ORIGINAL ARTICLE

TSP Model Service Design of Fourth-generation Electronic Book

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Abstract: E-book sales have exhibited explosive growth recently. A glimpse of this trend occurred as early as about 30 years ago, when E-books were used as media for circulating CD-ROMs and PCs. Their recent popularity is largely attributable to the popularization of mobile terminals such as smart phones. The authors classified the previous e-books into the first–third generations and later into 4G e-books, and analyzed the latter. The characteristics of 4G e-books are classifiable into the following three points: (a) instant search for book contents, (b) close relation between book contents and readers, and (c) reduction of expenditures for book contents. The TSP model, a novel e-book sales method proposed by the authors, (1) enables readers who start reading to read a whole book free of charge during a certain period of time, and then shifts to a time fee. (2) It can set up this period for each book, and can do so for each reader individually and unrestrictedly. Moreover, analysis of readers’ logs permits a bookseller to record purchasing behavior and plot a sales strategy for each customer. This paper demonstrates that the TSP model can realize the 4G e-book business.

Keywords: E-book, Service design, Business model

1. INTRODUCTION

Although the total sales of the entire publishing industry are declining year by year, many discussions have arisen about electronic books: e-books. One viewpoint holds that the e-book business is positioned as an extension of the existing paper-based publishing industry, although other observers regard e-books as digital contents. An important characteristic of digital contents is that a market is built up based on value creation: not by an exchange of commodities but by an exchange of information offered by suppliers.

The motive for purchasing an e-book is not the book appearance: The highest priority is its information contents. One cannot judge a book by its cover.

The authors regard the electronic book business in the following manner (Fig. 1). The business provides a service using the e-book as a medium to form an industry from the standpoint of e-book suppliers. The business requires preparation, distribution, or sales for e-books. Multiple business categories are possible according to which service is given and how they are combined. From the consumer side, consumers use services supplied by the electronic book business or a combination thereof to obtain some benefit (utility) for themselves.

It is insufficient to discuss the e-book business if one examines only the sales of digital contents as a commodity. It is important to ascertain what benefit a consumer acquires by services that are provided as a combination of diverse variations of preparation, distribution, and sales provided by suppliers. As a matter of fact, this benefit is associated with human sensibility. We are analyzing the e-book business based on sensibility engineering, and are striving to implement a business in an engineering fashion based on this analysis.

Customer interest is discussed in preparation for considering the e-book business service design. It is generated in the process of a consumer’s behavior from cognition to purchase and consumption. A consumer acquires utility by satisfying customer preferences. This paper addresses a process by which customer interest is generated. This study investigates the relation between utility derived from the reading action of an e-book and knowledge expansion with respect to the 4G e-book business. TSP book selling is discussed.

2. E-BOOK BUSINESS

Components of the electronic book system include (a) contents, (b) a mode of distributing contents, and (c) a player system that displays e-book contents [1]. Because similar classifications are adopted in many articles, our
classification redefines the electronic book system according to our objective. First generation (1G) – third generation (3G) e-book businesses are reviewed below based on this classification. Then the 4G characteristics are presented.

2.1 History of E-books (1G–3G) [1]

Characteristics of e-books of this generation are that many e-book contents have been prepared by digitizing paper books. The distribution mode was such that CD-ROMs were distributed as a commodity, not only via a publication system but also using distribution systems for household electrical appliances and volume retailers. Regarding content players, electrical equipment manufacturers produced dedicated terminals and hardware products incorporating reader software in advance. Subsequently, they sold them together with e-book contents [2]. For instance, both Sony and NEC sold discs containing e-books for use with a player dedicated exclusively to e-books.

The salient characteristic of e-books of this generation is that the distribution path of e-book contents has shifted from CD-ROMs to online downloading via the internet. Dedicated software was distributed as content players: e-books of earlier generations did not require a dedicated terminal, unlike the 1G [3]. However, because they were presumably read using a general purpose computer, reader software became necessary instead. For that reason, it was necessary to adapt e-book contents to reader software so that an e-book could be read on a computer. Furthermore, a personal computer (PC) having the necessary capabilities to accommodate the software must be prepared. However, PCs of those days were poorly transportable and less convenient than paper books, so it was inconvenient to carry e-books. Moreover, it was not comfortable to carry a PC. For example, a 12.1-inch early model notebook PC introduced by a major vendor in 1996 was 3.3 kg. A much better PC was only 1.62 kg in 1999. Thereafter, PCs became even lighter: around 1–1.7 kg afterward. Consequently, reading e-books on a PC lacked the portability of paper books during early generations. That early inconvenience presented a barrier against e-book adoption in the minds of many readers.

(3) Third generation (3G: circa 2010 – present)
An important characteristic of 3G e-books is that players have turned back from general-purpose PCs to dedicated terminals with a network function. This reversion implies that an important psychological barrier of readers was relieved: The lack of PC portability as a characteristic of 2G players. The change also implies a distribution mode via downloading, not via CD-ROM. Generally speaking, a contact point is necessary to encourage the distribution of goods. Until 2G, the industrial structure of a paper book was imitated in a fashion to distribute tangible goods as commodities and to distribute contents characterized by their immaterial nature. For that purpose, contents were prepared, commoditized and sold by stores serving as a point of e-book distribution. However in 3G, such a contact point is internet selling, which allows the distribution of contents as intangible goods [4].

An internet-based distribution mode is suitable for circulating contents. This mode enabled the distribution of more e-book contents than by distributing a commodity such as a CD-ROM. Moreover, original e-book titles have been increasing rapidly. Internet sales are characterized by their availability anyplace, anywhere, and anytime. The reading behavior of this generation has approached the form of paper books [5].

Popularizing a dedicated terminal in 3G is necessary. However, the quantity of production thereof is not large because dedicated terminals are less versatile than PCs are [6].

2.2 Fourth Generation (4G: circa 2012 – present)
A survey conducted by Impress Business Media revealed the e-book market for cellular phones as 48 billion yen (bY) and for new platforms as 11.2 bY in FY 2011. The market for new platforms has been expanding since FY 2012, when the market for cellular phones caught up with that for new platforms: accounting respectively for 35.1 and 36.8 billion yen (bY).

A new platform is a player for which e-books can be purchased, such as a smart phone or tablet. The new platform has the characteristics that e-book contents can be purchased using dedicated software (an e-book application) and that they can be browsed using multiple devices [7]. A determinant of this market extension is the expansion of the smart phone share. A survey by the MM Research Institute revealed that the share of smart phones out of the total shipments of cellular phone units exceeded 50% for the first time in FY 2011, then extended to 73.3% in FY 2012 and 75.5% in FY 2013. The previously described expansion of the e-book market for new platforms is correlated with this share of smart phones. In fact, the respective e-book markets for cellular phones, for new platforms, and for PCs were 57.2 bY, 2.4 bY, and 5.3 bY in FY 2010, 48 bY, 11.2 bY, and 3.7 bY in FY 2011, and 35.1 bY, 36.8 bY, and 1 bY in FY 2012.
The data suggest that smart phones are overtaking e-book players. A 3G player took the form of a PC or a dedicated terminal, showing poor versatility and diffusion, whereas 4G players have turned to smart phones and thereby extinguished the shortcomings of these players.

Consequently, the characteristics of the 4G can be summarized as follows. Regarding change on the supplier side, the distribution process has shifted to the combination of online downloading and streaming from online downloading. This shift is explained as follows: because smart phones have prevailed, players with less memory capacity than a PC, the mode of content storage is shifting to cloud services by the distribution of contents. This shift has allowed users to search for book contents as soon as they recognize them. This is characterized as (a) instant search for book contents. Moreover, the shift of a player to a smart phone has shrunk the distance in the sensibility for exploitation between contents and a customer. (b) A close relation between book contents and readers has been established, for which the characteristics of a smart phone, “anyplace, anywhere and anytime,” apply also to book contents. At the same time, (c) reduction of expenditures for book contents are taking place, followed by a shift to PC contents from mobile contents.

3. TSP BOOK SELLING

3.1 Outline of TSP Model

The contents of e-books and paper books differ in that the former is an intangible good whereas the latter is a tangible good. Because this difference is attributed to the presence of commodity distribution, it is necessary to investigate a corporate structure that might be suitable for intangible goods as a combination of manufacturing, distribution, and sales processes. Readers’ utility and consumption in the e-book business are estimated in the following three forms: (1) by the number of characters of contents, (2) by pages consumed, and (3) by the amount of knowledge acquired by a reader.

As for (2), the number of pages consumed is superficial. The act of reading a book by a reader can be comprehended, but it is difficult to measure whether it is an act for understanding. For that reason, it is improper as an index to measure how much a reader extends knowledge and acquires utility.

For (3), a reader’s contents consumption is appropriate as an index for measuring the amount of the reader’s knowledge acquired if both are inversely proportional. The TSP model specifies and models reader action to visualize the amount of reader knowledge (Fig. 2).

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Figure 2: TSP model

3.2 TSP Model [1, 8]

The TSP model measures a reader’s consumption of contents with time purchased. A general reader consumes reader time to comprehend the whole outline first. However, this is a state in which the reader is not storing knowledge but is acquiring preliminary knowledge. Accordingly, reader utility is not acquired in this state. A certain time from t0 to t1 in the figure is necessary for a reader to acquire knowledge. Then subsequent reading action increases the amount of knowledge and the reader acquires utility. The utility becomes constant when contents are read through. Because the subsequent reader action depends on a reader’s subjectivity, conditions that can be configured individually are necessary. Each reader can set the angle and distance from t1 to t2 in the figure individually. This scheme corresponds also to a reader’s reading speed or repetitive reading for understanding.

Generally, a reader acquires preliminary knowledge related to a purchase decision simultaneously when acquiring preliminary knowledge related to contents [9]. This acquisition is based on the subjective judgment of a reader, who acquires utility by such subjective evaluation. Then, the price of the contents is determined by the amount of the utility.
4. INTERPRETATION OF 4G E-BOOK BUSINESS BY TSP

4.1 Instant Search for Book Contents

The characteristics of 4G e-book business include instant search for book contents, which is immediate performance of interest action in the processes through cognition, interest, (search) action, and purchase, among actions toward book purchase as a consumer behavior [10]. An interest action for a paper book is search at a bookstore, which might take time: from several hours to several days. However, an interest action for a 4G e-book is a search performed instantly using the search service on a smart phone (Fig. 3). This real time search makes e-book contents familiar for consumers. Moreover, implementation of a search immediately after cognition implies that a reader is provided with an environment that permits search at any time, and an environment that facilitates search for documents for judging contents. Accordingly, a reader evaluates contents using the reader’s own criteria for subjective evaluation based on multiple objective ratings by others. This increases the number of states resulting in purchasing behavior as a result.

A reader’s subjective evaluation is established in a (search) action. Certain criteria are necessary to form subjective evaluation [11]. An act toward establishing the criteria is expectation evaluation, which is browsing for a paper book, where reading pages are made partially available along with reading objective ratings such as book reviews for an e-book. The expectation evaluation is formed from a subjective judgment after capturing the appearance of contents (including price). However, the expectation evaluation for an e-book formed by objective ratings might end up with an incomplete decision by a reader [12]. Furthermore, the expectation evaluation is related to price. Although this is relevant between reader satisfaction and reader expenditure because both evaluations are subjective, a smaller deviation with expectation evaluation engenders consent at a higher level.

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| 4G e-books | Search | Evaluation by reader is insufficient because search action does not permit to capture a global image. Book review, evaluation by others, might be based on different criteria from a reader.

4.2 Close Relation of Readers and Book Contents

A reader chooses purchasing behavior when the subjective evaluation exceeds the expectation evaluation [13]. Establishment of an expectation evaluation for an e-book must depend on objective ratings such as book reviews because no state is equivalent to browsing. However, if the expectation evaluation relying on individual sensibility is attributable to objective ratings, then a gap might occur with one’s subjective evaluation after a purchase. Moreover, evaluation after purchase must be objective ratings if no sales model exists based on the subjective evaluation. Then such a gap might arise and engender a low evaluation. Therefore, an e-book model based on a reader’s subjective evaluation is necessary considering these. The TSP model discloses the whole book contents for a period during t0 – t1 such as browsing of a paper book, so that it can form an expectation evaluation based on subjective evaluation (Fig. 4).

4.3 Reduction of Expenditures for Book Contents

The 4G e-book business characteristics include slimming of expenditures for book contents by readers because this business gives rise to a practice by which a customer can use PC contents for free: a customer is presumed to prefer the cutting of expenditures even to acquire information and knowledge. However, the e-book industry, which has a business model in the publishing industry, must project sales. A model that can resolve this contradiction in the objectives of reader expenditures and manufacturer profits must be investigated.

The TSP model includes the assumption that an e-book is purchased if the expectation evaluation exceeds the subjective evaluation during a transition process from t1 to t2. In addition, price setting after t2 permits presentation of a purchase budget for establishing expectation evaluation [14, 15]. The TSP model can suppress an unsatisfactory subjective evaluation arising from the...
discrepancy between expectation evaluation and objective ratings in the e-book business. It offers no book contents for free but is adapted for the reduction of reader expenditures (Fig. 5).

5. CONCLUSION

The TSP model is a novel e-book sales method suitable for use with the 4G e-book business. The period from starting reading to \( t_0 \) is regarded as a period during which expectation evaluation is established based on subjective evaluation. The period from \( t_0 \) to \( t_1 \), corresponding to a case for each reader, is regarded as a process for price-setting based on a reader’s subjective evaluation. Then utility is maximized at \( t_2 \), when the expectation evaluation is established with judgment considering a reader’s expenditure. Therefore, the TSP model, which uses a smart phone as a player, is suitable for 4G e-books with enhanced subjective evaluation factors.

REFERENCES
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