Geographic Information (GI) Product Marketing through Advertisements: An Application of Content Analysis

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Abstract

Marketing, particularly for new products, heavily depends on advertising. Advertising creates awareness among the potential buyers of the product and also poses the product as a need even if it is a want in reality. This study analyzed contents of 1749 marketing messages of Geographic Information (GI) product advertisements over the period of two decades (1989 to 2008). A tailored methodology was developed based on the approach of Resnick and Stern (1977). The contents analyzed include changing pattern of marketing message in the area of picture and text ratio, relevancy of headline message, sub-headline message and picture to the advertised products, image colour depth, and message media. The use of picture dominated the text in the second half of the study period. A majority of the headline messages were of a direct product descriptive nature while the use of indirect product descriptive type gained momentum lately. The use of sub-headline message was found to be comparatively low. Pictorial elements/images of the products were mirrored in a majority of the marketing messages. Photorealistic image dominated the message having the combination of both image and text. The study also revealed that marketing messages of GIS software products were dominant in the first half while it was GPS/survey product in the second half. No significant relationship was found between various elements of the GI product marketing messages. Based on the above findings, the likely future trends of GI product marketing messages were predicted.

Keywords: GI products; Marketing message; Content analysis; Advertisement; Print media

1. Introduction

The concept of market arises from the exchange and relationship (Kotler and Armstrong, 2008) and the market for a product is a set of actual and potential buyers of the product, where buyers share a particular need or want that can be satisfied through exchange relationships of the product. Advertising has been used by industries for organizing and ensuring markets for its products. Marketing, particularly for new products, heavily depends on advertising and consumer education. According to Dyer (1982), the advertising means "drawing attention to something or notifying or informing somebody of something". Advertising creates awareness among the potential buyers of the product and also poses the products as a need even if it is a want in reality. Marketing communication strategy of a business must have a marketing message consistent with its communication objectives, where the message strongly reflects the unique selling proposition of their products (Rowley, 1998). A marketing message has some basic elements, namely content (what to say), structure (how to say it logically), format (how to say it symbolically), and source (who should say or act as the spokesperson). Although there has been improvement in the Internet and other technologies, print advertising is still used as a medium to relay messages (Moriarty, 1991). Customers come in contact with hundreds of messages on a daily basis, developed by different advertisers with the goal of creating an effective one. However, only a small number of those messages become good and effective due to intense competition in the advertising market (Buda and Zhang, 2000). Geographic Information (GI) product is an important component of the technological world, especially Information Technology sector and it needs the same advertising principles like the other general goods and products to be competitive in the market. However, very few researches are published focusing on advertisement of GI products. Marketing messages of an advertisement not only help in the sale of a product but provides information about the product itself. We tapped this power of marketing messages of an advertisement to study the development of GI products, marketing and selling trends of these products and the changing pattern of GI industry over 20 years and predict the likely future print media advertising scenario of the GI products. We anticipate that this paper will arouse interest in other people working in the GI sector and more researches emerge apart from advertisement to strengthen and develop this valuable sector of the IT industry.

1.1 Picture, Color and Text as an Element of Marketing Message

The words and visualization factors are the two vital components of advertising that make up a marketing message (Moffitt, 1999). Pictures in an advertisement are easier to understand and are more influential than text, providing more opportunity to relay excitement, mood and imagination (Dyer, 1982). A study by Pieters and Wedel (2004) reported that pictorial element better captures the attention, independent of the size of the print advertisement, whereas text elements best captures the consumer attention in direct proportion to text surface size. Cutler et al. (1992) reported that visual display captures attention and colour is the vital component of visual advertisement in the print media. In the word of Stern and Schroeder (1993), the use of colour helps the print advertisement to reinforce the verbal message by conveying memorability by means of structure as well as content. Moriarty (1991) adds that colour communicates and speaks a language of its own and a successful advertising uses colour as a powerful part of a message design. Text element comprises all textual information of the print advertisement and is the key in capturing the attention of the consumer (Pieters and Wedel, 2004). Wells et al. (2000) argued that two categories of copy are used in print advertisement - display copy including headlines, sub-headlines and tags, and body copy including main text messages. Dibb et al. (2001) put headline as a critical part of the marketing message, which if arouse the interest and attraction, proceeds the consumer towards the main body. MacQuarrie and Philips (2008) found that consumers are more inclined to the pictorial form of magazine advertisements than those with textual documents.

1.2 Message Appeal of Advertisement

Every advertisement consists of some appeal message in textual and colour elements. According to Davies (1992), the choice of message appeal is a complex task as there is a large variety of creative options. Moriarty (1991) states appeal as "a message about a need that has the power to arouse innate or latent desires." Message appeals can be classified as either emotional or rational (Turley and Kelley, 1997). It is emotional if the given advertisement is about humour, romance, sex, status, adventure and fear. But, an appeal is rational if the message theme emphasizes availability, quality, price/value relationship and nutritional contents. Maheswaran and Meyers-Levy (1990) conducted a research on influence of message appeal and found that positively framed marketing messages are persuasive if there exists little emphasis on detail processing. However, negatively framed messages are more persuasive when detailed processing is given importance. Appeal is one of the most basic elements that are associated with advertising strategy choice (Turley and Kelley, 1997).

1.3 Content Analysis Study of Advertisement

Kassarjian (1977) defined the term 'content analysis' as scientific, objective, systematic, quantitative, and generalizable description of communications content. Leiss et al. (1990, cited in Hazel 1998) found the advertising message formats evolved in a series of stages and did not disappear in a short time span. Instead, these messages either integrated into other styles or played a different role for new and emerging formats. Turley and Kelley (1997) studied the content analysis of magazine advertisement for five attributes of business to business and consumer services and found only slight differences in message contents, others remaining the same. A study conducted by Stern et al. (1982) on general consumer magazine suggests that 86 percent of sampled magazine advertisements contain face value information that may help consumers to make an intelligent choice. Chen et al. (2007) conducted a study of 101 high tech firms in Taiwan and found that informational and relational, rather than transformational and elaborated advertising messages were useful during the launch of high tech products since high tech customers could process and understand new product information easily. Abernethy and Butler (1992) conducted a study on information content of service and product advertising of newspapers and found less information in service advertisements than that in product advertisements. Traynor and Traynor (2003) compared the marketing approach used by high-tech firms between 1985 and 2001, and found that most firms consider advertising messages as a vital element to differentiate them from others. Advertising in trade magazines is still one of the primary promotional tools even though web based advertising is gaining momentum. Information content analysis of television advertising on automobiles and drugs was conducted by Aaker (1984) who came up with the conclusion that commercials are informative for consumers while less informative for experts. Rice and Lu (1988) studied the content analysis of Chinese consumer magazine advertisements and reported that Chinese magazines contain more information cues than western magazines as Chinese people seek more information before deciding on their purchase. Advertising that has strong arguments on the effectiveness of the brand and a clear statement linking to the desired outcome can help to increase the effectiveness of the use of the product (Gelb, 1998).

From the literature study, it was discovered that marketing messages have a significant role to play in the promotion of a business. Every type of product needs a marketing message to increase its sale. There were numerous studies undertaken on the marketing of products worldwide. Most of them were focused on consumer goods such as foods, luxury goods and automobiles. However, few studies have been carried out on the marketing aspect of IT industry in general and GI industry in particular. General consumer goods and GI products are different in many respects. The GI product advertising is for educated and technical personnel and managers the general methodologies mentioned in the published literature were not fully appropriate to use for the study of GI products. In this context, the objectives of this study were to: (i) Develop a tailored methodology suitable for the study of marketing message of GI products published in the print media, (ii) Assess the nature of GI product marketing message (iii) Assess the GI product industry growth trend over two decades through content analysis of marketing messages, and (iv) Predict the likely future of GI advertising trends in the print media.

2. Materials and Methods

2.1 Sample Selection

Our aim was to study the advertising trends of GI products within a span of two decades. Ten magazines were available for this purpose however none of them had a continuous span of two decades. This led us to select two magazines: *Mapping Awareness* from 1989 to 1999 and *GeoInformatics* from 1999 to 2008. This combination gave us the data from 1989 to 2008, covering 20 years. The reason for selection of these two magazines among others was that both magazines were based in Europe and comparable in their editorial policy, meaning same category of advertisements appeared in both magazines. Only the GI product advertisements were considered for this study and included all the software, hardware, soft data and map data belonging to GIS, aerial photogrammetry and remote sensing. The advertisements that were excluded comprise of consultancy service, conference, seminar, symposium and computer hardware. Incorporating all these selection criteria, a total of 1749 advertisements were available for the data analysis. All advertisements that appeared in each magazine were recorded, allowing the same advertisements to be repeated over time. However, only double full page, full page and half page marketing messages were taken into consideration in order to reduce the heterogeneity in the sample and facilitate the analysis process.

2.2 Study Approach

Content analysis is the best approach to study information content of advertisements (Kassarjian, 1977). Many past studies have respected content analysis method to assess advertising strategy as well as information content. From the literature review, it has been discovered that there is no correct and established framework to analyse marketing messages. It was found that content analysis methodology developed by Resnik and Stern (1977), mentioned in Table 1 has been used widely by many advertising researchers.

Table 1: Content Analysis Methodology as developed by Resnik and Stern (1977)

Information Contents	Description
Price	How much does the product cost? What is its value retention capacity? What are the need satisfaction capability/dollars?
Quality	What is the product's characteristic that distinguishes it from other competing products?
Performance	What does the product do and how well does it do what it is designed to do in comparison to alternate purchases?
Components	What is the product comprised of? What ingredients does it contain? What ancillary items are included with the products?
Availability	Where can the product be purchased? When will the product be available for purchase?
Special offers	What limited time on price deals is available with a particular purchase?
Taste	Is evidence presented that the taste of a particular product is perceived as superior by a sample of potential customer?
Nutrition	Are specific data given concerning the nutritional content of a particular product or is a direct specific comparison made with other products?
Packaging	What package is the product available in which makes it more desirable than alternatives? What special shape is the product available in?
Warranties	What post purchase assurances accompany the product?
Safety	What safety features are available on a particular product compared to alternatives?
Independent research	Are results of research gathered by an independent research firm presented?
Company research	Are data gathered by a company to compare its product with a competitor's presented?
New ideas	Is a totally new concept introduced during a commercial? Are its advantages presented?

(Source: adopted from Abernethy and Franke, 1996)

However, GI products being special products many information cues stated in this methodology were not suitable, relevant and ideal for the purpose of the study on GI products. Therefore, we developed a new approach based on Resnik and Stern's methodology to carry out this particular study. A brief description of our approach is given in Table 2.

Table 2: Study Approach developed for the current study

Approach	Criteria
Ratio	Picture Ratio, Text Ratio
Relevance	Direct Product Descriptive (DPD), Indirect Product Descriptive (IPD), Non Product Descriptive (NPD)
Colour Depth	Photorealistic, 256 colours, 256 Grey Scale, Black & White
Medium	Picture and Text, Text

2.3 Database Attributes Assumption

Picture text ratio: - All advertisements contain two major elements. They are picture and text. The proportion of picture and text in the advertisements were considered here. If the picture and the text were separated, it was

straightforward to differentiate them. But often, picture and text could overlap in the advertisement. This condition necessitates us to make rules to simplify picture and text overlap. 1) If a picture contained a small proportion of text, then the text was considered as a part of the picture. For instance, a lot of pictures have vendor names in them. These text become part of the picture. However, if the proportion of the text is large then the text does not become a part of the picture. 2) If a picture was simply a different colour, but not really a picture with some message, then it was not considered as a picture but left as blank space. For instance, an advertisement can have yellow background with some shades and contain only the primary message. In this case, the colourful background is not a picture. 3) Both picture and text proportion had a lower limit of 5%. This means that if a picture or text occupied less than 5% of the total space, then it was not considered. It is important to mention that one could simply disagree with these rules. Although this measurement of the proportion can be considered subjective, we have tried to make this consistent with all the data collected. As most of the data for this study were categorical in nature, various assumptions were made to facilitate the analysis process. The data abstracted for this study are mentioned below with the assumptions made. **Headline message and its relevance: -** Headline message is the primary or main text message in the advertisement and normally comes first with big text sizes. Headline message relevance means whether the given headline describes or tells something about the product. If the headline mentioned the product name and tells something about the product, then it is considered as Direct Product Descriptive (DPD), if it contains company name and told something about the product, then it is Indirect Product Descriptive (IPD). If the message contains neither product nor company name and tell nothing about the product, then it is Non Product Descriptive (NPD). **Sub-headline message and its relevance: -** Sub-headline message is the secondary text message in the advertisement that normally comes below the headline and in most cases with smaller text size than the headline. Sub-headline message also has message relevance and it has the same three categories as the headline message. **Picture/image relevance: -** Picture or image relevance also has the same categories as text (i.e. primary headline and secondary headline message) relevance. This category was interpreted in a slightly different way. If a picture in the advertisement was about the product or told something about the product, then the picture was DPD. In the case of GI software, it was DPD if the advertisements displayed maps and models of geographic features, brand name in any features or software packed with brand name. In the case of hardware, it was DPD if the advertisements displayed images of product's full features. Similarly, if the advertisement displayed images without the above mentioned categories, then it was considered as NPD. **Colour depth: -** Only the colour that appeared in the picture/image has been considered for this study. Four categories were made, namely photorealistic, 256 colours, 256 grey scales, and black & white. If an image was taken from a photo, then it was photorealistic. If the image was coloured and looked like a painting or an abstract image but not photorealistic, then it was 256 colours. If the image was black and white but contained grey colour, then it came under 256 grey scales. If the image contained neither colour nor grey scale, then it was considered as black and white.

Similarly, we established a relationship between various major components of GI product marketing messages. The analysis was done in Excel 2007 where all the categorical values were transformed into numerical values by assigning dummy variables 0 and 1. The result of Pearson Correlation Coefficient was summarized in tabular form.

3. Results

3.1 Picture Text Ratio

The time series chart in Figure 1 shows how the picture text content of magazine based GI advertisement changed over the two decades. The proportion of text in advertisements had decreased by nearly 10% during this period. It is expected the picture to grab most of this share but the data shows that blank space increased its share by 8% and picture increased its share by just 2%. Therefore, we conclude that the proportion of text in the later years being not as important as in previous years. Vendors were more tempted to add less but high impacting text in recent years. In addition to this, most of the product vendors were already having established brands and they were mainly focusing on advertising the product rather than advertising their brand names. In their early days, they had to describe what they were in addition to what the products were.
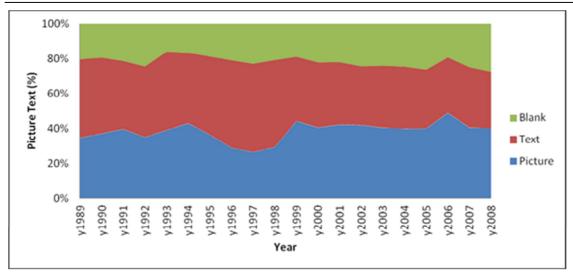
Figure 1 Picture Text Ratio

The graph also shows two major spikes one for the text and another for the picture. The first one was around 1997 where the text increased its share and the second in 2006 where the picture increased its share. These must have been due to some systematic shocks in those years. The impact of these shocks was not long lasting as both the text and picture proportions returned to their pre-shock levels.

3.2 Headline Message Relevance

From the time series chart in Figure 2, we can infer that in recent years people were using IPD message more than DPD. We did not have enough data to ascertain whether this is a short term shift or longer term pattern. This, however, indicates a change in consumers' taste in what kind of message they expect from advertisements. The consumers might have become more sophisticated and needed indirect persuasion.
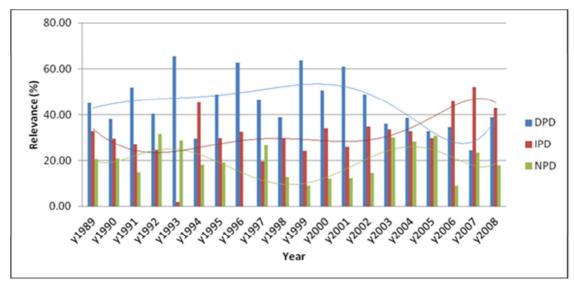

Figure 2 Headline Message Relevance

NPD also varied but this variation could simply be seasonal, meaning that the proportion of NPD was changing every 4-5 years.

3.3 Sub-headline Message Relevance

The time series chart in Figure 3 shows how the trend of sub-headline message relevance to the product advertised in magazines altered over time. It was noted that most of the messages advertised in the magazine did not contain a secondary message, indicating headline messages were sufficient to relay information about the GI product.
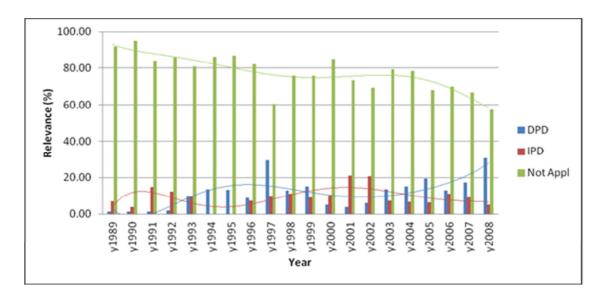

Figure 3 Sub-headline Message Relevance

However, there were some signs of increment in the use of sub-headline messages in the final quarter of the study period. The share of DPD and IPD messages were constantly changing at every 4-5 year period. If we extrapolate these trends, then we could say the proportion of DPD tends to go up whereas IPD remains bounded but still variable. Focusing on "Not Applicable" and DPD trend lines, it was clear that in recent years, more advertisements have started to have secondary messages and they were primarily DPD types. "Not Applicable" and DPD seem to mirror in the second half of the observation period, meaning when there was no secondary message, the proportion of DPD was low and where there was a secondary message, the proportion of DPD was high. From this we can conclude that DPD was dominant in secondary messages, meaning that if a vendor wanted to put a secondary message in an advertisement, then it was quite likely that this message directly described the product.

3.4 Picture Relevance

The time series chart in Figure 4 shows how the trend of picture relevance to the product advertised in magazines varied over time. The chart shows that the majority of the messages contained pictures that were an image of the product. This was because a picture of the product helped customers to understand the message quickly. The use of DPD picture was suitable for both professional as well as ordinary people having less technical knowhow.
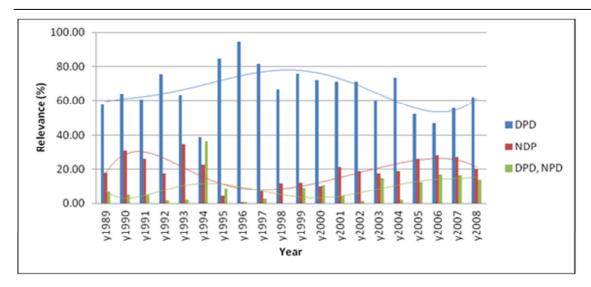
Figure 4 Picture Relevance

Trends of DPD and NPD mirror each other. Extrapolations of these trends showed that both are bounded but variable. It could be said that DPD and NPD in this case were negatively correlated with each other.

3.5 Colour Depth

The time series chart in Figure 5 shows some changes in the use of colour depth of the marketing messages over time. It was clearly noticeable that most of the pictures or images used in the advertisement contained photorealistic images. Photorealistic images look pleasant and attract customers more to read the message readily as compared to other categories. The use of photorealistic images continued to grow after 1994 with the development of sophistication in the image processing industry.
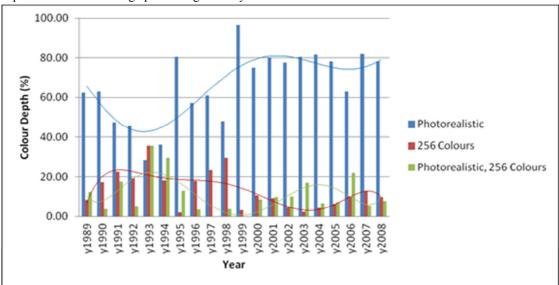

Figure 5 Colour Depth

Similarly, the use of 256 colours and combination of photorealistic and 256 colours decreased throughout the study period as they were less likely to capture customers' attention as effectively as that by photorealistic images.

Interestingly, not a single marketing message contained a black and white image over the same period.

3.6 Medium
The time series chart in Figure 6 shows how the trend of medium used in the advertisements varied over time. Almost all (average of 96 percent) messages were advertised with the combination of picture and text. This was because a combination of picture and text could explain things better and more effectively than only one of them. Also, visual and verbal components suit both technical and non-technical customers.
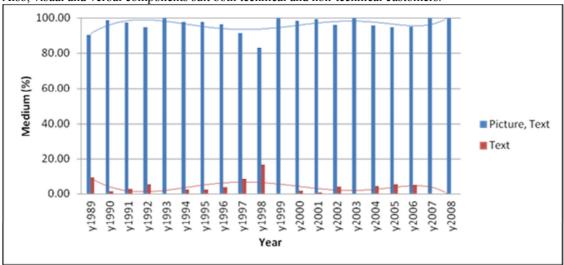

Figure 6 Advertisement Medium
The use of text alone was not preferable throughout the study period. No distinct changes in pattern were evident for both categories.

3.7 Geographic Information (GI) Products
The time series chart in Figure 7 shows the percentage share by the GI products that appeared in the advertisement over the years.
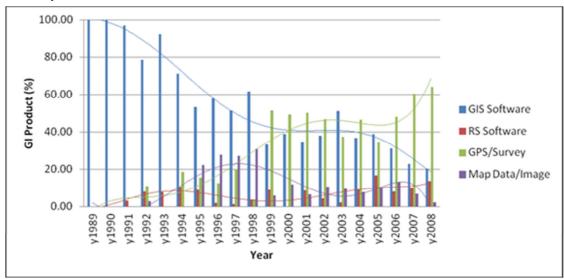

Figure 7 Geographic Information Products
There is an inverse trend between GIS software and GPS/Survey software, and hardware advertising. This could be due to the fact that GIS software and software products, in general, were expensive and the cost of owning such software

products suited larger organizations compared to small and medium sized firms. The magazines might have targeted professionals from all organizations and these professionals might not be the niche customers of these software products. However, GPS and survey products had undergone rapid changes in innovation recently as most of the products come with embedded software and hardware, and are smaller in size, thus making it portable and less expensive. This means ordinary customers could buy these products easily. This encouraged vendors to advertise these products in the magazine with more repetition.

3.8 Correlation Matrix Table for Headline and Sub-headline Message Relevancy
As headline and sub-headline message relevancy were categorical data, we used dummy variables to transform them into numerical values. Here, 1 indicates the presence of an attribute while 0 indicates its absence. The correlation matrix shown in table 3, between headline and sub-headline messages, indicates no significant association between these two variables.

Table 3: Correlation matrix table for headline and sub-headline message relevancy

Headline/Sub-headline message		Sub-headline message		
		Direct Product Descriptive (DPD)	Indirect Product Descriptive (IPD)	Non-Product Descriptive (NPD)
Head line	Direct Product Descriptive (DPD)	0.052	0.173	-0.208
	Indirect Product Descriptive (IPD)	0.173	0.031	-0.136
	Non Product Descriptive (NPD)	-0.208	-0.136	0.401

The only reasonable correlation we see from this table is the one between the NPD of headline message and NPD of sub-headline message. A correlation of 0.4 indicates that if the headline message is NPD then the sub-headline message is likely to be NPD as well. The rest of the messages had very low values, hence seem to be uncorrelated with each other.

3.9 Correlation of Picture and Text and Other Associate Elements of Marketing Message
In the case of picture text ratio, we assumed that if the picture proportion was equal to or greater than text, then it was big picture category (assigned a dummy value 1) and if it was less than the text, then it was small picture category (assigned a dummy value 0). A similar assumption was made in the case of text as well. The Pearson correlation of random relationship between picture and text and other associated variables of the marketing message are shown in table 4.

Table 4: Correlation of picture and text and other associate elements of marketing message

Relationship	Picture proportion	Text proportion
DPD_picture_relevance	-0.121	0.093
IPD_picture_relevance	0.019	-0.008
NPD_picture_relevance	0.174	-0.100
DPD_headline_message	-0.008	-0.011
IPD_headline_message	-0.021	0.024
NPD_headline_message	0.038	0.003
Photorealistic	0.060	-0.029
256 colours	-0.032	0.024
256 grey	-0.039	0.003
Photorealistic_256colours	0.042	-0.052

Most of the observed correlation values were very low. Their inclination towards zero means the elements of marketing message have no particular statistical pattern. This may be due to the fact that the creation of advertising was commissioned by very separate people using different criteria and thinking. They normally did not follow a

particular methodology in its creation.

4. Discussion and Conclusion

This study was undertaken using content analysis of Geographic Information Product marketing messages published in two trade magazines that were based in Europe. In the course of literature survey, it was discovered that very few studies related to GI marketing message had been undertaken earlier. This highlights the importance of this study in itself. Based on the methodology developed by Resnick and Stern (1977), we created our own tailored methodology suitable to meet the objectives of this study. Two aspects of marketing messages were analysed during the research. In the first stage, the pattern of various defined marketing message elements over a 20-year period was studied. This included picture text proportion, headline and sub-headline messages relevant to the advertised product, relevancy of the picture, colour depth used in the marketing message, medium of advertisement, and the GI product category. In the second stage, the study tried to establish a relationship among various message elements mentioned under stage one. No significant change was found in the use pattern of picture and text ratio in the marketing message. However, it was evident that picture became more dominant than text in the later stages. Most of the headline messages were directly relevant to the advertised product. However, the use of IPD had increased in later period. The use of NPD in the headline message kept on changing all the time and was less preferred than the other two. Most of the marketing messages did not contain sub-headline messages. The majority of the marketing messages contained pictorial elements/images that were replicas of the product in the offer. This dominance was continuous throughout the study period while NPD and combination of DPD and NPD were found less favoured and their trend changed continuously. Photorealistic image was common in marketing messages and almost all of those messages appeared as a combination of image and text. The study also revealed that marketing messages of GIS software product were dominant in the first half of the study period. In the second half, however, GPS/survey product dominated the published advertising messages. In this context, the appearance of map data and remote sensing software marketing messages were comparatively less and kept on varying throughout the study period. It was found that there was no relationship between the various elements as their correlation coefficient was very low (nearly zero).

As the key variables of the marketing messages were found to be uncorrelated, we infer the trends based on the time series data and charts. The inferences are summarized as follows.

1) The use of picture and text proportion in the GI product marketing messages will not go for drastic changes if small time periods are considered, the ratio will fluctuate but in the long run it is bounded within the current threshold.
2) Both DPD and IPD nature of headline will remain the main choice. If we extrapolate the graph we can say that in the short term IPD will continue to decrease and DPD will continue to increase. NPD will continue to fluctuate but will be bounded within a small threshold. It will not change as DPD or IPD.
3) The sub-headline messages tend to stay as low priority element. However, the use of DPD messages tends to be picking up. This means that advertisements will be using more and more sub-headlines. We expect this trend to continue, if not increase in the future.
4) There are some indications that DPD nature of picture will dominate marketing message in the future.
5) Photorealistic image will always be in favour in the future with further advancement in the technology.
6) A combination of picture and text in the advertisement will be a likely medium for coming years, just like in the past. It is more effective in conveying messages with a suitable combination of image and text.
7) There is a trend that the GI technology is becoming less expensive. Like other industries, this trend will impact the GI industry. GI hardware will become less and less expensive and hardware with customized embedded software will become more popular than just large scale software products. This will enable these products to reach a wide range of customers.

The present study focussed on the changing pattern of the GI product marketing messages over time as a basis of content analysis. There is wide scope to expand the research in this area of GI product marketing, particularly on (i) data collection from other media such as TV and the Internet, (ii) the same model, with minimum alterations, can be used to collect data from other industry sectors, (iii) there is a chance of tweaking the model so that it covers more than

just GI products, and (iv) advanced statistical analysis on categorical data to get more insight of the marketing messages.

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