNICATION



Note* Only selected concepts are represented within this graphic.