

# The Evolutionary Directions of Mobile Business Models

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## Abstract

Since the number of mobile Internet users has been increasing rapidly around the world, the mobile business which is a variety of applications of mobile Internet has gained attention among the related industry and academics. However, most researchers mainly focus on the issues concerning the trend, forecast, technologies, and demographic characteristics of mobile Internet services. Further, only mobile Internet users have participated in surveys, excluding network operators and contents providers.

The purpose of this research is to project the evolution of mobile business and identify its critical success factors. The results of this research are from the analysis of data collected not only from mobile Internet users but also from network operators and contents providers.

## 1. Introduction

The Internet and mobile telephony are two of the successful technologies of the 20th century and have formed another promising technology, mobile Internet access(Pioneer Consulting, 2002). The mobile Internet access offers a sizable market opportunity with global equipment revenues expected to grow from \$3.1 billion (USD) in 2002 to \$19.1 billion in 2008.

The number of the mobile Internet users in the world will grow 18-fold between 2000 and 2005(Intermarket Group, 2002). At the end of 2000, there were 39 million mobile Internet users in the world and that is set to increase to about 729 million by 2005. Europe will have the highest concentration of mobile Internet users by then, with 194 million people going online with a mobile device, up from 7 million in 2000. The number of mobile Internet users in North America will increase from 2 million to 89 million in the same period, while the mobile Internet population in Latin America will grow from 100,000 to 52 million. 79 million people in the Asia-Pacific region will have wireless Web access by 2005, up from 30 million in 2000.

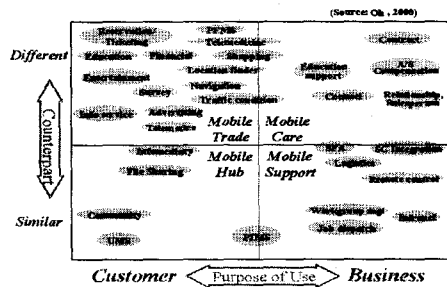
Since the number of mobile Internet users has been increasing rapidly around the world, the mobile business, which is a variety of applications of mobile Internet has gained attention among the related industry and academics. However, most researchers mainly focus on the issues concerning the trend of the mobile Internet services(e.g., Han, 2001), forecast of marketplace(e.g., Baskerville Communication Corporation, 1999; Ovum, 1999; The Strategis Group, 1999), technology(e.g., Unwired Planet, 1999), and demographic characteristics(Chae, 2000). Further, surveys on these issues have been conducted against only mobile Internet users(e.g., Han, 2001; Kim, 2001), excluding network operators and contents providers.

The purpose of this research is to group the mobile business models and project the evolution of these models, based on the review of the related literature and the analysis of data collected not only from mobile Internet users but also from network operators and contents providers.

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## 2. Mobile Business Models

Oh(2000) proposed the 2x2 matrix for mobile business. In this model, X-Axis is divided between business and customer by purpose of use. And Y-Axis is divided between out and in by direction(See <Figure 1>).



<Figure 1> Mobile Business Models

## 3. CSFs

This section describes the Critical Success Factors(CSFs) of mobile business.

### 3.1 Summary of Literature on CSFs

Oh(2000) proposed that mobile Internet service could make portable convenience, so view a matter from timeliness this is more outstand than fixed internet business. But its interface are deteriorated comparatively because of it has weakness to express and inconvenient to input work by small scale of it. Also mobile service able to success, if the success strategy must be considered the 3C(Convenience, Contents, Cost) that basis of analyzed findings of background of mobile business.

Han(2001) studied by mapping the factors on 3C of Oh(2000) to measure the overall satisfaction degree of mobile internet. <Table 1> shows the prior research for CSFs of mobile business.

<Table 1> Summary of Literature on CSFs

| Author         | Success Factors   |
|----------------|---|
| Oh(2000)       | Convenience, Cost, Contents   |
| Dulacher(2000) | Convenience, Customer Ownership, Personalization, Localization, Ubiquity, Timeliness                            |
| OVUM(2000)     | Convenience, Cost, Compulsive   |
| ARC(2000)      | Utility, Timeliness, Exclusivity, Personalization, Panache, Convenience   |
| Han(2001)      | Accuracy, Variety, Updatedness, Input, Security, Speed, Screen Interface, Success in Access/Communication, Cost |

### 3.2 CSFs of Mobile Business

The objects are the overall standard of importance and satisfactions by mapping on generic strategies model(Porter, 1985)

with the pre-study that is for strategies of mobile business(Oh, 2000; Dulacher, 2000; OVUM, 2001; ARC Group, 2000; Han, 2001). <Table 2> shows generic strategies of mobile business.

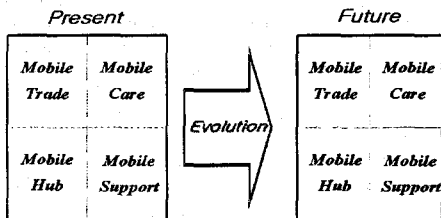
<Table 2> Generic Strategies of Mobile Business

| Constructs          | Subconstructs      | Items                      | References                                |
|---------------------|--------------------|----------------------------|---|
| Cost Leadership     | Cost               | Contents Fee               | Oh, 2001<br>OVUM, 2000<br>Han, 2001       |
|                     |                    | Packet Transmission Charge |   |
| Differentiation     | Convenience        | Mobile Device Price        | Dulacher, 2000<br>ARC, 2000<br>Han, 2001  |
|                     |                    | Timeliness                 |   |
|                     | Contents Character | Screen Interface           | ARC, 2000<br>Dulacher, 2000<br>OVUM, 2000 |
|                     |                    | Input                      |   |
| Contents Management | Accuracy           | Exclusivity                | Han, 2001                                 |
|                     |                    | Variety, Updatedness       |   |
| Technical Aspects   | Success in         | Access/Communication       | Han, 2001                                 |
|                     |                    | Security, Speed            |   |

#### 4. Research Method

##### 4.1 Research Model

The purpose of this research is to show the direction of evolution of mobile services. Therefore, mobile services mentioned in the chapter 2 is going to be mapped by using Oh(2000)'s 2x2 matrix to find out their direction of evolution. The <Figure 2> shows research model.



<Figure 2> Research Model

##### 4.2 Survey Questionnaire

The survey questionnaires were composed of 4 categories: General use of mobile Internet, Present and future demand of mobile Internet, overall importance and satisfaction of mobile internet, general demographics.

All of these survey questionnaires for this research were developed in two steps. First developed the measurement from prior studies. Second examined pilot test of measurement to university students. Respondents could choose from a 1-to-7 Likert-type scale to indicate the importance of each of the measurement instrument.

##### 4.3 Subjects

A total of 1180 data was respond to the survey for a period of

one week and the effective data of the 685 were selected, and Internet survey method was employed for the survey. <Table 3> summarizes the demographic characteristics of the respondents.

<Table 3> Demographic Characteristics

| Category   |                             | Frequency | Percent(%) |
|------------|-----------------------------|-----------|------------|
| Sex        | Male                        | 353       | 51.5       |
|            | Female                      | 332       | 48.5       |
| Year       | Below 20                    | 41        | 6.0        |
|            | 20-24                       | 171       | 25.0       |
|            | 25-29                       | 183       | 26.7       |
|            | 30-34                       | 169       | 24.7       |
|            | 35-39                       | 77        | 11.2       |
|            | Above 40                    | 44        | 6.4        |
| Occupation | Middle/high school student  | 21        | 3.1        |
|            | University/graduate student | 159       | 23.2       |
|            | Salaried Man                | 330       | 48.2       |
|            | Specialists                 | 41        | 6.0        |
|            | Self-employed               | 34        | 5.0        |
|            | Others                      | 100       | 14.6       |
| Total      |                             | 685       | 100        |

#### 5. Evolution of Mobile Business

##### 5.1 Present and Future Demand

<Table 4> shows the mean value ranking of mobile business service present and future. One can predict that services that have big mean value gap will be increased enormously in use.

<Table 4> Ranking of Mobile Services

| Constructs                             | Present |         | Future  |         |
|--|---------|---------|---------|---------|
|  | Mean    | Ranking | Average | Ranking |
| Ring Tone/Character Download           | 4.81    | 1       | 5.27    | 2       |
| e-mail/SMS/MMS                         | 4.71    | 2       | 5.34    | 1       |
| News/Weather/Phone Book/Dictionaries   | 3.45    | 3       | 4.82    | 3       |
| Games/Gambling                         | 3.24    | 4       | 3.78    | 13      |
| VOD/AOD                                | 3.20    | 5       | 4.51    | 8       |
| Shopping/Reservation/Ticketing/Auction | 2.98    | 6       | 4.78    | 4       |
| Location Finder                        | 2.92    | 7       | 4.73    | 5       |
| Payment                                | 2.90    | 8       | 4.49    | 9       |
| Community                              | 2.86    | 9       | 3.81    | 12      |
| PIMS                                   | 2.75    | 10      | 4.07    | 10      |
| Banking                                | 2.63    | 11      | 4.54    | 6       |
| Telematics                             | 2.50    | 12      | 4.53    | 7       |
| Customized Info Delivery               | 2.42    | 13      | 3.92    | 11      |
| Stock                                  | 2.21    | 14      | 3.69    | 14      |
| Real Time Chat                         | 2.18    | 15      | 3.26    | 17      |
| Advertising                            | 2.07    | 16      | 2.90    | 24      |
| File Sharing                           | 2.06    | 17      | 3.58    | 15      |
| m-Learning                             | 1.99    | 18      | 3.18    | 18      |
| PFMS                                   | 1.89    | 19      | 3.46    | 16      |
| Counsel                                | 1.81    | 20      | 3.03    | 20      |
| A/S                                    | 1.78    | 21      | 2.99    | 21      |
| Compensation                           | 1.66    | 22      | 2.87    | 25      |
| SFA                                    | 1.64    | 23      | 2.74    | 26      |
| Fleet Management                       | 1.62    | 24      | 3.08    | 19      |
| Telemedicine                           | 1.62    | 25      | 2.97    | 22      |
| Education Support                      | 1.60    | 26      | 2.65    | 29      |
| Video Conferencing                     | 1.60    | 27      | 2.94    | 23      |
| Logistics                              | 1.59    | 28      | 2.74    | 27      |

|             |      |    |      |    |
|-------------|------|----|------|----|
| Procurement | 1.55 | 29 | 2.57 | 30 |
| Telemetry   | 1.55 | 30 | 2.66 | 28 |

### 5.2 Analysis of Difference

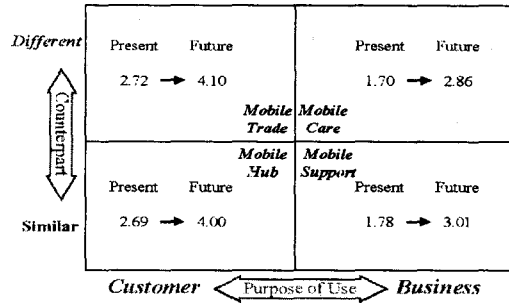
As you know by <table 5> there are difference between present mobile services and future mobile services.

<Table 5> Paired T-test of Mobile Services

| Present - Future                             | Paired Differences |                | t       | df  | sig (2-tailed) |
|--|--------------------|----------------|---------|-----|----------------|
|  | Mean               | Std. Deviation |         |     |                |
| Pair1 PFMS                                   | -1.57              | 1.84           | -22.322 | 684 | 0.000          |
| Pair2 Payment                                | -1.59              | 1.81           | -23.091 | 684 | 0.000          |
| Pair3 Banking                                | -1.92              | 1.92           | -26.173 | 684 | 0.000          |
| Pair4 Stock                                  | -1.47              | 1.92           | -20.05  | 684 | 0.000          |
| Pair5 Shopping/Reservation/Ticketing/Auction | -1.8               | 1.87           | -25.187 | 684 | 0.000          |
| Pair6 Telemedicine                           | -1.35              | 1.67           | -21.129 | 684 | 0.000          |
| Pair7 Location Finder                        | -1.81              | 1.93           | -24.602 | 684 | 0.000          |
| Pair8 Telematics                             | -2.04              | 2.11           | -25.243 | 684 | 0.000          |
| Pair9 Games/Gambling                         | -0.54              | 1.54           | -9.284  | 684 | 0.000          |
| Pair10 Ring Tone/Character Download          | -0.46              | 1.31           | -9.244  | 684 | 0.000          |
| Pair11 VOD/AOD                               | -1.31              | 1.87           | -18.394 | 684 | 0.000          |
| Pair12 News/Weather/Phone Book/Dictionaries  | -1.37              | 1.85           | -19.306 | 684 | 0.000          |
| Pair13 Customized Info Delivery              | -1.51              | 1.9            | -20.795 | 684 | 0.000          |
| Pair14 m-Learning                            | -1.18              | 1.7            | -18.153 | 684 | 0.000          |
| Pair15 Advertising                           | -0.83              | 1.75           | -12.365 | 684 | 0.000          |
| Pair16 Community                             | -0.95              | 1.76           | -14.078 | 684 | 0.000          |
| Pair17 e-mail/SMS/MMS                        | -0.63              | 1.65           | -9.971  | 684 | 0.000          |
| Pair18 Real Time Chat                        | -1.08              | 1.75           | -16.17  | 684 | 0.000          |
| Pair19 File Sharing                          | -1.52              | 1.9            | -20.987 | 684 | 0.000          |
| Pair20 PIMS                                  | -1.31              | 1.93           | -17.779 | 684 | 0.000          |
| Pair21 Video Conferencing                    | -1.34              | 1.8            | -19.473 | 684 | 0.000          |
| Pair22 Education Support                     | -1.05              | 1.65           | -16.666 | 684 | 0.000          |
| Pair23 A/S                                   | -1.21              | 1.86           | -16.984 | 684 | 0.000          |
| Pair24 Compensation                          | -1.21              | 1.76           | -17.948 | 684 | 0.000          |
| Pair25 Counsel                               | -1.22              | 1.83           | -17.451 | 684 | 0.000          |
| Pair26 SFA                                   | -1.1               | 1.7            | -16.879 | 684 | 0.000          |
| Pair27 Procurement                           | -1.02              | 1.57           | -16.894 | 684 | 0.000          |
| Pair28 Logistics                             | -1.14              | 1.72           | -17.398 | 684 | 0.000          |
| Pair29 Telemetry                             | -1.11              | 1.72           | -16.934 | 684 | 0.000          |
| Pair30 Fleet Management                      | -1.46              | 2.01           | -18.923 | 684 | 0.000          |

In this research used Oh(2000)'s 2x2 matrix for evolution of mobile business services. Oh(2000) classified mobile business into four segments, such as mobile hub, mobile trade, mobile care, mobile support. Measured services based on it are mapped. And service values are combined and the mean value is obtained.

The ranking of present mobile services and future mobile services is obtained by this result. <Figure 3> shows the result.



<Figure 3> Evolution of Mobile Business

## 6. CSFs of Mobile Business

### 6.1 Descriptive Statistics

<Table 6> shows the importance and satisfaction of success factors in mobile Internet.

Technical aspects is shown as the most important factor, and the cost as the second most important factor. There is no significant difference between technical aspects and cost. Nevertheless, it shows that the mobile Internet users regard technical aspects as more important than cost. It is worthy of attention that satisfaction of contents is regarded as high. It shows that mobile Internet users think that ultimately the quality of contents is more important than convenience.

<Table 6> Importance, Satisfaction of CSFs

| Constructs                      | Important Mean | Satisfaction Mean |
|---------------------------------|----------------|-------------------|
| Contents Fee                    | 6.14           | 2.97              |
| Packet Transmission Charge      | 6.19           | 2.82              |
| Device Price                    | 5.75           | 2.81              |
| Timeliness                      | 6.05           | 3.34              |
| Input                           | 5.78           | 3.49              |
| Screen Interface                | 5.54           | 3.45              |
| Personalization                 | 5.19           | 3.32              |
| Exclusivity                     | 4.55           | 3.21              |
| Panache                         | 4.3            | 3.57              |
| Localization                    | 5.07           | 3.81              |
| Utility                         | 5.68           | 3.54              |
| Compulsive                      | 4.62           | 3.32              |
| Accuracy                        | 5.96           | 3.68              |
| Variety                         | 5.69           | 3.5               |
| Updatedness                     | 5.94           | 3.52              |
| Speed                           | 6.38           | 3.14              |
| Security                        | 6.43           | 3.39              |
| Success in Access/Communication | 6.35           | 3.24              |

### 6.2 Reliability and Validity

In order to ensure that the variables comprising each proposed research construct were internally consistent, reliability assessment was carried out using Cronbach's alpha. The internal consistency reliability coefficients for the research constructs in this study are all well above the 0.80 level(See <Table 7>). The cronbach's alpha values indicated a satisfactory reliability by a widely used rule of thumb of 0.60 suggested by Nunnally(1978).

<Table 7> Reliability of Importance

| Constructs                      | Cronbach's Alpha |
|---------------------------------|------------------|
| Contents Fee                    | 0.9267           |
| Packet Transmission Charge      | 0.9264           |
| Device Price                    | 0.9283           |
| Timeliness                      | 0.9243           |
| Input                           | 0.9244           |
| Screen Interface                | 0.9253           |
| Personalization                 | 0.9269           |
| Exclusivity                     | 0.9309           |
| Panache                         | 0.9329           |
| Localization                    | 0.9285           |
| Utility                         | 0.9244           |
| Compulsive                      | 0.9318           |
| Accuracy                        | 0.9243           |
| Variety                         | 0.9248           |
| Updatedness                     | 0.9245           |
| Speed                           | 0.9253           |
| Security                        | 0.9255           |
| Success in Access/Communication | 0.9257           |

In order to support the validity of variables, a factor analysis with Varimax rotation was performed. The results extracted 5 constructs, which were consisted of contents management, contents character, convenience, cost, technical aspects. Items if Factor loading below 0.5 were also omitted. <Table 8> shows the results of the factor analysis.

<Table 8> Result of Factor Analysis

| Constructs               |                                 | Factors |       |       |       |       |
|--------------------------|---------------------------------|---------|-------|-------|-------|-------|
|                          |                                 | 1       | 2     | 3     | 4     | 5     |
| Contents Management      | Accuracy                        | 0.729   |       |       |       |       |
|                          | Variety                         | 0.775   |       |       |       |       |
|                          | Updatedness                     | 0.683   |       |       |       |       |
|                          | Utility                         | 0.623   |       |       |       |       |
| Technical Aspects        | Speed                           |         | 0.723 |       |       |       |
|                          | Security                        |         | 0.809 |       |       |       |
|                          | Success in Access/communication |         | 0.789 |       |       |       |
| Cost                     | Contents Fee                    |         |       | 0.818 |       |       |
|                          | Packet Transmission Charge      |         |       | 0.830 |       |       |
|                          | Mobile Device Price             |         |       | 0.734 |       |       |
|                          |                                 |         |       |       |       |       |
| Contents Characteristics | Exclusivity                     |         |       |       | 0.803 |       |
|                          | Panache                         |         |       |       | 0.864 |       |
|                          | Localization                    |         |       |       | 0.539 |       |
|                          | Compulsive                      |         |       |       | 0.629 |       |
| Convenience              | Input                           |         |       |       |       | 0.674 |
|                          | Screen Interface                |         |       |       |       | 0.737 |
|                          | Personalization                 |         |       |       |       | 0.687 |
|                          | Timeliness                      |         |       |       |       |       |

Extraction Method: Principal Component

Rotation Method: Varimax with Kaiser Normalization

6.3 Analysis of CSFs

<Table 9> shows differences between Importance and Satisfaction. As the result of it, the ranking come out in this order ; cost, technical aspects, contents management, convenience, contents characteristics.

<Table 9> Difference in CSFs

| Factor              | Constructs                                    | Importance           | Satisfaction         | Average Difference |         |
|---------------------|---|----------------------|----------------------|--------------------|---------|
|                     |   | Average of Means (1) | Average of Means (2) | (1) - (2)          | Ranking |
| Contents Management | Accuracy<br>Variety<br>Updatedness<br>Utility | 5.82                 | 3.56                 | 2.26               | 3       |
| Technical           | Speed   | 6.39                 | 3.27                 | 3.12               | 2       |

| Aspects                  | Security Success in Access/communication                          |      |      |      |   |
|--------------------------|---|------|------|------|---|
| Cost                     | Contents Fee<br>Packet Transmission Charge<br>Mobile Device Price | 6.03 | 2.87 | 3.16 | 1 |
| Contents Characteristics | Exclusivity<br>Panache<br>Localization<br>Compulsive              | 4.64 | 3.48 | 1.16 | 5 |
| Convenience              | Input<br>Screen Interface<br>Personalization                      | 5.50 | 3.42 | 2.08 | 4 |

7. Conclusion

The contributions of this study are twofold. First, mobile business is expected to evolve from mobile trade to mobile trade. Second, we found the most important CSF is technical aspect, followed by cost.

Although the findings in this research provide meaningful contributions in the area of mobile business, our research has some limitations. First, participants from network operators, contents providers, and solution providers are excluded for the survey. Thus research including these participants is desired in the future.

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