

INTERNET USERS AND E-COMMERCE IN GROWING E-SOCIETY: AN EMPIRICAL RESEARCH SERIES IN TAIWAN*

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ABSTRACT

This empirical research series, 1966-2004, investigated internet users' behavior and the growth of e-commerce in Taiwan. Some new ideas of methodological issues for internet users' surveys have been initiated and employed. There were two major findings:

1. The exploration and development of a forecast model of internet users and e-commerce.
2. The profiling of internet users and redefinition of the implication of 'Digital Divide'.

This research series has developed and proven the S-type diffusion of innovation model among internet users. It has successfully explained the explosion of e-commerce during 1996 to 1999 and forecasted its decline after 2000. Based on this forecast model, the author announced an alert to predict the international 'dot com disaster' 4 months earlier than it really happened. It is possible that this series has observed some core reliable predictors to understand internet users' behavioral pattern and produce a theoretical framework under certain validity. This series might have reflected the first threshold of real science that is reliable and predictable.

The longitudinal data suggested the reality of current 'e-commerce' is 'communication more than commerce'. Most users consider the internet more important as a media channel than as a purchase place. Goods in the B-to-C market are still limited by price. Four strategies were examined including: market scale and trends, sales volume and trends, best seller and potential products, and barriers to e-commerce.

Evidence has also shown another angle in which to consider the 'Digital Divide'. Psychological and cognitive factors might be a better approach than demographic variables to analyze the cause.

This research series is the first and only work to conduct internet users and e-commerce research on a random sampling base in Taiwan.

KEYWORDS

Internet, User Behavior, E-commerce, Diffusion of Innovation, Digital Divide

1. SPECIFIC OBJECTIVE

The internet is becoming a part of human life and forms a new race of 'cybercitizen'. It brings up a key issue of marketing strategy for e-commerce, cross-cultural business and multinational cooperation. However, there is little related research on internet users in Taiwan although Taiwan plays such a distinguished role in the information industry and international business.

This empirical research series attempted to respond to this scarcity to investigate the following:

To explore internet users' profiles and their behavior as world cybercitizens. To forecast internet activities in Taiwan and its implication for e-commerce and globalization.

To analyze the growth and trends of e-commerce. To propose e-commerce strategies on market planning and public policies for private or governmental sectors.

To initiate new ideas of methodological issues for internet users' surveys and also contribute to the scientific philosophy in behavioral research.

The findings were also compared with relevant results in the USA to provide cross-cultural perspectives. Furthermore, the author found there were various results in different studies. The statistics were even not convergent in different release versions of the same survey conductor. The different survey methods and interpretation might have produced this conflict. Thus, four core methodological issues were selected and

* Acknowledgement: this research series has been sponsored by the National Science Council, Economics Ministry and the Institute for Information Industry.

discussed in order to initiate integrated points of view.

2. LITERATURE REVIEW

2.1. Taiwan's Experience

There were some reports with indirect methods such as estimating the number of users. The most popular way was to estimate by personal perspective. For instance, Liou[19] estimated the user numbers by intuition and observation when maintaining his internet server. This method would also cause a very large estimation range. The Education Ministry[11] provided an analysis of communication quantity on TaNet that is the dedicated network for academic or research institutes. The Economic Ministry examined the numbers of host domain names and counted the subscribers that were announced by ISPs. But those methods made it very difficult to identify the individual users' favor service. It was also impossible to precisely estimate user's behavior and their contribution to e-commerce.

Some ran a non-random sampling survey by putting a questionnaire on the internet. An example was Jang[14]'s work. The problem was that respondents were not randomly selected. It could not draw a whole picture including both users and non-users. A couple of commercial organizations such as the Commonwealth Magazine[5], conducted a sampling survey. However, they kept an aggressive point of view to encourage e-commerce participation that was different from a scientific purpose.

The first internet users' report, based on rigid methods and random sampling in Taiwan, was the first wave of this research series that collected user data in metropolitan Taipei, 1996. Since then the survey has been conducted annually, and the sample frame has extended to Taiwan region wide [33][36][37][38][41]. This research series had provided the analysis of internet users and e-commerce for the Economics Ministry and Institute for Information Industry.

2.2. USA and worldwide

There were many useful empirical reports by different organizations in the USA and other countries. They executed their research in various, heuristic methods. A summarized introduction is given in Table 1.

Table 1. Major internet users' surveys and their methods

Organization	Sampling Frame	Research Methods
Network Wizard[24]	Global	Host survey
MIDS[23]	Global	Second level analysis based on data of Network Wizard
CommerceNet -Nielsen[4]	USA and Canada	Random sampling telephone survey series
Find/SVP-Cyber Dialogue[7]	USA	Random sampling telephone survey series
Nielsen-NetRatings[26]	Global	Panel opt-in survey
Media Matrix[22]	Europe and USA	Panel opt-in survey
comScore[6]	USA	Panel opt-in survey
Plurimus[28]	USA	Analysis based on ISP data
Lycos[20]	USA	Second level analysis based on data of Cyber Dialogue
Cyberatlas[8]	Global	Literature analysis

Considering the criteria of a probability sampling procedure, there were two groups and they were generic.

2.2.1. CommerceNet/Nielsen

CommerceNet/Nielsen's Internet Demographic Survey[26] was based on a probability sample of persons 16 years or older among telephone households in the USA and Canada. They made use of re-interviews to compare each other's study. The sample was selected from an unrestricted random digit frame of phone numbers from exchanges operating in the US and Canada. The frame was stratified by geography and

approximately 280,000 phone numbers were selected. Up to 8 attempts was made to reach a household and a respondent was randomly selected. Collected data were transferred by a 3-way weighting procedure (Age / Gender / Region) or a 4-way weighting procedure (Age / Gender / Region / Education).

They classified current internet users into long-time internet users and newcomers. Current Internet users are those respondents who have used the internet in the 6 months prior to the interview, and their classification as long-time users or newcomers are a function of whether or not they had used the internet in the 3 months prior to being interviewed.

2.2.2. Cyber Dialogue and Find/SVP

Find/SVP fielded the American Internet User Survey [12] by telephone with the random digits dialing (RDD) method in 1995. They took 'qualified (heavy) user' definition and suggested that the real number of users were more than those who responded that they were users.

Thus, they formulated the following calculations:

Adult users: respondent household users = 1.43: 1

Total users (including children): respondent household users = 1.61: 1

Cyber Dialogue[7] carried on the American Internet User Survey after they purchased Find/SVP. Using RDD survey of internet users and non-users, they fielded in the second and fourth quarter of every year. They conducted approximately 13,000 screener interviews to identify 1,000 current online users and 1,000 non-users. Their data was weighted for response bias by age, gender, income and geographic region.

CommerceNet/Nielsen (C.N.) was based on general user definition and an aggressive point of view. Cyber Dialogue and Find/SVP (C.D.) took qualified user definition and a careful attitude to interpreting data. There were always conflicts between the two reports.

C.N.'s numbers of users were always much more than C.D.'s every year. The difference was from 50% to 250% (see Table 2). C.N. declared 'Join e-commerce now, or it will be too late' while C.D. warned 'Do not inflate the scale of e-commerce'.

Table 2. Brief comparison of the estimation of users

Year	1995	1999
CommerceNet/Nielsen	16%	41%
Find/SVP/ Cyber Dialogue	6.40%	30%

C.N. suggested the car would be the best seller for e-commerce, while C.D. pointed out people did not shop for new cars online. With a second examination, we found C.N. was asking about the 'searching information to buy a car' when C.D. was talking about real closed transactions.

Those studies provided grounded perspectives, and reference maps to conduct user survey in Taiwan. However, their contradictions proved that different survey methods would produce contrary results and point of view. Wu and Song[35] asserted that are still a lot of questions in the field of behavioral research. We need to adopt Kuhn[16]s' revolutionary spirit, to deliberate more effort on methodological issues to define indicators, to reconsider measurement, to initiate a new behavioral model.

3. METHODOLOGY

The following study design would adopt the former studies' heuristic experiences and attempt to denote a more precise research paradigm to include more comparative respondents' opinions.

Four methodological issues could be deduced and discussed as follows.

3.1. Measuring who the internet user is

Who is an internet user? This definition will affect the methods and results of the study.

A vague general user's definition was taken by many studies as people who had experience accessing the internet within the last 6 months. However, C.D. advocated a rigid concept of 'qualified users' or 'heavy users' who had to have an email account and had to use at least one internet application.

Though most studies did not exactly check these definitions, it indicated two conceptual ideas of users whom we shall consider. It also explained why C.N. had a higher percentage of users', because they implicitly took the 'general user' definition.

According to changes in the internet market, people would obtain at least a browser in addition to an email when they apply for an internet account. It seems that C.D.'s two rules could be combined as one. Therefore, the author suggested the definition of 'qualified user' shall be someone who had a personal internet account (the same as an email account).

A general user was one who had a chance to have a glance or borrow an internet account to have a peek occasionally. It is obvious that their user behavior does not have same value in these two user groups.

3.2. The weighting procedure of estimating user numbers

All former studies interviewed only one respondent who answered the phone in the sample family. It was highly possible that there were more than 1 user in a family. On the other hand, if the respondent answered that he/she was not using the internet, then 1 family would be added to the non-users record. On the contrary, the truth might be there were other users in the family.

Most studies reported that they employed 2 possible ways to compensate for such flaws. They would use a weighting skill by demographic or other independent variables. They always made a further step to formulate their own ratio to estimate the user number. The basis of formulation was heavily dependent upon researchers' experience and intuition. It would reveal why there were such large gaps between different organizations' surveys. Furthermore, we could find there were not totally convergent versions of the same organization.

The author suggested a 3-step procedure to solve this problem:

In the opening section of interview: ask the respondent if there was anyone who was using the internet in his/her family. If there was, the interviewer must ask for the user. If the user was not home, the interviewer must make an appointment and use callback until the user was located.

In the closing section of the interview: ask the respondent how many other households were internet users in the family and how many of them obtained their own internet accounts.

In the analysis, 2 tables can be produced from the collected data of steps 1 and 2, and can be used to formulate a quantitative ratio of family users and respondent users.

This procedure would provide a more precise estimate based on clear data.

If it is inevitable that human experience and intuition have to be involved in estimation, then Cyber Dialogue[7] remembered a valuable methodological philosophy that it was better to keep a conservative attitude. They criticized the fact that there were lots inflated statistics of internet activities that were from too positive a point of view.

3.3. Predicting procedures for future growth

There were also two ways that most of the former studies predicted the internet in future. They used historic data and their intuition. The basis of their prediction was mostly linear.

Although the linear method was a quite simple approach to forecast the future, it was considerably doubtful that humans would follow a linear behavioral pattern.

The researcher suggested that a classic theory of the diffusion of innovation or the S-type adoption model would draw a better picture.

This fruitful idea could be traced back to Ryan et al.'s[31] early original work in 1940's, Katz's[17] and Bohlen's[1] deduced frameworks in 1960's. Rogers et al.[29][30] defined the final concept as an 'innovation model' in the 1970s. Extended applications in the information technology field could be included: Gibson[13] and Nolan's[27] four stages of EDP growth in the 1970's and Nolan et al's IT adoption theory in the 1990's.

The basic assumption of this theory was that users of an innovation would be passing through a 4-stage S-type curve from awareness, trial, evaluation to adoption.

The researcher suggested that the S-type curve could be explained as the cumulative curve of the normal distribution for the time frame of new users. Then the certain period of each stage of innovation could be computed.

Nevertheless, the S-type model was a qualitative concept; the author suggested a 3-step procedure for predicting the future innovation:

Testifying and adjusting the historic data to how it fitted to the awareness stage of S-type.

Determining where the critical point from awareness to adoption was.

Predicting the time period of the next stage by the last stage.

This forecast might match human's behavior more closely.

3.4. Measuring sampling precision rates

Sampling precision was directly related to the inference of results. It was easy to estimate the sampling error theoretically. It was another story to apply field work.

An early and common equation was suggested by Kuiz[18]:

$$\begin{aligned} \text{Response rate} &= \text{response samples} / (\text{drawn samples} - \text{unconnected samples}) \\ &= \text{response samples} / (\text{response samples} + \text{refusal samples}) \end{aligned}$$

It was a somewhat confusing and incomplete definition.

First, ruling out unconnected samples from the denominator of designated samples would cause significant distortion. Research evidence showed that people, who were difficult to locate, always retained different characteristics from those who were easy to be found.

Second, defining refusal as the incomplete part was a bias of interpretation. Refusal meant the selected respondent did pick up the phone, then hung up after understanding the survey's purpose and gave no clear answers. They, eventually, responded to the call and expressed their attitude for the survey: negative or non-opinion. They were meaningful in the analysis and could not be excluded from the designated samples.

'Refusal' made things hard. In the real world, it is rare to get a one-hundred percent complete response for a long questionnaire and marketing surveys are always relatively long. Each researcher has his own way to screen and interpret the data.

The author would introduce two emerging significant problems as follows. (There were more detailed problems in fact)

Most of the telephone surveyors used a telephone directory as the sampling frame. However, the percentage of unlisted users was up to 40%, which already endangers the basis of random sampling. The author suggested that a virtual population directory, with a random dialing method, must be designed and generated by database management techniques instead of a telephone directory.

Next, almost all the survey researchers would take a replacement when they failed to access a designated sample. The replacement percentage could reach as much as 60% due to the growth of social mobility. It would totally distort the precision of the sampling.

An easy to be forgotten principle was: 'Do not replace drawn samples, even they were difficult to connect to.' (Many current surveys violate this rule.) There was only one exception under the method of sampling from a virtual directory. This method would unavoidably draw a certain proportion of inactive phone numbers that did not 'exist' within the designed sampling frame. The inactive samples may or may not be replaced according to the research resource. Active samples did not affect sampling precision, but it determined the real sample size and the denominator of the sampling precision rate.

Since it would produce confusion between 'replacement' and 'non-existing sample', if a virtual sampling directory was adopted, the author also suggested an online control procedure to lower the difficulty.

Unfortunately, there is not a universal standard definition and management procedure to cope with the above problems in the community of marketing survey yet.

Therefore, the author suggested four rates: active rate, accessed rate, response rate, and eligibility rate to evaluate sampling precision for applied surveys. A brief operational definition is provided as Table 3.

Table 3. Four rates to evaluate sampling

Object	Operational Definition
Active sample	Existing sample in the virtual sampling frame
Inactive sample	Non-existing sample in the virtual sampling frame
Updated sample	Updating the inactive sample by a screening procedure, if this procedure is employed
Final active samples	Original active samples + updated active samples
Total samples	= Original drawn samples from virtual sampling frame + updated samples
Active rate	= Final active samples / total samples
Accessed sample	Active sample was connected
Lost sample	Active sample was not connected
Accessed rate	= Accessed sample/ Active samples
Response sample	Sample answers the core questions
Refusal sample	Sample does not answer the core questions completely
Response rate	= Response sample / Active samples
Eligibility sample	Sample passed filtering items
Ineligibility sample	Sample does not pass filtering items
Eligibility rate	= Eligibility sample / Active samples

The four rates were expected to provide a broad scope and clear perspective to examine the sampling precision. The accessed rate was very useful to project the basic level for sampling precision while the active rate could also reflect the cost-efficiency of the research design.

3.5. Research series design

3.6. Sampling

The sampling frame is the Taiwan region including Taiwan Province, Taipei and Kaohsiung Metropolitan areas.

Sampling method: Systematic or simple random sampling from virtual directories drawn by information systems.

Household selection: Random selection procedure employed.

Expected errors: desired confidence limits and confidence interval based on the research budget and the optimum estimation of the author's [34] design.

This research series, based on the above methodological improvements, developed the following research designs, as Table 4, from 1996 to now.

Special design: No replacement allowed.

3.7. Measurement

The main questionnaire structure of the surveys was divided into 3 parts to measure different problems.

To identify if the respondent was an internet user.

Users: to measure their understanding about the internet and information application; to ask their using place, time, and their behavior on e-commerce including their favor, the resources, services, product categories, their purchase history and comments, and their email address.

Non-users: to measure if they knew anything about the internet and information application; to measure if they had related equipment and potential motivation to become users and why; to ask their reasons why they were not users yet.

Some question items and item values were modified every year with concerns of information technology development and market change.

Demographic data will be collected at the end of the interview.

3.8. Interviewing

Method: Telephone interviewing.

Verification procedure: 5% of complete interviews were repeatedly interviewed to verify and measure the reliability of interviewer.

Using the continuous call back method to access selected respondents who were always not home. (Wu[34])

4. SELECTED FINDINGS

4.1. Sampling Analysis

A major brief sampling analysis is as Table 4.

A new random sample set was drawn from Taiwan regional wide every year from 1996 to 2001. For year 2002 to 2003, revisit skill was employed by panel samples redrawn from database of Taipei metropolitan area.

According to the accessed rate, it was gradually improved by experience and control procedure annually. Rate above 80% could be considered as convincing, while rate above 90% could be very convincing. The series sampling precision was above average except survey 1996.

Two additional procedures were employed to testify sampling precision. The first was to compare the gender distribution of sample and census data. The second was to compare the using time distribution of users' activities reported by respondents and the record of server.

The gender distribution differences were all within and/or lower than expected errors of sampling design.

On the time distribution of internet using, this study also found that was matching the report by the Education Ministry.[11]

The multiple analyses could support the acceptance of this research series.

Table 4. Sampling analysis

	Original samples	Updated samples	Active samples	Active rate	Accessed sample	Accessed rate
2005	3000	4642	4421	57.9%	4390	99.7%
2004*	3103	0	2436	78.5%	2410	98.9%
2003	2683	0	2308	86.0%	2142	92.8%
2002	1600	0	1323	82.7%	1266	95.7%
2001	4000	2099	4000	65.6%	3606	90.2%
2000	3200	800	3225	80.6%	2896	89.8%
1999	1600	556	1600	74.2%	1434	89.6%
1998	2000	224	2000	89.9%	1668	83.4%
1997	3000	0	2766	92.2%	2261	81.7%
1996	1500	0	1202	80.1%	905	60.3%

*We employed a revisit design for 2004. All the samples were from the former accessed samples of database. The inactive samples reflected the changing proportion of phone numbers. Furthermore, the analysis technique would be different and would be introduced in another way.

4.2. Modeling, Forecast and Trend Analysis

The forecast model was designed by the historical structure of users, and non-users s, therefore, their future trends could be predicted as follows.

The growth of users was summarized as Table 5.

Table 5. Users and non-users (%)

	General Users		Qualified Users		Non-Users	
	Family	Population	Family	Population	Family	Population
2005 Taipei	58.2	37.4	48.6	37.8	41.8	62.6
2004 Taipei	56.8	46.2	47.2	34.8	43.2	53.8
2003 Taipei	64.3	42.8	58.6	36.6	35.7	57.2
2002 Taipei	61.2	38.7	47.7	26.7	38.8	61.3
2001 Taipei	48.0	17.3	36.2	11.6	52.0	82.7
2000 Taipei	42.2	14.7	24.8	7.6	57.8	85.3
1999 Taipei	25.2	7.6	15.5	4.1	74.8	92.4
1998 Taipei	26.2	7.9	16.5	4.1	73.8	92.1
1997 Taipei	27.2	9.0	17.5	5.1	72.8	91.0
1996 Taipei	17.2	-	9.9	-	82.8	-
2001 Taiwan						
2000 Taiwan						
1999 Taiwan						
1998 Taiwan						
1997 Taiwan						

It was a fast growth for general user. In 1996, there were 13.5% respondents in Taipei metropolitan who had at least one chance to use internet. The estimation of Taiwan regional wide could be around 10%.

Since the sampling unit was family, the researcher made further questions about if other households in the family also used internet as Table 6 to weight the average user numbers per home. Calculating the result of Table 6, it could estimate the general users' percentage of population made a halfway milestone (50.6%) in 2000. However, the numbers of general user appeared a retreat in 2001, it also happened in USA.

The growth rate of qualified user, who owned an email account, had a relatively slower but steady progress. It followed the expected growth curve even in recent years of the recession of dot-com.

The year of users began to use internet was summarized in Table 7. The data weighed with Table 5 would produce the cumulative percentage of users as Table 8.

Assume:

P_k = Percentage of that there are k users in a family

Q= Average numbers of households in a family

n= Numbers of users in a family

Then, define:

$$\text{Weighting} = \left(\sum_{k=2}^n k * P_k \right) / 100 / Q$$

The figures that produced by the above weighting model matched the S-type innovation theory. It also implied that internet had passed the 2nd step of diffusion of innovation.

Table 6. Household users(%) and average numbers per home

\No	Use internet						Have email account					
	1	2	3	4	5+	Ave.	1	2	3	4	5+	Ave.
2005	11.2	27.6	28.0	20.4	12.8	3.0	2.6	13.6	30.9	29.2	23.8	3.6
2004	8.0	29.0	33.7	21.0	8.3	2.9	14.1	34.0	30.7	14.7	6.5	2.7
2003	12.0	32.3	28.4	18.5	8.8	2.8	15.6	37.2	25.2	13.6	8.4	2.6
2002	17.8	29.6	28.5	17.5	6.6	2.7	24.4	35.9	24.7	10.4	4.6	2.4
2001	75.9	8.6	6.4	6.5	2.6	1.5	81.5	8.2	5.4	3.7	1.2	1.3
2000	76.1	10.0	7.9	3.7	2.3	1.5	82.8	9.9	4.4	2.2	0.7	1.3
1999	85.4	6.9	4.7	2.0	1.0	1.3	91.7	6.1	2.0	0.1	0.1	1.1
1998	86.0	6.1	4.6	2.4	0.90	1.26	96.8	2.1	0.7	0.3	0.1	1.0
1997	75.7	13.5	6.8	3.7	0.30	1.39	85.0	9.5	4.6	0.6	0.3	1.2

Table 7. Year began to use internet of qualified users(% of qualified users)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
2005	0.5	0.8	1.0	0.5	9.5	5.0	6.8	7.3	9.8	11.8	15.5	11.8	10.8	5.3	1.8
2004	1.2	0.2	1.0	4.6	2.4	8.7	3.9	8.2	12.3	13.8	16.9	11.6	11.1	3.6	
2003	0.8	0.3	4.0	1.4	2.3	8.1	10.5	13.1	11.7	17.2	16.8	11.4	2.4		
2002	0.9	2.5	0.9	1.8	3.2	9.6	12.5	14.1	15.7	17.3	16.6	3.6			
2001	1.1	0.5	1.5	2.5	4.3	11.3	11.6	17.2	20.1	18.5	10.6				
2000	0.5	0.5	1.8	1.9	5.2	10.7	14.9	18.0	31.1	14.2					
1999	1.5	0.3	1.7	2.3	4.4	13.4	26.5	32.8	17.2						
1998	0.8	1.1	1.8	6.6	13.9	31.9	37.7	6.3							
1997	1.4	1.8	2.7	4.1	15.8	42.5	31.7								

Table 8. Cumulative percentage of qualified users(% of total population)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Ave.	0.1	0.3	0.5	0.9	1.7	3.0	4.5	6.9	10.3	15.2	21.8	28.5	33.7	35.2	37.1
2005	0.2	0.5	0.9	1.0	4.6	6.5	9.1	11.8	15.5	20.0	25.9	30.3	34.4	36.4	37.1
2004	0.4	0.5	0.8	2.4	3.2	6.2	7.5	10.3	14.5	19.3	25.0	29.0	32.8	34.0	
2003	0.3	0.4	1.7	2.2	3.0	5.7	9.3	13.7	17.7	23.6	29.3	33.2	34.0		
2002	0.2	0.7	0.9	1.3	2.0	4.1	6.9	10.0	13.4	17.2	20.9	21.7			
2001	0.1	0.1	0.3	0.5	0.8	1.7	2.7	4.1	5.7	7.3	8.1				
2000	0.0	0.0	0.1	0.2	0.4	0.9	1.5	2.2	3.5	4.1					
1999	0.0	0.0	0.1	0.1	0.2	0.4	0.9	1.5	1.8						
1998	0.0	0.0	0.1	0.1	0.3	0.8	1.3	1.4							
1997	0.0	0.0	0.1	0.1	0.3	0.9	1.3								

4.3. Forecast Model

Assume:

Y_{ij} : Observed cumulative percentage of qualified users of the i year at the survey of j year.

P_i : The average cumulative percentage of qualified users of the i year

Then :

$$P_i = \sum_{k=1}^j Y_{ik}$$

Assume:

C : Constant

β_1 : Unknown parameter

Therefore:

$$\ln P_i = \ln C + \beta_1 i$$

Define:

$$\beta_0 = \ln C$$

$$P_i^* = l_n P_i$$

Then:

$$\beta_1 = \frac{\sum_{i=1}^n i P_i^* - n \bar{i} \bar{P}^*}{\sum_{i=1}^n i^2 - n \bar{i}^2}$$

$$\beta_0 = \bar{P}^* - \beta_1 \bar{i}$$

Therefore, a basic forecast model could be produced as:

$$\hat{P}_i = e^{\beta_0 + \beta_1 i}$$

This model could explain and forecast the left side of the S-type curve. However, a pure exponential model will reach a lasting growth curve that is against the reality. Thus, when the curve is approaching the top of the 'S', the moving angle θ between P_i and P_{i+1} should also be adjusted by the calculation of moving average.

According to the momentum of S-type model's changing, the development of internet is standing on a critical increasing turning point. It took 5 to 6 years to finish the first stage of innovation diffusion; we could predict that it needs another 5 years to accomplish evaluation and to reach popular adoption.

4.4. Users' Behavior

Internet users' profile and their chronological change could be sketched as Table 9:

Table 9 Internet users' profile (%)

	Gender		Age				Education				Income		
	Male	Fem.	~15	16-30	31-50	51~	-Mid	High	Aca-	low	Ave.	High	
2004	44.7	55.3	7.9	50.1	33.3	8.7	13.1	31.5	55.5				
2003	47.94	52.06	7.26	50.22	32.66	9.87	15.51	29.71	54.78				
2002	46.82	53.18	7.12	39.71	36.15	17.02	26.91	32.73	40.36				
2001	54.1	45.9	12.2	55.0	30.4	2.4	11.6	30.2	58.2	65.0	23.2	11.8	
2000	49.5	50.5	9.5	44.4	36.6	9.6	21.7	33.7	44.7	45.4	40.4	14.3	
1999	50.9	49.1	8.7	58.7	30.7	2.0	10.3	27.9	61.7	99.6	0.4	0	
1998	51.6	48.4	2.9	52.7	40.7	3.7	7.0	35.5	57.5	37.7	36.8	25.5	
1997	60.2	39.5	~	54.8	28.0	17.2	12.4	25.8	63.8	56.6	28.6	21.6	
1996	68.1	31.9	~	55.7	25.6	11.6	2.3	6.6	91.1	38.3	21.3	40.4	

Male was more than female of internet users before 1997. After 1998 female users were growing and got natural balance.

More than half of users were younger than 30. Mid aged user group increased while senior user group stayed small.

Use of internet was correlated with higher education. Most users were educated in academy or college or above. Number of user group under middle school was the least. Users with high school diploma were moving up.

The annual income of users could be categorized into low (under US\$7,000), average (US\$7,000-17,500) and high (above US\$17,500). The result needed a further explanation why the percentage of the category of 'low income' was so high. The reason was that there were many student users without stable revenue. Excluding students, user's income was above average.

However, we found the missing data of income is constantly large, so this data was not included in the

formal report after 2002 to avoid misleading inference.

Though the job fields of users were various, their ranks seemed higher. The most popular job function was professional and technical, then administrative and managerial.

No significant difference of user behavior was found between users' gender, age and education.

Table 10. Places using internet (%)

Place	Home	School	Office	Café etc.	Other
2004	69.5	8.0	18.9	3.5	
2003	74.88	5.34	17.46	1.73	
2002	69.72	7.25	18.76	4.26	
2001*	94.6	-	-	-	
2000	65.4	13.0	18.7	2.5	0.4
1999	65.9	11.9	20.4	0.6	1.2
1997	52.0	24.4	16.3	2.3	5.0
1996	36.0	26.0	32.0	-	6.0

*See explanation

Users would spend average 3 days more in a week to surf on internet.

Home, Office, School showed their changing importance of using internet by their order. The percentage of school was somehow stable as expected. It also implied internet's growing popularity in family nowadays.

Except 2001, the respondent was asked to answer where is the most place he/she used the internet. In 2001, the focus was if the user had the experience to use internet at home.

Table 11. Most important resource or service (%)

	WWW	Email	Messenger	FTP	AV	Games	News	BBS & Chat	P2P	Others
2004	33.9	22.9	8.0	1.8	1.6	10.1	10.7	4.1	0.4	6.5
2003	31.5	36.4	8.2	7.4	1.9	8.4	3.9	1.9		0.3
2002	30.4	36.2	4.9	5.9	1.6	8.3	7.4	4.4		0.7
2001	20.9	19.6	5.4	15.1	5.2	8.6	17.1	8.1		-
2000	58.6	26.2	-	2.7	-	-	2.8	8.7		1.0
1999	58.0	20.0	-	1.6	-	-	1.3	6.5		11.6
1997	47.3	21.4	-	2.7	-	-	1.8	17.9		9.0
1996	33.0	23.5	-	14.1	-	-	7.1	21.2		1.2

Table 12. Most important information (%)

	Business	Life	Sciences	Entertainment	Social	Culture & Arts	Government	Education	C&C	Medical care
2004	9.2	22.3	3.2	23.4	6.8	6.3	3.9	5.1	6.2	3.0
2003	8.5	26.5	1.8	28.7	3.3	3.3	6.5	5.7	10.6	3.6
2002	9.9	23.8	2.6	30.3	3.9	4.0	5.7	6.2	9.3	3.0
2001	11.3	11.7	2.5	22.0	1.6	1.7	8.6	6.1	7.0	1.8
2000	12.7	22.5	3.9	29.8	1.5	4.3	3.4	8.7	10.9	2.3
1999	13.1	19.1	2.1	30.5	1.5	3.6	5.8	8.0	10.8	1.8
1997	10.2	20.9	2.8	27.9	1.4	3.3	2.3	7.4	12.1	0.9
1996	17.4	19.7	2.33	26.7	4.7	4.6	2.2	5.8	15.2	1.1

WWW with their advantages of multimedia performances became users' favor resource. Since the fast growth of websites, the importance of search services and portal sites were getting hotter. Like the significance in United States, communication including email, BBS and other chat services took major activities of users. The chat function of BBS was widely adopted than other popular chat application. The reason is the common language in BBS is Chinese while other chats, such as IRC, are English.

'Soft information' was the basic demand of users. Browsing entertainment and life information motivated near half of users' accessing in different time frames.

Business activity was still relatively slow move on internet.

The dominant equipment surfing on internet was PC. The most popular platform was Windows. Considering the browsers, Netscape is slightly more than I.E., while less than 10% users were using both of them.

Table 13. Top 10 internet providers (%)

	HiNet	SeedNet	TANet	Ht.net/AP OL	ADSL	ERANet	EBT	GCNet	Giga	FICNet
2000	55.6	10.4	7.3	1.2	0.6	0.6	0.6	0.4	0.4	0.3
1999	60.2	9.8	9.8	1.5	-	-	-	1.8	-	0.9
1997	46.8	10.1	21.1	-	-	-	-	-	-	-
1996	36.0	13.0	11.0	-	-	-	-	-	-	-

Table 14. Top 10 portals of default homepage

	Yahoo	Hinet	MSN	PCHome	Yam	Google	Sina	Giga	Office, School	None
2004	73.92	4.84	2.59	2.76	1.55	2.07	0.35	0.17	1.21	2.07
2003	68.72	7.20	3.67	3.67	2.94	2.06	0.88	0.73	3.23	2.79

It is very useful to examine uses' activity of surfing websites and describing internet providers. However, the data of top 10 websites was limited to reveal from the beginning of this research series due to the concerns of business conflict in the industry.

The top 3 government funded providers: HiNet, Seednet, TaNet owned major market share; the ex-monopolized telecommunication company HiNet took the largest pie. However dozens private ISPs were playing aggressive as well as competitive role in the market to develop their territory. It would also bring a fast acquisition and reorganization in small ISPs under such competition in the near future. Lot of users was using what they were given and they did have the idea who was the provider.

After 2001, the rank of ISP was not allowed to publish by the research sponsor anymore, either.

However, we developed another angle to look out this matter from 2003. We gathered the data which was the portal of uses' default homepage of their browser, if they had one. The finding was also amazing.

Table 15. Barriers to users

	None	Connect	Interrupt	Slow	Phone line	Operatio n	Privacy & Security	Virus	Porno	Spam	Content	Cost
2004	25.4	3.8	12.1	27.3	1.9	1.6	1.8	6.3	2.7	6.6	5.2	1.9
2003	17.3	4.7	9.8	26.9	1.3	0.8	3.3	9.8	3.7	14.6	4.6	2.3
2002	16.6	2.8	13.3	34.0	2.3	1.2	2.1	7.1	1.9	11.5	3.3	3.1
2001	18.5	10.9	20.5	55.0	1.2	1.0	0.3	3.1	0.6	2.9	2.1	0.6
2000	8.5	14.9	17.1	54.7	-	1.9	2.8	-	-	-	2.4	-
1999	10.6	14.5	11.7	50.2	-	1.9	2.2	-	-	-	-	-
1997	6.5	11.1	4.0	39.1	-	2.2	0.3	-	-	-	-	-

Concerning the barriers, bandwidth and related problems including: difficult to connect, interruptions during connect, and slow data transferring were users' primary complains. Relative few users became aware of privacy and security issues. An emerging and enlightening issue was that users began to dissatisfied to find proper information and contents.

4.5. E-Commerce

How many users were who considered internet was an alternative use for their normal life? The researcher pointed out 3 alternatives: media and political forum, Learning classrooms, and shopping and e-commerce

place. Their answers showed that e-commerce was just beginning.

Not until 1999, CommerceNet/Nielson claimed the beginning of e-commerce year in USA, were there barely 1 tenth internet users shopping online in Taiwan. The increasing rate was even not much in users right now.

After 2002, we put one more indicator that the user would respond to online shops' promotion.

Table 16. Activities in e-commerce (%)

	Taxation	Stock	Shopping	Responding to promotion	willing to pay for Ads
2004	13.9	11.1	42.8	27.2	44.0
2003	4.1	3.0	10.5	8.8	6.1
2002	2.6	3.7	9.7	9.1	-
2001	-	-	17.0	-	-
2000	4.0	5.7	10.9	-	-
1999	-	-	9.9	-	-
1997	-	-	5.0	-	-

If we put the data of e-commerce activities into the same S-type innovation model, we would find that e-commerce was still slowly moving on the flat, long stage of awareness.

The average monthly purchase records were also relatively low.

Table 17. Purchase volume (US\$)

	Average per month	Lower limit	Higher limit	Standard deviation
2004	99.3	1.5	2121	291.2
2003	67	1.3	2850	162
2002	108	3	2850	236
2001	90	1	1430	223
2000	96	3	580	
1999	64	9	370	

On the purchased products, there were not many categories before 1999 while there were diverse choices after 2000.

Relatively hot products were: computers software, books, leisure commodity such as music CDs, and electronic hardware. Next were tickets, toys, fashions, adult accessories, furniture, and cars.

There were 2 features for online bestsellers: low price and stable quality. Service oriented products were also promoted such as 'hours of internet use' (that was included in the item of software) and ticketing.

The items of goods and services were also adjusted by the buyers' responses annually.

Table 18. Purchased products-multiple choice (%)

	Books	H/W	S/W	Leisure	Job	AV	Toys	Furniture	Fashion	Flower	Cars	Adult	Ticket	Commodity	Cosmetics	Education	Gambling	Finance
2004	8.4	8.7	6.1	1.8	0.2	3.2	1	1.3	5.4	0.5	0.3		1	4.9	0.3	0.2	0.2	0.3
2003	2.5	2.0	1.9	0.4	0.2	0.7	0.2	0.0	0.6	0.2	0.0	0.0	0.8	1.1	0.5	0.0	0.0	0.2
2002	3.7	1.3	2.5	0.6	0.1	0.3	0.1	0.1	0.5	0.2	0.0	0.0	1.1	0.6	0.0	0.0	0.0	0.1
2001	5.8	2.8	3.6	1.5		1.5	0.1	0.3	0.3	0.2	0.0	0.0	2.5	0.5	1.6	0.1	0.2	1.7
2000	2.5	1.4	3.1	-		1.5	0.5	0.2	0.3	-	0.2	0.2	0.9	-	-	-	-	-
1999	2.4	0.5	-	-		2.6	-	0.3	-	-	-	-	-	-	-	-	-	-

Were there any concerns for experienced online consumers?

Relative few people did not worry. The barriers to them were: the security of transaction, the leakage of personal privacy, the product quality, the way to pay, the after services and refund policy, the possibility of fraud, and the time for delivery.

In the other hand, the non-buyers' reasons were almost the same. Some did not know yet that they could

shop online. However, there were certain amount users who just not used to e-commerce.

Table 19. Barriers to consumers-multiple choice (%)

	None	Quality	Security	Fraud	Price	Payment	Delivery	Services	Privacy
2004	11.7	16.3	15.2	19.5	3.8	6.7	3.5	5	15.2
2003	16.6	9.8	18.0	11.2	2.5	5.9	1.6	9.9	22.8
2002	13.3	10.5	24.1	8.9	5.5	6.5	4.8	3.2	0.0
2001	12.0	18.0	33.5	22.8	3.0	3.0	3.6	6.0	21.0
2000	14.4	13.8	21.6	2.9	-	12.1	2.4	7.3	22.3
1999	14.8	10.2	36.1	-	-	-	25.0	-	-

Table 20. Reasons to users don't shop-multiple choice (%)

	Not aware	Quality	Security	Fraud	Payment	Price	Delivery	Services	Privacy	Not used to
2004	6.5	13.5	17.1	23.3	1.3	4.1	1.3	0.8	10.1	11.4
2003	3.6	11.9	20.7	11.4	6.5	5.6	1.8	2.2	17.5	18.0
2002	7.7	9.8	18.5	16.5	2.5	5.9	1.4	2.4	17.3	16.3
2001	3.3	24.4	19.2	22.2	1.6	6.2	2.5	1.1	7.0	33.8
2000	3.9	12.9	17.5	12.0	6.9	-	2.1	3.2	17.3	24.2
1999	11.5	47.2	-	-	-	-	-	-	-	17.9

The promising aspect was there were 14.9% of non-buyers who would consider trying e-commerce in the coming 6 months in 2003 and grew enormously to 43.2 in 2004.

For the possible coming buyers, they provided their shopping list. Most of categories were as same as existing products. Though, in 2000, they suggested 2 new potential items: the first is leisure and travel packages, and the second is cosmetics and non-prescript medicines. It ended up to become popular online goods after 2001 and realized the users' expectation.

The average and range they would like to pay for the online shopping coincidentally remained the same as existing buyers.

Table 21. Potential buyers

	Percentage of non-buyer
2004	43.2
2003	14.9

Table 22. Potential products-multiple choice (%)

	Books	H/W	S/W	Leisure	AV	Toys	Furniture	Fashion	Flower	Cars	Adult	Ticket	Commodity	Cosmetic	Education	Gambling	Finance
2004	7.9	7.6	5	2	0.3	1.7	0.5	0.8	4.4	0.2	0.3	0.2	0.8	2.5	0.2	0.2	
2003	17.8	17.5	12.8	3.6	4.1	8.5	0.8	1.1	1.1	0.8	0.0	0.0	7.4	10.1	2.5	0.5	0.0
2002	21.8	13.3	18.1	11.8	1.9	7.1	1.9	0.7	3.1	0.7	0.0	0.0	3.7	6.7	1.7	0.0	0.0
2001	2.4	1.0	0.9	0.4	0.2	0.8	0.1	0.2	0.5	0.2	0	0.3	0.6	0	0	0.1	0
2000	7.2	4.0	4.5	0.2	-	4.1	0.5	0.6	1.0	0.5	0.2	2.3	-	0.6	1.8	-	6.0

Table 23. Acceptable subscribing price (US\$)

	Average per month	Lower limit	Higher limit	Standard deviation
2004	196.6	0	3333	436.1
2003	17	0	94	11
2002	16	0	31	11
2001	16	3	26	5
2000	17	6	19	

Would the potential buyers pay for subscribing information?

They would agree to subscribe financial analysis, entertainment features, and computers related information. The acceptable monthly fee was around US\$16.

There was also 16.1% users agreed to post internet advertisement if it was necessary.

The longitudinal data suggested the reality of current 'e-commerce' is 'communication more than commerce'. Most of users consider the internet as a media channel is more important than as a purchase place. Goods in B-to-C market are still limited by the price. Four strategies were examined including: market scale and trend, sales volume and trend, best seller and potential products, and barriers for e-commerce.

All findings showed, it should take a very careful policy to run e-commerce in the near future in Taiwan.

4.6. Non-users Behavior

Non-users were asked to report if they ever heard internet, and how much they knew about internet by the scale from 1 to 100. The mean score was 28.8 in 1997, 20.0 in 1998, 31.2 in 1999, and 17.6 in 2000, 17.5 in 2001, 25.56 in 2002 then it kept 24.65 in 2003. Those who reported their knowledge below mean would be categorized as not understood.

Table 24. Non-users knowledge about internet(%)

	Non-Users	Never heard	Heard, not understood	Understood, not using	Knowledge score
2005 Taipei	62.6	42.1	0.7	19.8	62.6
2004 Taipei	53.8	19.2	7.0	27.6	53.8
2003 Taipei	57.2	14.9	19.8	22.5	57.2
2002 Taipei	61.3	14.3	20.0	27.0	61.3
2001 Taipei	82.7	45.2	2.2	35.3	82.7
2000 Taipei	85.3	29.0	32.1	24.2	85.3
1999 Taipei	92.4	25.0	45.8	21.6	92.4

The respondents in Taipei had more knowledge about internet in each category than who was in Taiwan regional wide. It was worthy noting that there was always a considerable part of population who had never heard of 'internet.'

Table 25. Reasons of not on internet yet (%)

	Lack of knowledge	Short of facilities	No need or not interested	Fear computer or language concerns	Too busy to use	Cost concern	With replacement
2004	13.1	21.5	46.8	3.8	19.8	0.8	0.4
2003	5.6	19.6	35.8	9.1	19.2	6.5	1.8
2002	10.1	35.5	35.6	6.6	19.7	5.5	4.8
2001	3.6	39.5	26.4	4.1	20.8	5.6	3.8
2000	13.8	22.2	32.9	8.1	18.3	4.7	-
1999	18.5	10.0	33.9	7.1	4.9	20.5	-
1998	19.2	60.7	7.8	1.4	2.3	6.8	-
1997	22.3	33.5	24.4	1.7	8.9	3.0	-
1996	36.1	27.9	-	8.1	-	9.3	-

Short of facilities, lack of knowledge and no need or not interested were the biggest obstacles for potential users. The data also implied that internet did not walk in ordinary life in Taiwan yet. Anyway, it would promise a lot of attraction to the potential users in the future, if facility was more available.

The demographic analysis of non-users was almost on the contrary to the users. Summarized profile was as follows.

In 1997, female was more than male. It reached a balance percentage right now.

Compare with users, senior person were relatively more than young people for non-users.

Most of non-users' education background was under high school. Almost half were under primary school.

The job fields of non-users were also various except about 1 third were housekeeper.

The income of non-users was lower than average, though the trend was gradually changing. It indicated again that the social economic status was highly related the motivation to access internet in the entry stage of innovation.

Table 26. Non-users' profile (%)

	Gender		Age				Education			Income		
	Male	Fem.	~15	16-30	31-50	51~	-Mid	High	Aca-	low	Ave.	High
2003	44.07	55.93	6.90	14.83	45.17	33.10	46.21	33.79	20.00			
2002	40.26	59.74	3.9	22.3	40.1	33.7	46.02	36.33	17.65			
2001	50.5	49.5	6.4	21.5	43.6	28.4	51.0	31.7	17.3	38.8	52.4	8.8
2000	44.1	55.9	7.2	22.9	40.3	29.7	55.7	33.3	11.0	59.6	32.1	8.3
1999	55.0	45.0	7.8	24.0	49.3	19.0	41.5	35.3	23.3	98.0	1.7	0.3
1998	45.7	54.3	3.4	23.7	50.4	22.5	43.6	37.9	18.5	52.1	31.9	16.0
1997	46.2	53.8	6.0	21.5	34.0	38.5	47.9	34.2	17.9	65.0	26.1	8.9

5. CONCLUSION

5.1. Exploring a prototyped paradigm for Internet users' behavior

There were two major findings of this research series:

Exploring and developing a forecast model of internet users.

Profiling the internet users and redefining the implication of 'Digital Divide'.

Crossings a 9-year time frame, this series has found a set of reliable variables and observed longitudinally coherent measurement that many marketing, even general behavioral, researches do not have. This series might have reflected the first threshold of real science that is reliable and predictable.

We have emulated a stable demographic structure and its change, forecasted a coherent and predictable growth curve. This cumulated finding might have explored an 'Internet users' behavioral model' with the fundamental of scientific paradigm.

This research series has developed and proven the S-type diffusion of innovation model in internet users. It has successfully explained the rush on of e-commerce during 1996 to 1999 and forecasted the decline after 2000. Based on this forecast model, the author announced an alert to reveal the international 'dot com disaster' in 4 months earlier than it really happened. It is possible this series has observed some core reliable predictors to understand internet users' behavioral pattern and produced a theoretical framework under certain validity.

This series also revealed the evidences to reason the 'Digital Divide'. It had enlightened that the psychological and cognitive factors might be better approach than demographic variables to analyze the cause of internet gap.

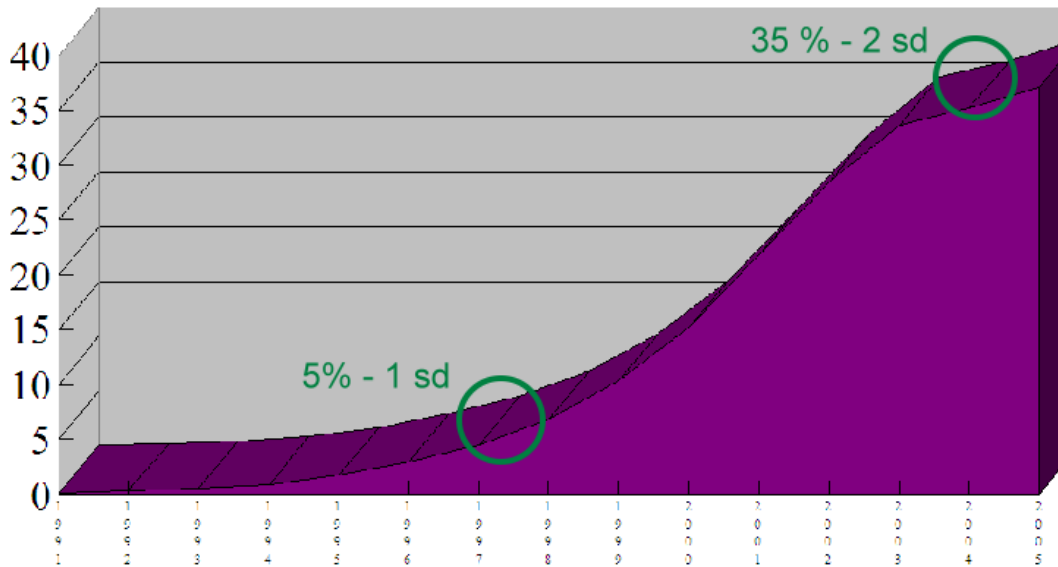
We wanted to be very careful to consider if this research series might be approaching a prototyped paradigm for Internet users' behavior.

5.1.1. The forecast model and its application

By the authors' development of the S-type diffusion model, we could sketch out the Figure 1. We would find the consistency of longitudinal data, shape and trend. The figure not only matched the S-type innovation model but also could have predicted the past and the future growth.

According to the S-type diffusion of innovation theory and the empirical evidence of American studies, we could announce that the internet use in Taiwan had passed the awareness stage, been entering the trial stage, and been marching toward the evaluation and adoption stage. The slow, long and flat journey of S' left tail is almost finished; internet is taking off the runway in Taiwan.

Figure 1. The forecast model of internet users' behavior



The peak of the largest number of 'general user' in Taiwan launched in 2000. The population was more than 21 million in this area according to the Census Bureau[3]. It could estimate the optimistic maximum user number would be around 10 million. However, it had a retreat in 2001 as a worldwide trend.

The numbers of qualified users was stably growing. It had passed one quarter of the whole population. This number was the real force of the innovation of internet, and was the basis of the author's forecast model.

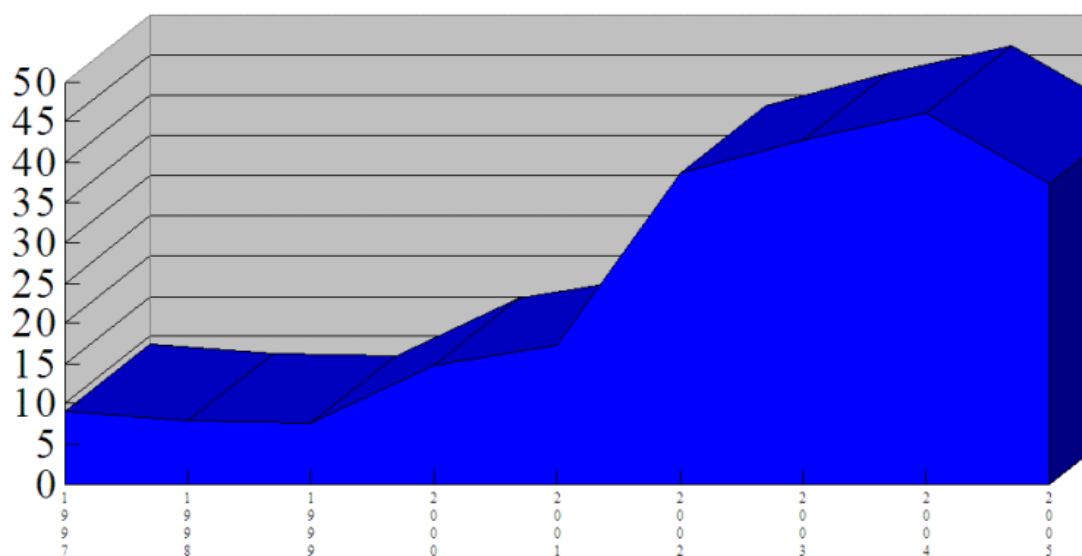
Based on this forecast model, the author announced an alert to e-commerce in the 'International Conference on Communication Technology' December, 1999. The basic tune of this conference was 'Jump in e-commerce, before it is too late'. The author[38] was the only one to step on the brake. In March 2000, the 'Dot com disaster' really happened. It is possible that this model had proven certain validity.

5.1.2. Comparison with general user

If we do not have the idea to identify the 'qualified user' from 'general user' and not have attempted to reason and model the users' behavior, we would draw a diagram of the growth of users by descriptive statistic of raw data as Figure 2.

We found many internet related surveys followed this way. This approach could not suggest the concept of S-type development, or forecast a useful trend, either. The surfaced noise would blur the knowledge, if we can not detect the insight of scientific logic.

Figure 2. The growth diagram of general users: a comparison



5.2. User structure and digital divide

This research series found a '2*3 user structure.

The whole population could split into two groups: users and non-users.

For users, there were two segments: general users and qualified users.

For non-users, there were 'aliens', who reported they never heard internet, and 'transformer'. Transformer could be categorized into 'heard, not understood' and 'understood, not using'. There were total three segments.

The 'digital divide' between 'users' and 'transformers' was flexible. A transformer could become user in the near future. However, the gap between 'users' and 'aliens' could be very sever and very difficult to pass through.

The number of qualified users kept on increasing, the transformers were moving toward users, but the size of aliens remained the same, around 35%, during the last years. The aliens were not categorized by any visible demographic variables; it was decided by psychological and cognitive factors. The aliens declared they had never heard of 'internet' even under the bombing of media's promotion raid. An explanation might be 'recognition dissonance' that implied media failed to leave any trace on their audience's memory.

They had an unconsciousness to resist innovation. The polarized development of user structure indicated the true problem of digital divide. It also reminded us about Masuda's warning[21] about the new problems of information society.

5.2.1. A Mirage and an Oasis

Internet has been becoming a very hot issue in Taiwan since 1995. All major newspapers have a special page, or pages, everyday and a special stack on internet events of their Sunday edition. Every TV network is used to present internet coverage from time to time. This research result reflected an asymmetric phenomenon that was not proportional to user percentage.

Qualified users were around a quarter of total population. The number indicated that internet user was still a relative minority in Taiwan.

The hot flame of internet did not seem parallel to the relatively cool access of use. Internet was not so easy for people with lower social and economic status to surf on yet. It was probably still a forbidden palace for the elite, and a somehow distant mirage for the public of the pyramid's bottom.

In the other hand, there were lots of potential users wished to surf the web. We could expect that there is an oasis in the near front.

The critical problems for non-users were short of facilities and lack of knowledge. They would make it to the oasis, if they knew the direction, and had a camel.

5.2.2. Cybercitizen and small village

The features of internet users in Taiwan looked very similar to users in USA. The world 'cybercitizen' is quite a real thing more than a concept.

Gender: Male user and female user were getting closer.

Age: Young generation was playing the leading role.

Education: The higher educated person had the higher possibility to be user. Students of college and academy were one of the major groups on internet.

Income: There was an interesting two sides that internet users' income was either above average or not stable. More than one fifth of users had good revenue while student users had no regular wage. An explanation is that students were using the free academic network.

As the moving of see-saw, services with command interfaces were falling down when WWW and multimedia was rising up. Web based services had dominated the most popular internet applications.

The hottest information that users were looking for was entertainment and life. Users need internet when they want to sit back. Communication was the most important service for users. Internet was a confidant and a comfortable conduit to get in touch with others.

Users' behavior in Taiwan was similar to the users in States. It implied that the internet community shared the similar interests without international differences. The cybercitizens were staying in a small village together.

5.3. E-Commerce Strategies

5.3.1. Market scale

Users in Taiwan did not recognize internet as a regular shopping place yet, while CommerceNet informally announced that e-commerce was already entering in ordinary life in USA.

Less than 20% users had tried online shopping. The emptying as well as the potential of the market was still large.

A good strategy for current marketing was to promote business to business market and provide unique goods or services.

5.3.2. Purchase Volume

The user percentage in Taiwan was relatively closer to the Cyber Dialogue and Find/SVP's finding. Though it might imply a cross-cultural behavioral pattern in the same time frame, its meaning was not the same because the United States' market size was much larger than Taiwan's. Same number did not produce the same values. Internet commerce is still under fermenting in Taiwan. Furthermore, we would like to remember Cyber Dialogue's warning: Do not inflate the internet activities.

The reasonable pricing policy should be under US\$100. The upper limit would be US\$800.

5.3.3. Purchase Products

Computer related goods and service had the advantage to attract users' attention. Low priced products such as books, leisure commodity, music CDs, tickets, toys, fashions were easier to sell via internet. Adult accessories were another best seller because of the concern of privacy.

Potential customers expected two promising products: cosmetics and travel package.

5.3.4. Barriers to e-commerce

Most of online shoppers kept cautious. Before 2000, they worried about the security of transaction, the time for delivery and the exaggerated advertisement. Now, their prior concerns were on the leakage of personal privacy, the product quality, the way to pay, and the after services and refund policy.

For the internet users who did not shop online, their reasons were almost the same except they consider fraud was a more serious problem. An interesting fact was nearly a quarter of users who did not have any concern; they were just not used to e-commerce.

We could hear the longing bell rhyme shows the camel is heading straight; and we could feel a fresh breeze is coming through. It is not too far away to meet the oasis behind the mirage of e-commerce.

We could be optimistic, and should be discreet.

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