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Theory-Guided Analytics Process: Using Theories to Underpin an Analytics Process for New Banking Product Development Using Segmentation-Based Marketing Analytics Leveraging on Marketing Intelligence

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Abstract: Retail banking is undergoing considerable product competitiveness and disruptions. New product development is necessary to tackle such challenges and reinvigorate product lines. This study presents an instrumental real-life banking case study, where marketing analytics was utilized to drive a product differentiation strategy. In particular, the study applied unsupervised machine learning techniques of link analysis, latent class analysis, and association analysis to undertake behavioral-based market segmentation, in view of attaining a profitable competitive advantage. To underpin the product development process with well grounded theoretical framing, this study asked the research question: "How may we establish a theory-driven approach for an analytics-driven process?" Findings of this study include a theoretical conceptual framework that underpinned the end-to-end segmentation-driven new product development process, backed by the empirical literature. The study hopes to provide: (i) for managerial practitioners, the use of case-based reasoning for practice-oriented new product development design, planning, and diagnosis efforts, and (ii) for researchers, the potentiality to test of the validity and robustness of an analytical-driven NPD process. The study also hopes to drive a wider research interest that studies the theory-driven approach for analytics-driven processes.

Keywords: marketing intelligence and analytics; retail banking; new product development; customer behavioral segmentation and profiling; theoretical underpinning; theory-driven or theory-guided approach; naturalistic instrumental case study

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1. Introduction

In a retail banking setting, traditional products are the banking accounts, credit lines, and bank cards. However, new product entrants are driving significant competition and disrupting the industry.

Let us take credit card as an example. Credit cards are a key product segment. Despite thinning margins in the competitive credit card segment, the 3.6% return on assets in 2020 places this segment as one of the best performing businesses in banking [1]. In the 2021 *Findings from the Diary of Consumer Payment Choice* (Diary) from the U.S. Federal Reserve [2], credit cards' share of payments (27% of total share of payments) was found to be just marginally under debit cards (28% of total share of payments) as the most commonly used payment medium in the U.S. In fact, credit card usage has been experiencing rapid growth, surpassing cash for the first time since the outset of the Diary in 2016. It is expected that credit card utilization rate will surpass that of the debit card in the near future. The annual report shed light on the evolution of payment patterns: there is an unrelenting trend towards a cashless society. This trend is presently led by credit cards.

New product entrants are challenging this trend. For instance, new entrants of cashless point-of-sale financial offerings (e.g., buy now, pay later (BNPL) promotes the convenience of card payments, alongside installment lending). McKinsey estimates that credit card issuers can lose as much as 15% of incremental profits to BNPL by 2025. To tackle these challenges, a reimagining of products to meet customer needs and drive engagement is required. This may involve a product differentiation strategy (over a cost-leadership strategy), enhanced by marketing intelligence.

The research objective of this study is to present a marketing intelligence-driven product development case study where marketing analytics were applied in a retail banking setting, using customer behavioral-based market segmentation. In particular, we discuss a case study arising from the retail banking business of a Singapore-based regional banking group. The case example applied unsupervised machine learning techniques of link analysis, latent class analysis, and association analysis to undertake behavioral-based market segmentation, in view of attaining a profitable product differentiation strategy (with specific focus on niche client segments for the banking group).

The significance of this research is represented through an instrumental case study approach: (i) present a naturalistic banking case study where a real-life bank had leveraged on marketing analytics, and in particular, unsupervised behavioral-based consumer segmentation, to pursue a product differentiation strategy, and (ii) discuss theoretical underpinnings, which provide a more informed appreciation and transferability of knowledge in a case-based reasoning format, to a range of practice-oriented contexts pertaining to the application of analytics-based new product development processes within the banking domain.

This study investigated the following research question: "*How may we establish a theory-driven approach for an analytics-driven process?*" In particular, the research question is narrowed to: "*How may we establish a theory-driven analytics process that leverages on marketing intelligence, using segmentation-based marketing analytics, for new banking product development?*" Through addressing the latter narrower scope question, the study hopes to drive more research that addresses the former broader research question across the extensive range of analytics-driven processes.

Findings of this study include a theoretical conceptual framework that underpinned the end-to-end segmentation-driven new product development process backed by the empirical literature. The theoretical framework embodied: (i) market orientation theory, (ii) information processing theory, (iii) schema theory, (iv) adoption theory, and (v) attribution theory. This end-to-end early-to-late phase product development process was accounted for by five different product development stages, namely:

Early phase: Leveraging on marketing intelligence to progress customer orientation for competitive advantage.

Early phase: Leveraging on big data information processing capability to drive marketing analytics.

Mid phase: Market segmentation to assess customer specificity and differentiability for new product engineering.

Mid phase: Assessing customer response to product at pre-launch stage for testing and validation.

Late phase: Assessing customer behavior to study post-launch product success.

The research novelty and value of this work lies in the notable lack of theoretically underpinned work on an end-to-end analytics-driven process [3], and by extension, a paucity of related studies pertaining to new product development processes. This instrumental case study approach study provides a practice-orientated insight into a marketing analytics case study on a real-life retail banking product development, using unsupervised behavioral-based consumer segmentation techniques. Among other future work applications, we hope this research approach can provide researchers and practitioners practical insights into similar analytics applications in banking in a case-based reasoning format for follow up studies.

The remainder of the paper is organized as follows: (i) the section on *Theoretical Foundation and Conceptual Framework* provides the foundational theories and conceptual framework of the new product development analytical process that would be interwoven into the real-life case study; (ii) the section on *Methodology* shares the case study approach and the case study event; (iii) the section on *Case Study* expounds on five product development stages embedded within the end-to-end early-to-late phase product development process, alongside the integration of the theoretical underpinnings backed by the empirical literature; (iv) the section on *Implications and Limitations* discusses the theoretical and practical implications, as well as research limitations of the case study; and, (v) last but not least, the section on *Conclusion* closes with concluding remarks and potential future work opportunities.

2. Theoretical Foundation and Conceptual Framework

2.1. Theoretical Foundation: Marketing Intelligence Underlying Market Segmentation-Based New Product Development

New product development (NPD) is defined as the "*transformation of a market opportunity into a product available for sale*." [4]. NPD is critical to industries characterized by competitive pressures, such as banking. Benefits of NPD may include improved market positioning, resource utilization, and organizational transformation and renewal, leading to competitive advantage and improvements in financial performance metrics.

Marketing intelligence is "*viewed in its totality as a continuing and interacting structure of people, equipment, and procedures to gather, sort, analyze and distribute pertinent, timely and accurate information for use by marketing decision-makers to improve their marketing planning, implementation and control*." [5]. The deployment of marketing intelligence and analytical systems for NPD is a subset of the discipline of information systems. Selection of theories form an important aspect of information systems studies. Mkhomazi and Iyamu reviewed research articles with and without underpinning theories and concluded that many articles, particularly qualitative papers, suffer from rejections from publication due to the absence of or inappropriate underpinning theories [6]. In fact, the papers with sound underpinning theories achieved 86% acceptance rate, whereas the papers with inappropriate theories or without underpinning theories achieved 33% and 18% acceptance rates, respectively.

Theories help shape disciplines, define practice scopes, and influence socialization and training of professionals. Theories and models can help provide behavioral explanation and generalization and provide insights to effective strategies and methods to influence and change behaviors. Glanz defines a theory as a "*set of interrelated concepts, definitions, and propositions that explains or predicts events or situations by specifying relations among variables*" [7]. The author highlights that strongest theoretical influences may be built from multiple theories. NPD is a process workflow of systems, influenced by policies and environments. A good NPD program design, evaluation, and research may integrate contributions of multiple theories, each with unique contributions in the process workflow for product development success.

Frishammar investigated the extant literature and segregated NPD into three phases [8], namely, (i) *early phase*, including activities such as new product strategy identification, concept generation and development, and product planning etc.; (ii) *mid-phase*, including activities such as product development, as well as testing and validation, etc.; and (iii) *late phase*, including activities such as product launch and post-launch review, etc. Helm, Krinner and Endres viewed NPD from the lens of marketing capabilities, segregating NPD into marketing intelligence and marketing mix capabilities [9]. Both of these research topics utilize underpinning theories or theoretical constructs to enrich the understanding towards NPD. This study extends the research from both papers, with specific application on market segmentation-based new product development that leverages marketing intelligence. The conceptual model that outlines theoretical underpinning of segmentation-based NPD is shown in Figure 1.

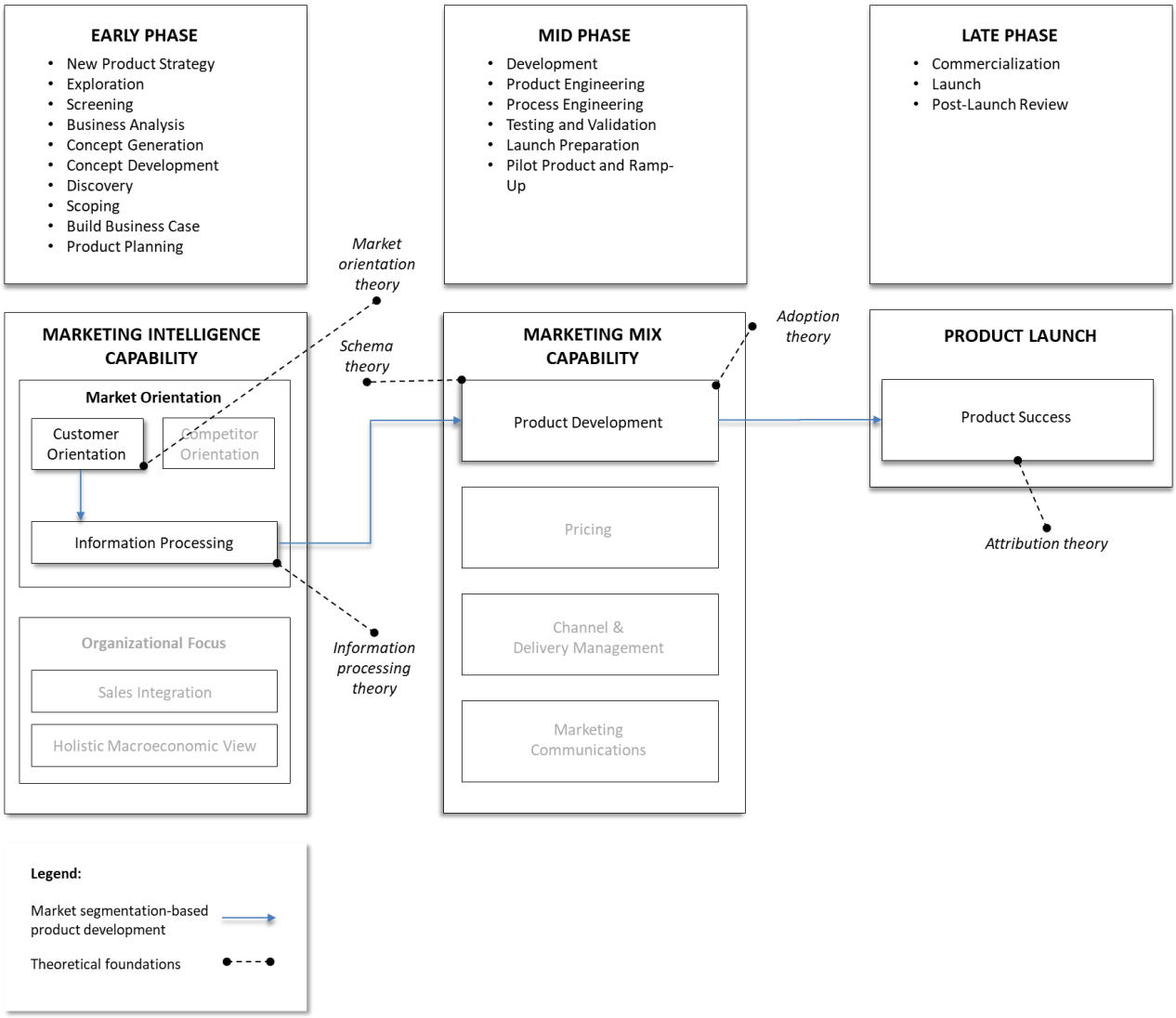

Figure 1. Conceptual model outlining theoretical underpinning of segmentation-based product development.

2.2. Conceptual Framework

Helm, Krinner and Endres expound on the construct of market orientation as a cornerstone of marketing intelligence [9]. The role of organizational adaption, or the intentional change backed by, among others, architectural marketing capabilities (i.e., marketing strategic decisions driven by within-firm market learning processes) [10] to increase convergence between a firm's decision making and its environment, is critical to superior NPD capabilities [9,11].

From a segmentation-based NPD perspective, strategic market orientation in the early product development phase involves customer orientation [12]—the propensity to understand and address both current and future expressed and latent needs of clients to devise a new product strategy. This will require a customer-oriented approach, underpinned by the market orientation theory, to gather information on consumer beliefs or to test new adaptive beliefs [13,14]. The generation of analytics-derived decision making from architectural marketing capability requires a systematic processing and analysis of gathered information. This is underpinned by the information processing theory that, through integrated information processing systems, enables the strategic consideration and expression of coordinated activities and asset utilization [15,16]. The mid product development phase involves product development work that integrates assessment of customer specificity

and differentiability for product engineering. The recognition and segregation of the heterogeneity of customer groups using machine learning pattern recognition techniques is underpinned by schema theory [17], which allows improved organizational comprehension of the mapping and structure of customer profiles. The mid product development phase also includes the attestation of product adoptability among customers. This is underpinned by adoption theories [18] that test and validate user preferences for product refinement. Last, but not least, the late product development phase involves the understanding of product success and the causal forces, agents, and factors that results in product success or failure. This is underpinned by attribution theory [19], upon which evaluation of the product development can be conducted.

2.2.1. Early Phase: Leveraging on Marketing Intelligence to Progress Customer Orientation for Competitive Advantage

Theoretical Underpinning: Market Orientation Theory

Marketing concept is defined as "*a philosophy of business management, based upon a company-wide acceptance of the need for customer orientation, profit orientation and recognition of the important role of marketing in communicating the needs of the market to all major corporate departments*." [20]. *Market orientation theory* stemmed from the translation of marketing philosophy into practice, where operationalization of the marketing concept meaningfully manifests customer focus, marketing coordination, and profit orientation.

Kohli and Jaworski defined market orientation as the "*organization wide generation of marketing intelligence pertaining to current and future customer needs, dissemination of intelligence across departments, and organization wide responsiveness to it*." [12]. In close relation, Narver and Slater described market orientation as a focus on the incorporation of three behavioral factors, namely, (i) customer orientation, (ii) competitor orientation, and (iii) inter-functional coordination, to generate high value to customers [21]. The Narver and Slater approach was conceptually adopted by Helm, Krinner and Endres, and applied in this paper, as shown in Figure 1 [9,21].

The behavioral perspective of Narver and Slater seeks to uncover meaningful insights from customers and competitors to establish the necessary marketing intelligence capability for superior NPD and customer value-add. For segmentation-based NPD, to achieve superior customer behavioral understanding, we focus on customer orientation (rather than competitor orientation).

Market orientation theory underlies organizational adaption to the environment that results in changes in decision rules as part of the learning process. Cognitive schema guiding the pursuit of new opportunities from marketing intelligence-derived search initiatives may direct managerial attention to recognize and act upon market-oriented factors that lead to effective value propositions [22,23]. These cognitive dynamic capabilities form the micro-foundations of competitive advantage and directs product development teams to seize market and technological opportunities [24].

Empirical Literature

Yu, Jin, and Wang explored market orientation theory using a case bank—the China Construction Bank—and identified a process of change that can help institutionalize market orientation in banks [25]. Monferrer Tirado, Moliner Tena, and Estrada Guillén looked at how market orientation helped facilitate the exploitation of knowledge in banks, through marketing capabilities, leading to higher performance [26].

Iyer et al. explored market orientation and NPD-associated constructs such as proactive and responsive market orientation among different industries, including banking [27]. The authors found that proactive and responsive market orientation supports product positioning strategies, which mediate the relationship between market orientation and product performance.

2.2.2. Early Phase: Leveraging on Big Data Information Processing Capability to Drive Marketing Analytics

Theoretical Underpinning: Information Processing Theory

Information processing theory views an organization as a system, which undertakes information exchange with the environment to apply in the organizational context. The central tenets of information processing theory lie in (i) information processing demand, and (ii) information processing capability [28], and the relationship (or fit) between the two factors. A high information processing demand can be addressed by expanding redundancies in resources, but this raises expenditure. A high information processing capability (i.e., extraction, transformation, exchange, and storage of information) can be useful to improve the availability of decision-supporting informational resources. A good match between information processing demand and capability can result in continual competitive advantage [29].

The information processing theory underlies organizational NPD activities that tangibly and systematically breaks down marketing intelligence arising from customer and competitor information into capability-enhancing knowledge base and coordinated resource deployment activities, transforming marketing intelligence into new or adapted products [30].

Slater and Narver emphasize the need for market-oriented firms to address both expressed and latent client demands [14]. However, one set of difficulty that plagues product development success stems from unobservability of client characteristics. From an agentic perspective, in line with the resource-based view, client data serves as an imperative intangible asset for competitive advantage. The processing character of marketing intelligence for niche differentiated product development capability requires the ability of an organization to gather, classify, analyze, and act on market data, using the entity's marketing intelligence system architecture, to raise the propensity to satisfy personalized client needs [9].

Beyond collecting appropriate valuable customer and competitive data, improving information processing capability entails building a marketing intelligence architectural capability to ensure proper processing of data, a systematic and continuous flow of analytics-derived information, and informed decision making [15], yielded from the behavioral view of market orientation.

To conceive a sound NPD product strategy, quality information processing demand will have to be met by robust information processing capability.

Empirical Literature

Egelhoff considered information-processing theory from the perspective of multinational enterprises, including banks [31]. Rogers, Miller, and Judge utilized information processing theory to investigate, given a variable strategy, the differences in planning processes in the banking sector [32]. It can be extrapolated that transforming good product planning to product performance requires the moderating effect of a sound product strategy.

More recently, Song, Zhang, and Heng studied new service development, through over 600 projects, including 217 from the banking sector [29]. They found evidence of high big data analytics capability and robust information processing demand-capability fit to the enhancement of sustainable innovativeness.

Isik investigated the fit between big data information processing demand and capabilities [33]. Pertaining to the banking sector, the author found that while demand may be met via analytical capabilities enhanced through better technology and tools, there was an emphasis on the utilization of quality data collected via data sharing (e.g., data partnership building) to enhance the availability of appropriate valuable customer and competitive data for intelligence efforts.

2.2.3. Mid Phase: Market Segmentation to Assess Customer Specificity and Differentiability for New Product Engineering

Theoretical Underpinning: Schema Theory

The cognitive science theory espouses on the understanding and interpretation of our world through the access of a schema of knowledge structure in our brain—methodically organized information built from prior knowledge that is pivotal for us guide how we learn and act in the future. *Schema theory* is defined as an ontological classification approach where entities organize and structure information "*stored in memory that specifies the defining features and relevant attributes of some stimulus domain, and the interrelations among these attributes*" to guide future thoughts, perceptions, and actions [17].

A schema is defined as a unit of functional analysis, from which one *assimilates* (or the making sense of an environment and comporting of an action orientation in terms of a stock of schema) and *accommodates* (or the dynamic change in schemas over time due to changes in assimilation). A schema instance is defined as an active deployment of the process of recognition, recall, reflection, and action-oriented generalization in one's interaction with the environment [34]. Corbacho and Arbib provide a fascinating discourse on this subject blending cognitive psychology, neuroscience, and computing, proposing autonomous agents capable of adaptive behavior [35].

Organizational knowledge is an organized collective capability to dynamically guide activities of a contextual action within domains of practice. This is achieved by "*enacting sets of generalizations whose application depends on historically evolved collective understandings.*" [36]. From a marketing intelligence perspective, schema theory can be viewed as an organizational approach can help an organization learn vital customer information and acquire critical knowledge that are useful for effective organizational decision-making and actions.

To improve organizational intelligence efforts, machine learning can be employed as a tool to assimilate and accommodate existing knowledge schemas. From an analytics standpoint, learning can be achieved through structuring knowledge schemas using, for instance, machine learning pattern recognition techniques, such as market segmentation. Market segmentation is defined as "*the process to divide consumers into similar or homogenous groups sharing one or more [expressed or latent] characteristics such as, among others, habits, lifestyles, tastes, and preferences.*" [37]. Segmentation techniques can help discover and influence new ways of segregating existing knowledge schemas to improve organizational comprehension on the heterogeneity of customer behavior.

Market segmentation is a core activity within marketing analytics, alongside visualization and class prediction [38]. While segmentation can be performed over a range of customer features, including behavioral, geographic, psychographic, and demographic, it is essential for customer segments to be (i) actionable, (ii) accessible, (iii) differentiable, (iv) substantial, and (v) measurable [39]. These five factors are crucial for new differentiable and niche product development.

It is worthy to note that there has been research that looked at the behavioral theory of the firm (BFT) and artificial intelligence [40], which may be useful to extend research of this paper by applying artificial intelligence applications in organizational learning, theoretically framed by BFT. Research includes Puranam [41], who studied the configurations of human–algorithm collaboration that can help describe organizational learning dynamics, as well as Raish and Krakowski [42], who expanded the augmented learning theory arising from machine learning and human–computer interaction to the perspective of organizational learning.

In this paper, application of BFT is not appropriate as the theory introduces complexities of conflicting interests of individual and firm aspirations in managerial decision making. In the scoped view of the application of segmented-based NPD leveraging on marketing analytics, the schema theory would apply a more precise theoretical framing for deployment instantiations.

The Empirical Literature

Theoretically framed by schema theory, among others, Kunle, Akanbi and Ismail found significant influence of internal marketing intelligence data on the improving of competitive advantage in banking [17]. Most segmentation-based banking use cases focuses on the technicalities of segmentation analytics techniques and methodology to tailor marketing strategies, with lesser focus on theoretical underpinnings [43,44].

From a marketing angle, many applied schema theoretic papers are framed from a promotion, product, or brand recall perception and cognition perspective [45,46]. This paper applies schema theory from a different context. Here, we utilize schema theory from an organizational knowledge discovery viewpoint, through the application of machine learning techniques. There exists a paucity of papers in this area. It will be of benefit to understand how organizational knowledge and learning can be improved through the use of analytics from a schema theory perspective. This can lead to further exploration on more specific applied schema theoretic research, for instance, on organizational comprehension of express or latent customer behavioral characteristics using, for instance, segmentation-based machine learning techniques.

2.2.4. Mid Phase: Assessing Customer Response to Product at Pre-Launch Stage for Testing and Validation

Theoretical Underpinning: Adoption Theory

Adoption, or acceptance, is defined as "*an antagonism to the term refusal and means the positive decision to use an innovation*" [47]. At the alpha or beta stages of pre-launch, it is crucial to understand the factors that influence a potential customer's decision to adopt a particular product, so the bank will be able to account for these factors during product development [18].

Figure 2 provides a good overview of the breadth of *adoption theories* and theoretical models. These theoretical framing are well expounded in [18]. There are a multitude of studies that looked at customer behavioral responses to product adoption, backed by adoption theories and theoretical models, such as unified theory of acceptance and usage of technology (UTAUT) or technology acceptance model (TAM), etc. [48]. These theories and theoretical models help researchers and practitioners assess new product usage and understand and predict customer behaviors.

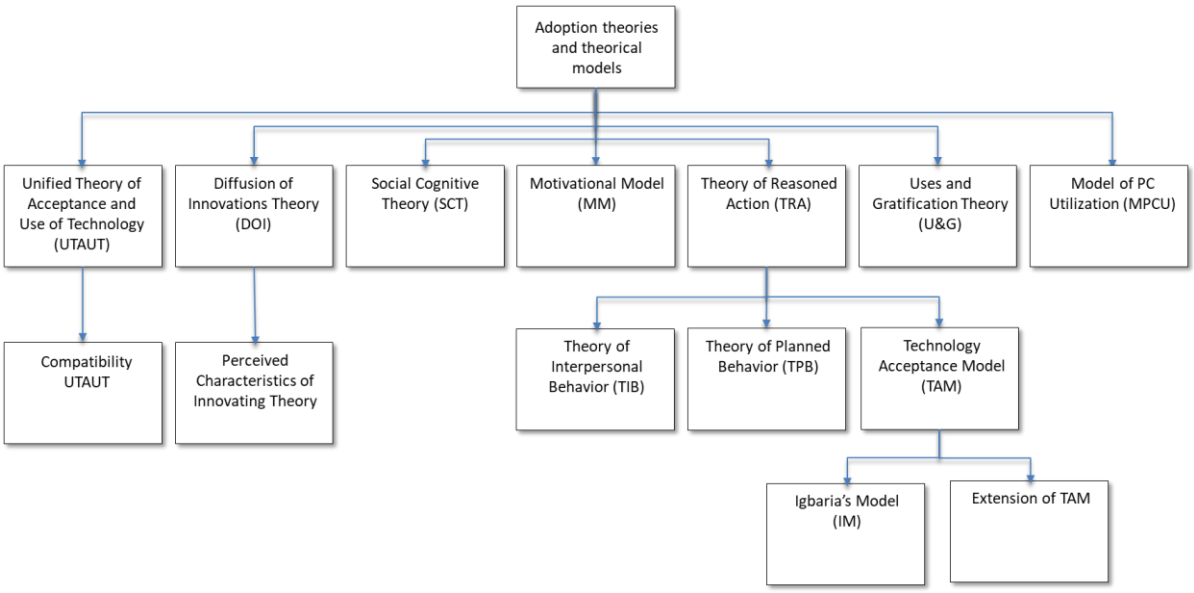

Figure 2. Adoption theories and theoretical models.

Empirical Literature

Shaikh and Karjaluoto performed a review of the literature of 55 empirical mobile banking adoption papers [49]. The authors found that eleven adoption theories and theoretical models, and their hybrid or modified versions, provided the foundations to guide improved mobile banking adoption and the development of dedicated marketing programs. TAM, innovation diffusion theory (IDT), and UTAUT were the top three most widely used theories and theoretical models for mobile banking adoption.

Underpinned by adoption theory, Martins, Oliveira, and Popovič studied internet banking adoption to understand the determinant factors that influenced and attracted customers, through the integration of perceived risk theory with UTAUT [50]. Applying structural equation modelling, the authors found that perceived risk of product use was an important determinant to new product adoption decisions.

In another adoption theory-framed paper, Jamshidi and Hussin combined theory of reasoned action (TRA) with IDT to interpret customer usage behavior and behavioral intention for Islamic credit cards (ICC) [51]. The authors applied partial least squares structural equation modeling (PLS-SEM) and found that factors such as trialability and compatibility were good predictors of customers' intention to adopt a new ICC product.

2.2.5. Late Phase: Assessing Customer Behavior to Study Post-Launch Product Success

Theoretical Underpinning: Attribution Theory

Attribution theory is the "*study of the process by which people associate causes to events and outcomes that they experience*" [19]. The theory suggests that antecedent factors, such as motivation or information, may casually influence a customer to form inferences about a successful or unsuccessful product experience outcome.

There are different dimensions of attribution, including the (i) locus of causality (i.e., internal or dispositional attribution where causality is assigned to internal forces, agents or factors, such as personal ability, or external or situational attribution where causality is assigned to outside forces, agents or factors such as luck or weather); (ii) stability of causality (i.e., consistency of relationship between causal forces, agents or factors, and outcomes of behavior); and (iii) controllability of causality (i.e., where depending on the locus of control and stability of behavior, the ability of a customer to control the outcome of a behavior) [52].

For instance, a new product can change the way customers interact with a bank. If this new product experience does not allow customers to accomplish their goals in a manner that maximizes efficiency and minimizes friction, customers may experience anxiety and challenge. Customers could express complaints to hide their anxieties, and in attribution theory terms, attribute their difficulties in adopting to the new product leading to product failure.

Aside from theoretical framing by attribution theory, some studies applied the contemporary information systems (IS) theoretical model—the *IS success model* (also known as the *Delone and McLean IS success model*)—to understand if a system has been implemented favorably. New product evaluation is conducted through six key dimensions, namely: (i) service quality, (ii) system quality, (iii) information quality, (iv) user satisfaction, (v) system usage intentions, and (vi) net system benefits. As with attribution theory, the IS success model is a post-adoption evaluative theory to understand customer behavior post-product launch [48].

Empirical Literature

Heinemann et al. utilized grounded theory to validate customer perspectives of sustainability financial products [53]. Theoretically framed by attribution theory, the study found that poor uptake of sustainable financial products was largely driven by low customer awareness, lack of product selection orientation, customers' attitude–behavior gap, and, in terms of advisors, a lack of initiative and product knowledge.

Underpinned by attribution theory, Srivastava and Gosain investigated customer satisfaction on retail banking service failure attribution [54]. Through the application of a 2 × 2 × 2 between-subjects experiment methodology where homogeneous groups of participants were given different treatment levels of independent variables, the authors found the perceived level of service provision and suitability of customer care significantly influenced customer perceptions about the service failure.

Puspitasari and Jayanto studied, in line with attribution theory, the influence of factors on customers' interest to use Islamic financing products [55]. Using structural equation modeling, the study found significant influence of factors, including faith-based product knowledge and Shariah marketing.

Motiwalla, Albashrawi, and Kartal studied mobile banking platform adoption using the information system (IS) success model [47]. Applying confirmatory analysis using structural equation modeling, the authors found that system use success factors were highly influenced by heterogenous user behavioral segments.

3. Methodology

3.1. Case Study Approach

A case study is defined as "*a research approach that is used to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context*." [56]. There are three case study approaches to scientific enquiry. These include: (i) a collective approach that, sequentially or simultaneously, studies multiple case studies to gain a broader appreciation of an inquiry; (ii) an intrinsic approach that shares a unique phenomenon, distinguishing from other phenomena; and (iii) an instrumental approach that uses a particular case to provide a broader appreciation of an inquiry. In this study, we adopt the instrumental case study approach, which is a naturalistic research approach that uses a specific case to provide an in-depth appreciation of a phenomenon.

It is noteworthy that this case study shares similarity to an idiographic theory-guided case study, which centers its attention on theoretically underpinned aspects of reality built around an explicit and well-developed conceptual framework [57]. Such theory-guided idiographic case studies are explicit in terms of its case normative biases and analytic assumptions, allowing straightforward empirical validation of case interpretations.

However, while an idiographic nature targets analysis of a single episode in history, it is of benefit to consider a "detailed examination of the aspect of a historical episode to develop or test historical explanations that may be generalizable to other events." [58]. There is a degree of nomothetic inclination in this paper that seeks to make inferences beyond the case study to encourage theoretical generalization in research and practice [59].

3.2. Banking Case Event

The case study approach values the understanding of the '*why*', '*what*', and '*how*' in terms of the practice of analytics-based NPD in the real world. Using a real-life banking scenario, this study discusses an analytics-driven NPD workflow from the perspective of theoretical underpinning and case study applications.

In this case study, a retail banking arm of a regional banking group based in Singapore aimed to introduce a new banking product.

> "*Banking industry is highly competitive . . . we have different customer segments, and these customers have different expectations from the bank.*"

To achieve this end, the bank sought to understand the profiles of clients within their customer base to search for possible areas where more customer value could be captured, so as to develop relevant propositions and offers for each customer segment.

In alignment with the conceptual model in Figure 1, Figure 3 presents the five-step flowchart of the case study across the early-to-late phases of NPD, as expounded in the section above. In the following section, we apply an instrumental case study approach to detail the case study event.

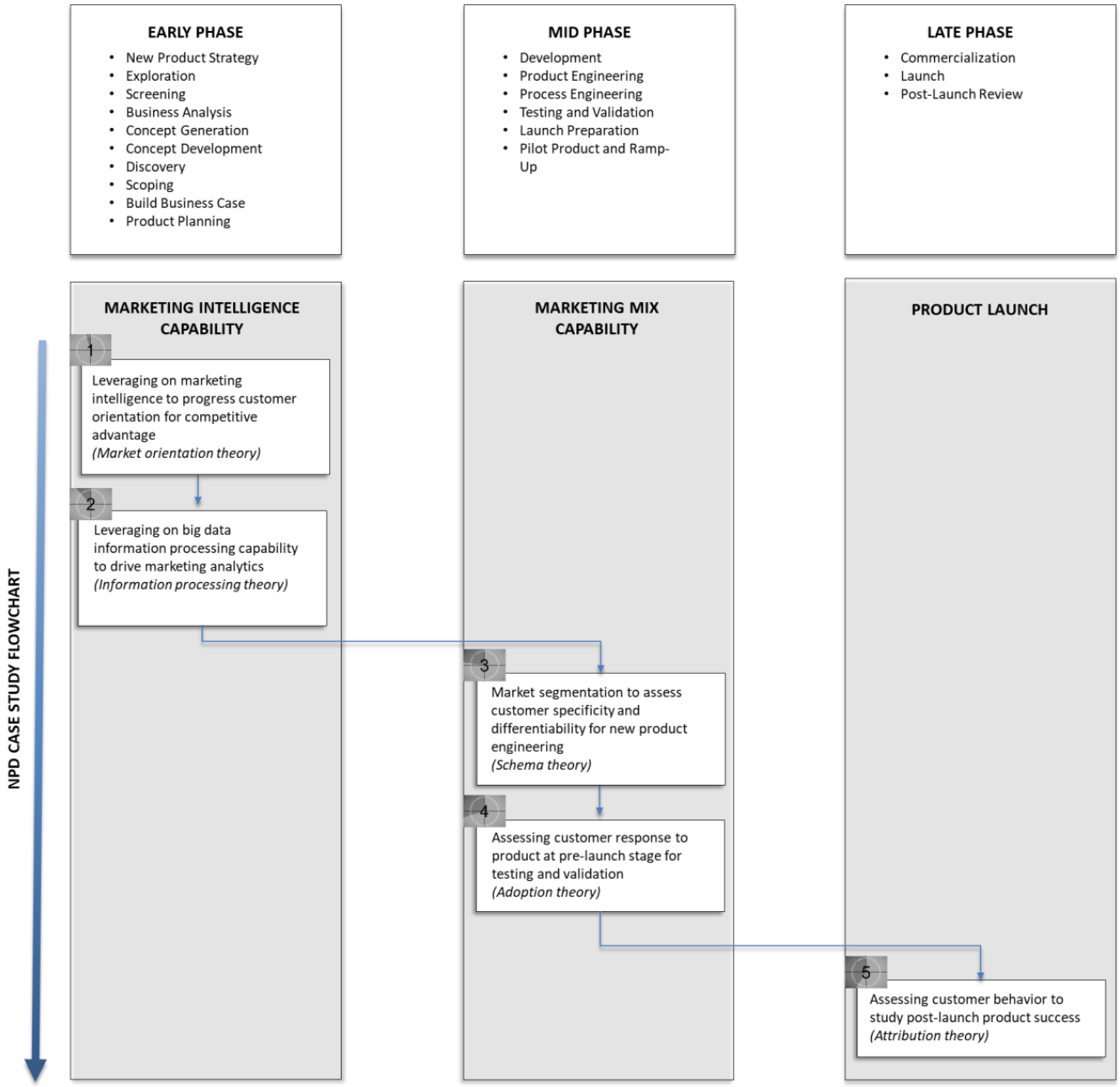

Figure 3. NPD case study flowchart.

4. Case Study

4.1. Early Phase: Leveraging on Marketing Intelligence to Progress Customer Orientation for Competitive Advantage

4.1.1. Case Study Bank's Product Development Stage

Market-oriented NPD could be informed by competitive strategies [27,60]. These Porter strategies outlined the strategic marketing choice of focus (i.e., niche orientation), cost leadership (i.e., price competitiveness), or differentiation (i.e., distinctiveness of products or services) as pivotal elements to competitive success. In the banking business, where margins are thin, the Porter strategic measures of choice in NPD lie in differentiation, with a focus on particular client segments. To achieve this, it might be beneficial for marketing intelligence to understand associations that drive transactional behaviors and adapt to distinct client characteristics through market segmentation [17].

At the exploration stage of NPD, the bank looked to identify a market segment of focus. This began with a hypothesis that high healthcare spending existed in Singapore [61,62]. Despite improved treatment capabilities and life expectancies, healthcare cost inflation remained an intractable challenge that weighed on the mind of the government. In response, the government announced more fiscal spending on healthcare facilities construction, as well as increased healthcare subsidies. In a 2018 survey, which polled over 1000 Singapore residents, a significant proportion of residents were concerned about the cost of living for retirement planning, with healthcare cost being an important factor [63]. A NPD strategy would center around this hypothesis.

4.1.2. Data Background

Credit card transactional information provides a rich source of information. Three-month desensitized credit card transaction dataset was extracted from the bank's digital client data pool, upon which analytics was performed. Desensitization of data entailed that no individual customers, and their related transactions and consumer behaviors, were identifiable. The study looked at card spending on healthcare-related expenditure and tracked all other card spending made by these customers.

To ensure meaningful merchant analysis, the raw data were pre-processed to consolidate merchant names and correct inconsistencies in merchant categories. In order to encourage card transactions, the bank had embarked on many targeted promotions with different card types and merchants, particularly on high frequency basic household transactional items, such as grocery spending (e.g., *NTUC FairPrice* and *Cold Storage*), departmental store spending (e.g., *Robinsons*), utility spending (e.g., *SingTel* and *SP Services*), and gas stations (e.g., *Shell* and *Esso*). Initial analyses performed on the original dataset yielded little implementable strategic insights beyond what the present credit card market were implementing. To extract insights over and above present market strategies, it was imperative that the aforementioned merchants with high frequency household transactional items were excluded to remove data noise from such transactional items, forming an additional transformed dataset.

For a clearer insight into healthcare-related merchants, the study further segmented merchant categories, for instance '*Other Retail*', into relevant healthcare and wellness merchant categories, including '*Beauty*', '*Traditional Chinese medicine*' (TCM), among others. In addition, all merchants in the original '*Healthcare Provider*' category were grouped into subcategories, including '*General*' or general healthcare practitioners; '*Specialist*' or specialty healthcare practitioners, such as cardiology or urology; '*Women and Kids*' or obstetrics, gynecology, and pediatric specialists; '*Dental*' or dental specialists; '*Optical*' or optometry specialists, among others.

The purpose of these extensive data cleaning was to validate the worthiness to position healthcare as a strategic card marketing sector and to identify patterns that may exist within the healthcare sector, if any, such that the bank can use these patterns for targeted outreach efforts, in view of a profitable NPD strategy.

4.1.3. Summary of NPD Strategy

Using the data-driven approach, analysis on the credit card transaction dataset for the case bank revealed a potential high growth opportunity in the healthcare sector.

> "*In fact, customers who had spent in the healthcare sector had spent disproportionately more. This group of customers represented 15% of the sample population, but accounted for 30% of the total transacted amount.*"

In a later subsection, the study shows that cluster analysis had identified two customer clusters with distinct needs ('*Chronically Ill*' and '*Women and Kids*') and found that they spent even more, specifically 2.8 to 3.0 times more than the average customer (Figure 4).

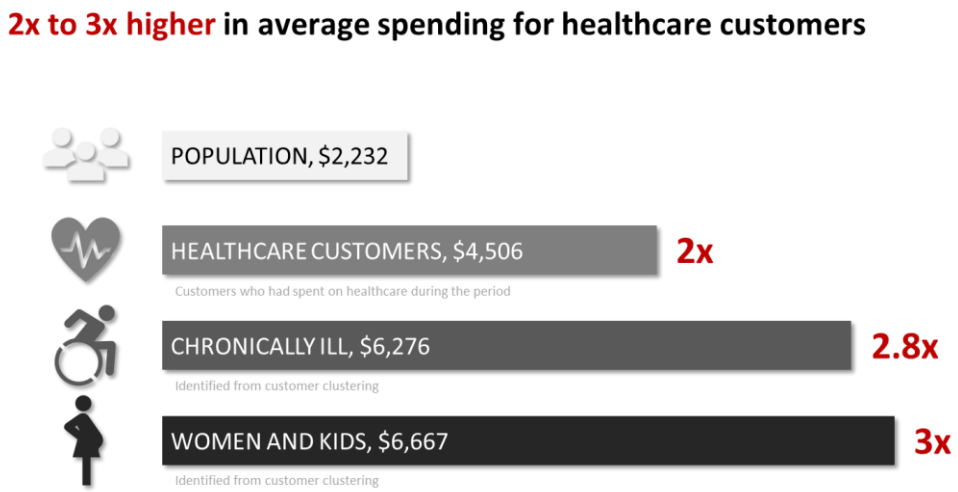

Figure 4. Healthcare customers made 2× to 3× higher in average spending.

Further, association analysis had also revealed strong merchant associations within the healthcare sector, which revealed possibilities of merchant platform integration, with potential product bundling, cross-selling, or upselling opportunities.

The proposed NPD strategy was to create a healthcare sector-positioned retail banking product by building a banking healthcare ecosystem platform as a differentiated service for the bank's customers and partners, so as to better integrate into the healthcare value chain.

Based on an internal data source from Bain & Co, provided shortly prior to product launch at around 2019–2020, Singapore's healthcare ecosystem was valued to be approximately SGD $20bn in market size. By building the ecosystem platform on top of the bank's existing digital infrastructure, along with its network effects, there was a potential to generate meaningful return on investment and capture a larger share of the SGD $20bn ecosystem.

4.1.4. Application of Underpinning Theory in Banking Case Scenario

Proactive and responsive customer-oriented managerial approach towards NPD is a deployment instantiation of the market orientation theory. The data driven approach to analyze customer behavioral segments can help bring about differentiated products that go beyond incremental product improvements towards products that embrace customers' substantive needs.

To investigate market orientation view of a bank, the application of qualitative research can involve ethnographic observations and interviews [25], among others. Quantitative surveys are typically investigated using structural equation modeling [27], among others.

4.2. Early Phase: Leveraging on Big Data Information Processing Capability to Drive Marketing Analytics

4.2.1. Case Study Bank's Product Development Stage

To validate the potential high growth opportunity in the healthcare sector, the bank performed exploratory data analysis (EDA) derived from its digital client data pool and its marketing intelligence system architecture to investigate the spending patterns exhibited by its credit card customers.

From 62 distinct merchant categories, Figure 5 highlights the top 20 total transactions of card spenders who spent on healthcare, segregated by merchant categories. It was found that the majority of card spenders who made any form of healthcare card spending, predominately incurred healthcare-related spending, including hospital, wellness, and insurance services (36% of total spending), over and above other areas of spending. From a client's propensity-to-spend perspective, this same effect continued across credit limit bands. There also existed evidence of increasing average and total spending patterns across healthcare related categories as clients aged (refer to Figure 6).

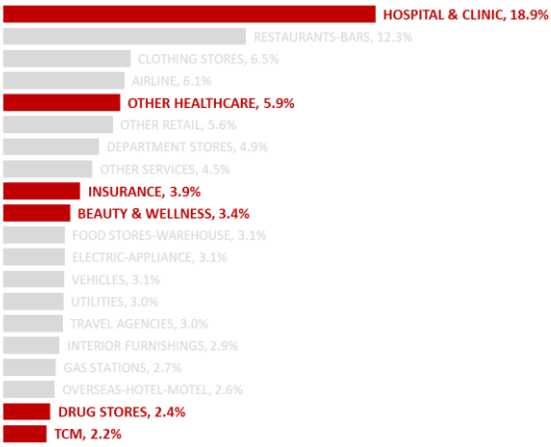

Figure 5. Spending by merchant category.

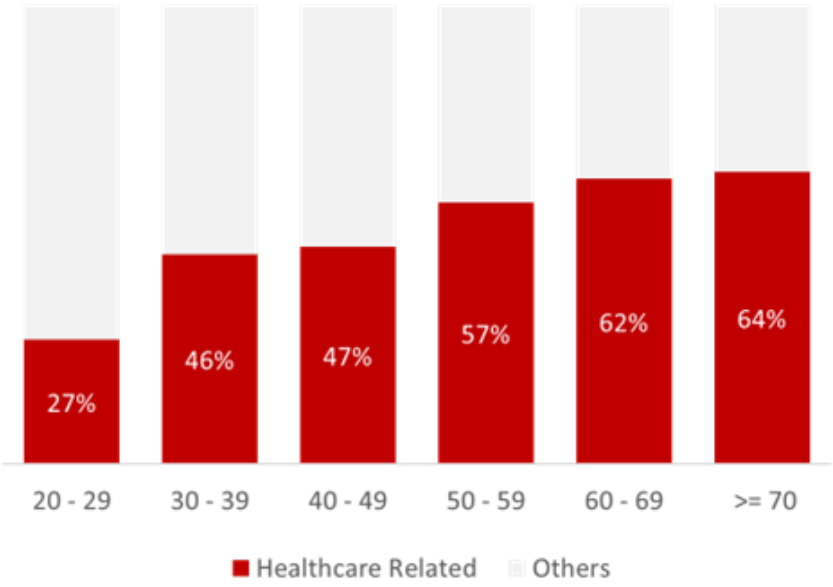

Figure 6. Spending by age bands.

> *"The positive effect of this dominant and increasing spending pattern on healthcare improved the appetency of exploration on this client segment."*

Link analysis is an analytics technique used to evaluate or predict the relationship and estimate the strength of the connection between entities in a network of objects, such as transactions, customers, or merchants [64]. Link analysis was performed on merchant categories on all transactions. It revealed that there were strong associations between healthcare-related spending, as indicated by high confidence in association rules as shown in Figure 7. Such strong merchant associations signaled potential opportunities in cross-selling and marketing between healthcare-related merchants.

Selected specific spending sub-groups are highlighted in Figures 8 and 9. It was distinct that the proportion of spending on '*Women and Kids*' increased when card spenders were in the age range of 30s and 40s. In addition, among others, '*Specialist*' healthcare was in increasing demand as clients aged. Both the proportion of spending on medical specialists and average spending on home care services increased when card spenders reached their 50s.

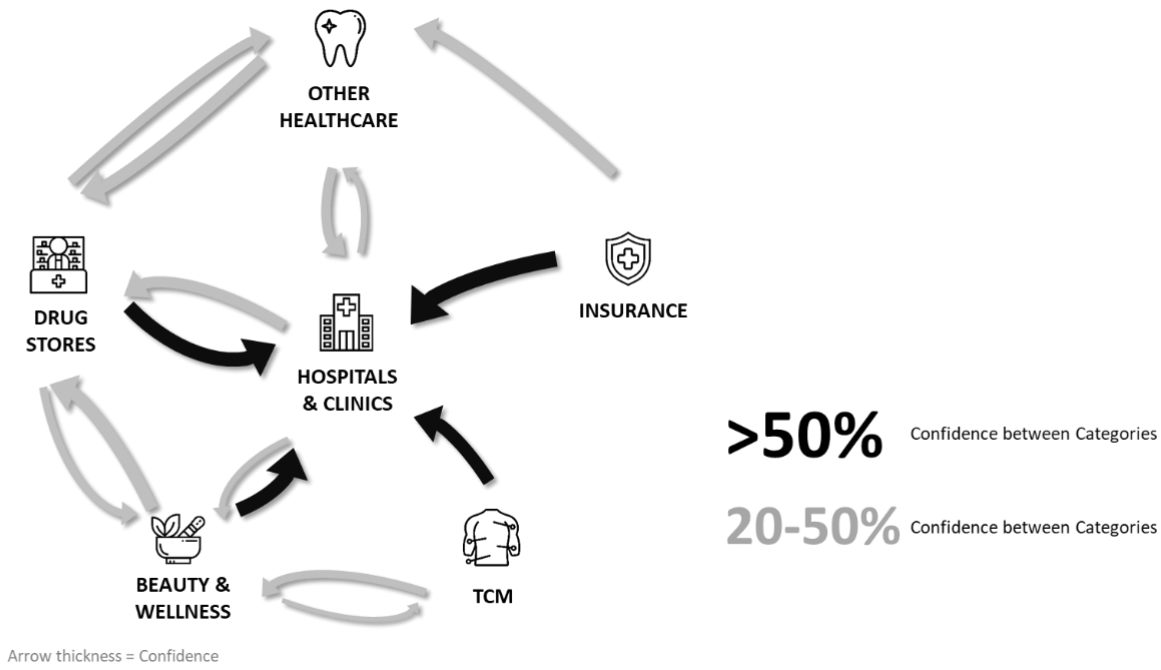

Figure 7. Associations between healthcare-related merchant categories.

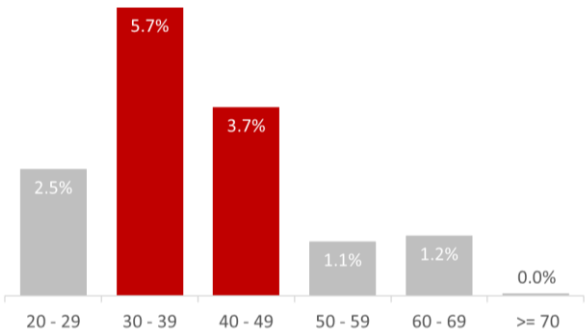

Figure 8. *'Women and Kids'* spending by age band.

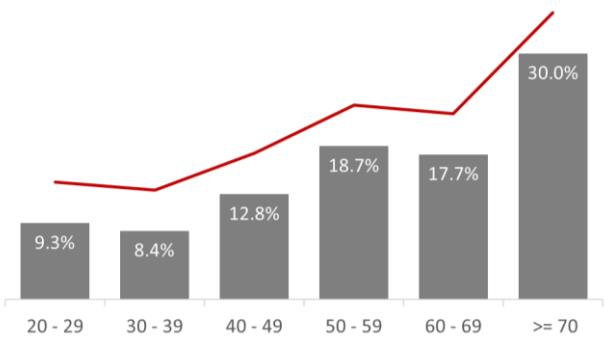

Figure 9. *'Specialists'* spending by age band.

Figure 10 highlights the top average spending by healthcare-related merchants, segregated by revolving categories. It was noticeable that the average card spend on hospitals and insurance merchants were of relatively higher amounts. Furthermore, a higher proportion of payments were made by occasional and middle revolver clients. This represented a positive observation for banks as client spend translated to higher card interest income.

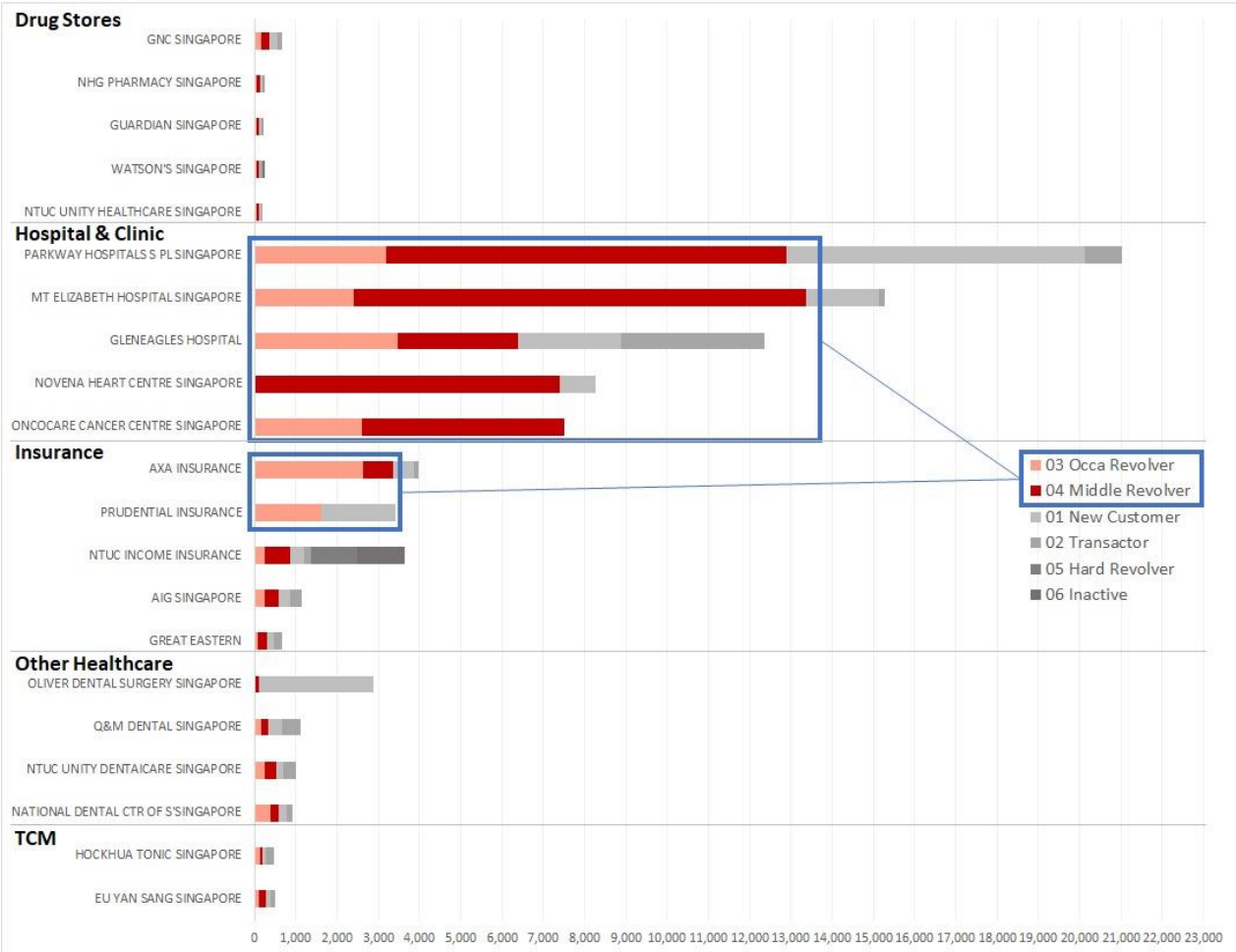

Figure 10. Average spending on healthcare-related merchants by revolving categories.

On an overall basis, the spending patterns of healthcare card spenders appeared distinctive—card spenders who spent on healthcare had a higher propensity to spend on healthcare related merchants. Sub-group patterns could also be observed, which could be further probed for targeted marketing efforts. Specific merchant spending also revealed insights into the profitable high absolute dollar and the revolving nature of client spending patterns. Identification of top healthcare merchants could help the bank identify merchants whom the clients visit and provide merchant leads to generate profitable synergies.

4.2.2. Application of Underpinning Theory in Banking Case Scenario

To satisfy its big data information processing demand, the bank's segmentation-based information processing NPD workflow (Figure 11) was built upon its big data information processing capability. This relied on its digital client data pool and its analytics-driven marketing intelligence architectural system, which helped executives in their analysis and decision-making tasks. The analytics aspect of this workflow included appropriate data collection and transformation for (i) EDA and data visualization, as well as (ii) the application of applied learning systems to perform segmentation tasks.

To assess the fit between organizational big data information processing demand and capability, qualitative research can be conducted using survey questionnaires and open-ended interviews [33], whereas quantitative research can be conducted using exploratory factory analysis and regression analysis [29], among others.

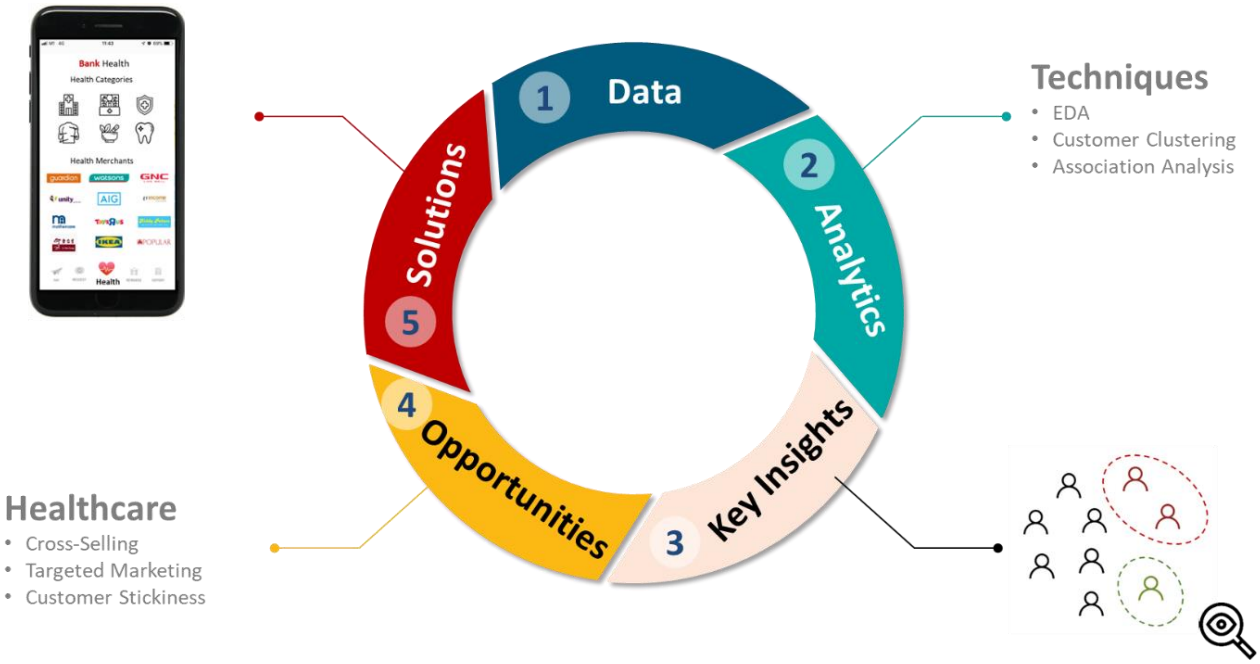

Figure 11. Segmentation-based product development workflow.

4.3. Mid Phase: Market Segmentation to Assess Customer Specificity and Differentiability for New Product Engineering

4.3.1. Case Study Bank's Product Development Stage

Market segmentation can help researchers and practitioners identify client behavioral segments and develop new products with differentiability and niche specificities [38]. To identify distinct customer behavioral segments that could help in the engineering of new products, the bank explored sub-group spending patterns among healthcare customers using a clustering analysis. The variables used were as follows:

- Age band of the customer
- Credit limit band of the customer
- Gender of the customer
- Frequency of healthcare-related spending by the customer ('*Once*', '*Infrequent*', '*Frequent*', where '*Infrequent*' was defined as two to three times of visit and '*Frequent*' was defined as more than three times of visit during the quarter under observation)
- Monetary value of healthcare-related spending by the customer ('*Low*', '*Medium*', '*High*', where the categorization was based on percentiles)
- Whether the customer had visited medical specialists during the period ('*Yes*', '*No*')
- Whether the customer had visited women and kids-related healthcare services during the period ('*Yes*', '*No*')
- Whether the customer had spent on insurance during the period ('*Yes*', '*No*')
- Whether the customer had spent on mum and baby-related merchants, e.g., *Mothercare* or *Kiddy Palace* during the period ('*Yes*', '*No*')

A latent class analysis (LCA) approach was adopted given that all variables used were categorical. A four-cluster model was chosen as the best model, given it yielded the smallest Bayesian information criterion (BIC) and identified four distinct clusters of customers. The characteristics of the four clusters identified were illustrated in Figure 12.

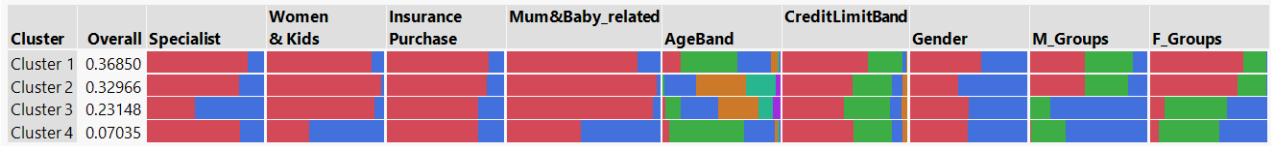

Figure 12. Customer cluster characteristics summary from four-cluster LCA model.

4.3.2. Cluster 1—'Young Occasional Healthcare Spenders'

An amount of 80% of this customer group only spent on healthcare once during the period under observation. Almost 90% of them spent only a low or medium monetary amount on healthcare. This group had an average spending of SGD $323. In addition, 93% of them are below 50.

4.3.3. Cluster 2—'Senior Occasional Healthcare Spenders'

An amount of 75% of this customer group only spent on healthcare once during the period, and 24% spent only two or three times. An amount of 85% of them only spent a low or medium amount on healthcare. This group had an average spending of SGD $338. In contrast to Cluster 1, 71% of them were above 50.

4.3.4. Cluster 3—'Chronically Ill'

This group of customers went to healthcare services four times on average during the period. An amount of 82% of them spent a high amount on healthcare, with the overall average spending was at SGD $1950. In addition, 62% of them visited medical specialists. They tended to be older than average, with 86% being above 40 (53% above 50).

4.3.5. Cluster 4—'Women and Kids'

This group of customers also went to healthcare services four times on average during the period. An amount of 69% of them spent a high amount on healthcare, with the overall average spending at SGD $1288. An amount of 77% of them visited women and kids-related healthcare services. An amount of 59% of them spent on mum and baby-related merchants. Moreover, 98% of them were aged 20–49, which mirrored the child-bearing age range.

From the LCA model, it could be seen that Cluster 3 and Cluster 4 were the ones more likely to generate higher sales and incur related spending (Figure 13). It was imperative to focus on these two groups of customers for further spending pattern and merchant analyses.

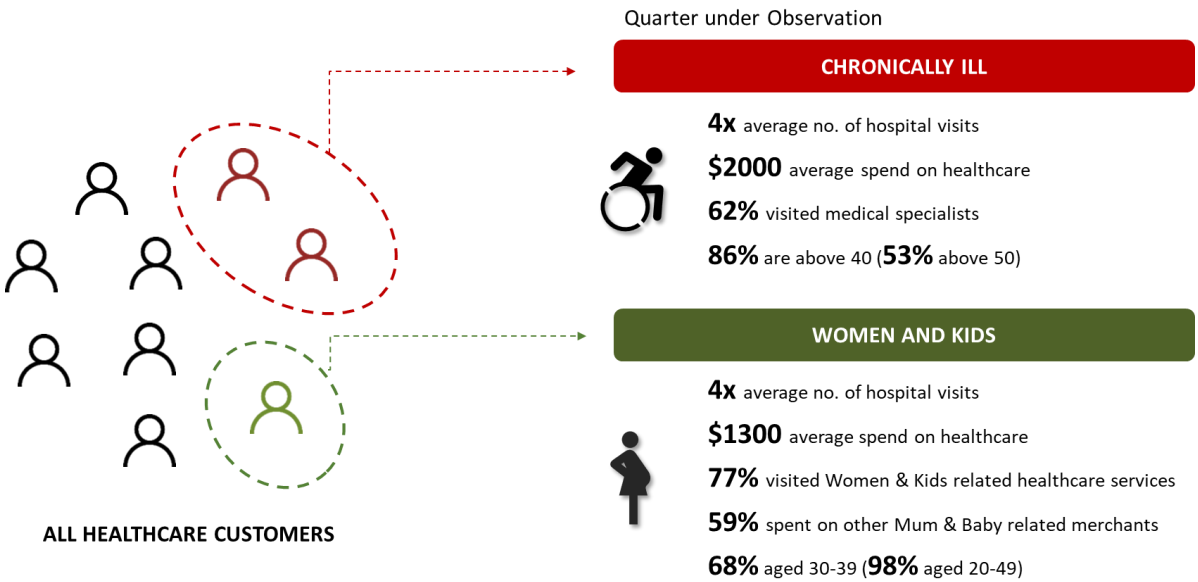

Figure 13. Identifying customers with distinct needs for bespoke solutions.

For the cluster of '*Chronically Ill*' customers, merchant-level market basket analysis (MBA) was performed. Association rules involving medical specialists are illustrated in Figure 14.

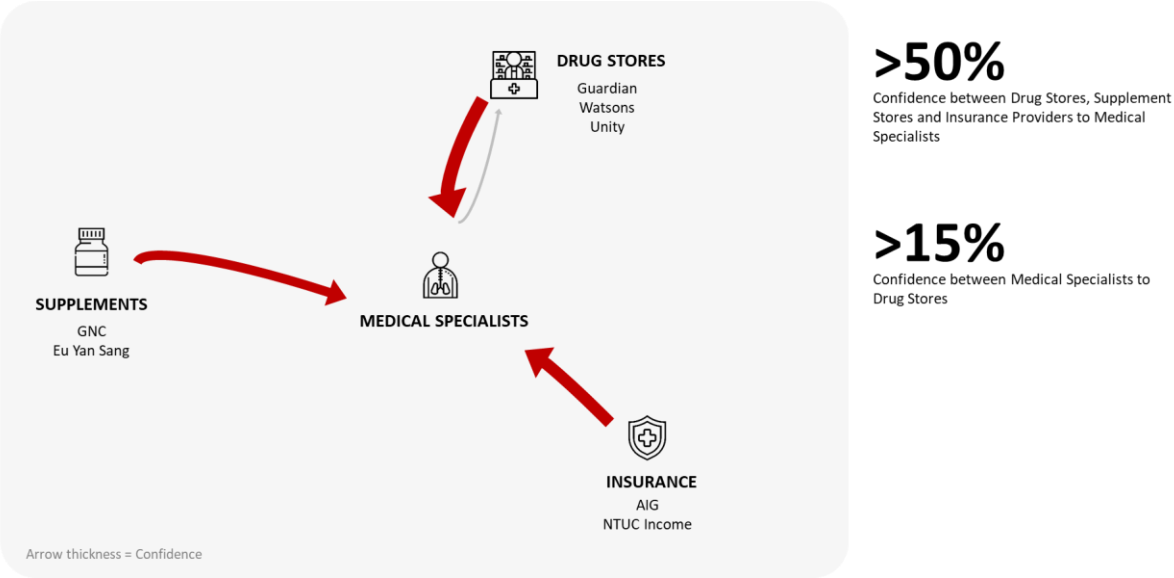

Figure 14. Merchant association rules for '*Chronically Ill*' customers.

It could be seen that there were strong associations between medical specialists against drug stores, supplement stores, and insurance providers. In particular, medical specialists on the right-hand side of an association rule tended to have stronger confidence. This implied that among the group of customers who had spent on drug stores, supplements, or insurance, they were more likely to have spent on medical specialists. These findings are intuitive. Given that this group of customers tended to be older, with the majority of them above 40, they were likely to be conscious of financial planning and may have purchased health insurances. This suggested that there was a high potential of cross-selling of insurance products, which the bank may possibly utilize by leveraging on its insurance arm, especially given that some of the top merchants were found to be insurance competitors *AIG* and *NTUC Income*. In addition, customers who had chronical illnesses or are in suboptimal health status were more likely to frequent drug stores or need nutritional supplements. This could explain the strong associations between drug store, supplement stores, and medical specialists. Analysis revealed that drug stores with the strongest associations to medical specialists were *Guardian, Watsons,* and *Unity*, while the supplement stores were *GNC* and *Eu Yan Sang*.

For the cluster of '*Women and Kids*', associations rules involving women and kids-related healthcare services are illustrated in Figure 15.

It could be seen that there were strong associations between women and kids-related healthcare services, against drug stores, mum and baby-related merchants, government birth registration agency, bookstores, and furniture stores. Similarly, women and kids-related healthcare services on the right-hand side of the association rules tended to have stronger confidence. The strong associations between women and kids-related healthcare services and mum and baby-related merchants were intuitive, confirming the special life stage this group of customers were at, and highlighted opportunities to cross-sell, conduct targeted marketing or other measures to strengthen customer intimacy. The top merchants in this category were found to be *Mothercare, Kiddy Palace,* and *Toys 'R' Us*. An unexpected finding was the association between the Singapore's *Immigration and Checkpoints Authority* (ICA) and women and kids-related healthcare services. ICA requires all births in Singapore to be registered for the issuance of birth certificates [65], and the payment of registration

fees likely resulted in this association rule. This also suggested that this group of customers were likely to have newborns. The association between bookstores and women and kids-related healthcare services could be due to the need to buy prenatal education materials or children's books. The association between home furnishing stores and women and kids-related healthcare services was also intuitive, given that adding new member(s) to a family often necessitates the need to get new furniture and household decor. The drug stores identified were similar to the '*Chronically Ill*' group, namely, *Guardian, Watsons,* and *Unity*.

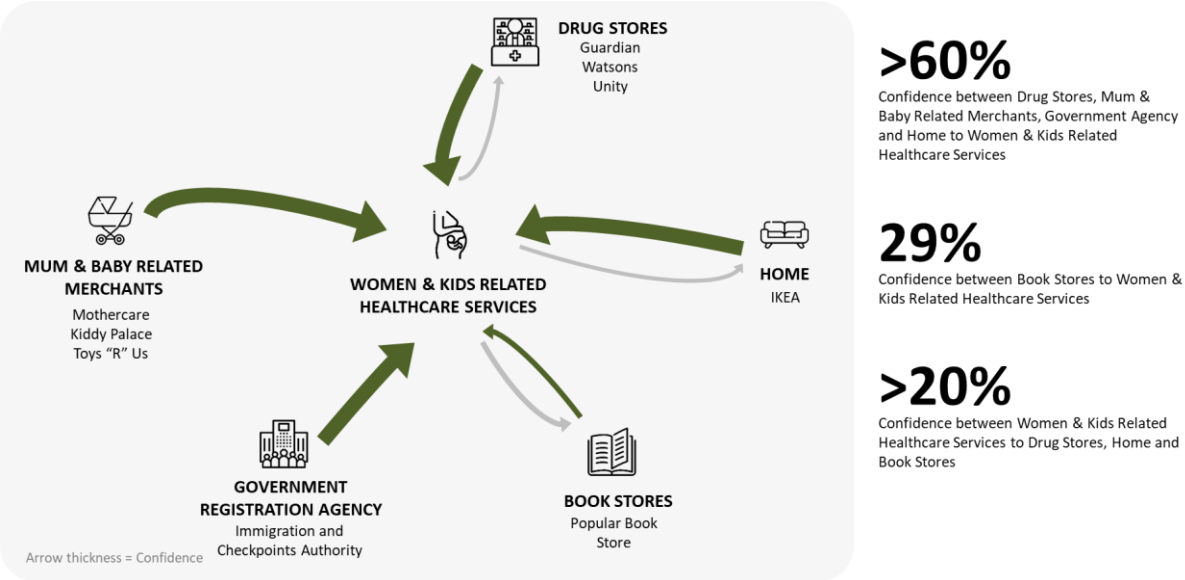

Figure 15. Merchant association rules for '*Women and Kids*' customers.

4.3.6. Application of Underpinning Theory in Banking Case Scenario

Application of segmentation-based marketing analytics is a deployment instantiation of schema theory as part of an organization learning process to improve its marketing intelligence for competitive business advantage.

Performance of clustering analysis (i.e., latent class analysis) and association analysis (i.e., MBA) allowed the generation of actionable insights for the NPD process. Clear differentiability and niche specificities of this customer group favored the creation of a new product, over and above its existing product pool, which recognized and facilitated the synergy of these customer behaviors identified above.

A successfully deployed analytics instantiation updates the internal organizational knowledge state by refining and extending existing schemas so that customer behavioral phenomena, and their associated mapping and trajectories, can be modeled for future product planning.

4.4. Mid Phase: Assessing Customer Response to Product at Pre-Launch Stage for Testing and Validation

4.4.1. Case Study Bank's Product Development Stage

> *"Data analysis findings suggested that there is a high growth opportunity in the healthcare sector, given its strong associations with customers' spending and importance to customers' life goals."*

To capture this high growth opportunity, the banking team conceptualized a healthcare application ecosystem platform, which would be a one-stop solution to its customers' healthcare needs. From the platform, customers could find merchants covering every stage of their healthcare journey, starting from preventative to curative, as well as other supporting services such as insurance. Merchant categories on the platform include, but were not limited to, *Hospitals and Clinics, Drug Stores, Insurance, TCM, Beauty and*

Wellness, and *Other Healthcare Services*. These were the merchant categories derived from the exploratory data analysis where strong associations were identified.

Within each category, the healthcare application would show pages of the most frequent merchants according to a merchant analysis algorithm, along with their promotions, vouchers, discounts, or coupons. The most frequent merchants that have been identified in Figure 16 would be given priorities and greater incentives to onboard the healthcare application ecosystem. The merchants partnering with the bank on the healthcare application would be recommended according to the unique needs and preferences of each bank customer. The machine learning algorithms behind the healthcare application would primarily be used to process customer behavioural data, but it could also be fed with information derived from clustering analysis.

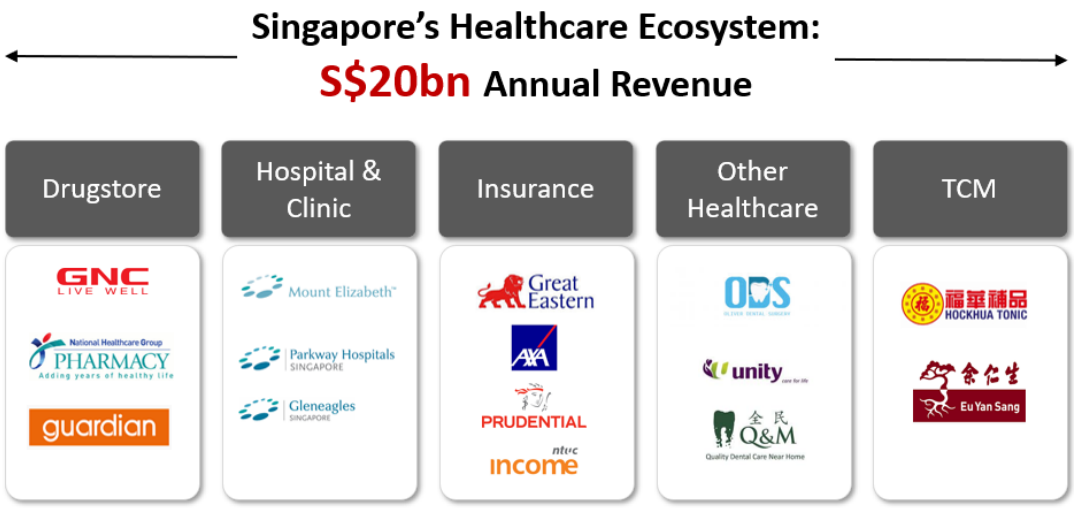

Figure 16. Top merchants identified for each category.

In terms of the technical infrastructure, the healthcare application could be built upon the existing bank mobile application, as illustrated in Figure 17. The existing bank application would act as a digital payment entry point for the healthcare application. A healthcare credit card was also studied for NPD to provide the bank customers with an alternative physical payment method, should they prefer so.

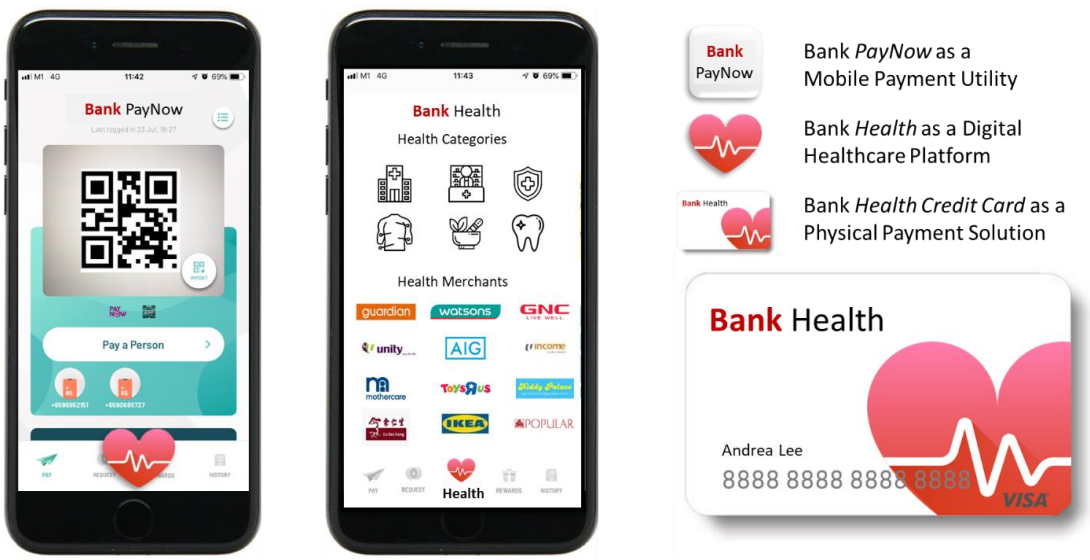

Figure 17. Illustration of the healthcare application.

4.4.2. Application of Underpinning Theory in Banking Case Scenario

This stage entailed the conduct of product adoption testing to understand client acceptance of the new product at the pre-launch (alpha or beta) stage.

Qualitative adoption studies can be conducted using focus groups [66,67], among others. Quantitative adoption tests or surveys are typically investigated using exploratory or confirmatory factory analysis through structural equation modeling, partial least squares (PLS), and path analysis, and to lesser extents, regression analysis and fuzzy analysis [68], among others.

Any beneficial (or adverse) findings should be integrated into the product prototype as an enhancement or addition of product features (or deletion of features or product pivoting).

4.5. Late Phase: Assessing Customer Behavior to Study Post-Launch Product Success

4.5.1. Case Study Bank's Product Development

The healthcare digital application platform product, launched at 2020, looked to complement the bank's wealth management solutions with key merchants in the healthcare space. For a start, the bank had partnered with several medical groups to deliver in-clinic consultation or tele-health services across both general practitioners and over twenty medical specialties, including oncology and paediatrics. This digital platform was directly integrated with healthcare providers' clinic management systems, providing a secure through-train user experience, where customers could access digital invoices, medical certificates, and results from laboratory tests and scans. In addition, customers could also access over 100 wellness merchants through the platform, such as TCM, pain management, and dental services, allowing a seamless experience where all customers' past transactions were tracked and rewarded. The application platform would require the pre-adding of a bank debit or credit card, such that no physical cash or card payments were required.

> *"Health is wealth. We hope the solution can help provide a boost to manage Singapore's healthcare needs."*

Beyond the team's healthcare application solution, future product refinement works (as illustrated in Figure 18) included the continued growth and development of the application as a robust ecosystem platform to capture greater customer value within the healthcare sector. This would allow for greater network effect and increased demand-side economies of scale. The increase in the ecosystem platform value benefits all its stakeholders. Customers would be able to enjoy the convenience of finding entrusted merchants along with their various promotion. Merchants would benefit from the increased customer traffic driven by the platform. The bank could gain from: (i) increased customer transaction value, (ii) the possibility of using membership to the ecosystem platform as an incentive for merchants to transfer their operating accounts to the bank, and (iii) the platform would also be a good source of data for the bank to have better understanding of their customers (both individuals and corporates) for more efficient implementation of future product developments.

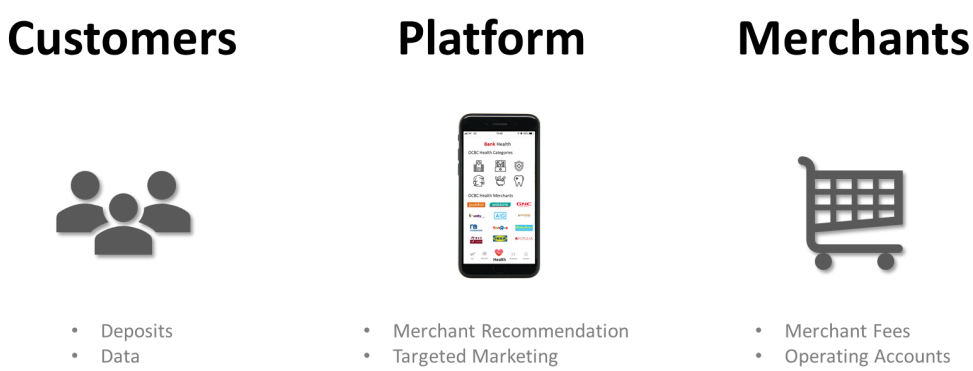

Figure 18. Future product refinement works.

At the time of writing in the last calendar quarter of 2022, the platform, operational for almost two-and-a half years, had been earmarked for discontinuation in the near future. The bank was understood to have re-evaluated their strategic priorities based on evolving customer priorities. It was believed that relevancy and value to customers can be better delivered via other products.

4.5.2. Application of Underpinning Theory in Banking Case Scenario

Aside from quantitative financial metrics (such as average revenue per user, and monthly recurring revenue) and customer metrics (such as customer acquisition, retention and referral cost, and customer lifetime value), it was imperative to undertake periodic post-launch analyses in line with attribution theory to study qualitative and quantitative factors that resulted in successful or unsuccessful product experience outcome. This allows a pulse check on product success and identifies areas of product features and positioning that requires refinement. Alternatively, application of IS success model is also beneficial.

Qualitative attribution studies may be conducted using the grounded theory approach [52], among others. Quantitative attribution tests or surveys are typically investigated using exploratory or confirmatory factory analysis through structural equation modeling [51], and general linear models [19], among others.

5. Implications and Limitations

5.1. Theoretical and Practical Implications

In terms of theoretical implications, this paper provides a discourse of theoretical underpinning of an end-to-end segmentation-based NPD process in banking, applying marketing analytics leveraging on marketing intelligence. The strongest theoretical influences may be built from multiple theories [7]. A good NPD program design, evaluation, and research may integrate contributions of multiple theories, each with unique contributions in the process workflow, for product development success. The paper introduced a conceptual theoretical model for this NPD process and instantiated the application of the theory in different stages of the case study NPD process. Such theoretical framing can provide researchers and practitioners a greater understanding of different stages of the process. They can help researchers and practitioners test the validity and robustness of the analytical-driven NPD process, in a step-by-step process granularity level, in terms of assessing factor influences, examining relationships, and identifying insights.

In terms of managerial implications, it is recognized that conceiving and executing a high-quality NPD program is a difficult task. Investing firm resources and capabilities on NPD may be replete with high costs and uncertainties. There is a paucity of studies in the existing literature that devote themselves to the development of theoretical underpinnings for analytical-driven NPD processes. It may be useful to apply case-based reasoning to adapt the findings of this case study to meet or create new NPD demands and solutions, and interpret, explain, or critique new NPD situations. Using case-based reasoning for problem solving may be useful for practice-oriented NPD design, planning, and diagnosis efforts [69].

5.2. Limitations

At the case data and analytics application level, there are several limitations observed:

- The card transaction data only covered a three-month period and presented a stratified subset of the bank's total customer base. It might not give a full picture of the bank's overall business, and might not allow the study of any seasonal patterns, making it difficult to estimate the impact of the proposed solution or project potential revenue growth. For future NPD product strategy analysis, a more comprehensive dataset covering a larger time frame could be utilized.
- Transaction-level data provided merchant-level data, but not any information on the actual products and services purchased. This implied that assumptions had to be made, which might affect the accuracy of customer clustering analysis and profiling.

This could potentially be mitigated by collecting more detailed product level data from merchant-level data sharing or new banking product launches that collects granular product level data.

- Segmentation based on historical data might not persist in the future. The most frequent merchants and some association rules could change. For future NPD post-launch analysis, it would be useful to undertake periodic analysis to update changes in customer behavioral patterns.

In addition, at the case study level, qualitative assessment was applied on the case findings with authors' expert judgement and experience. While authors maintained objectivity over the case discourse, this assessment could be subjectively influenced [70]. A more rigorous mixed method approach may involve (i) identifying research propositions in the theoretical conceptual framework, as well as applying qualitative expert field interviews to synthesize and develop these propositions [12], and (ii) utilizing structural equation modeling, through survey instruments, to quantitatively establish relationships between theoretical constructs to develop, extend, or refine the theoretical conceptual framework [9]. It is, however, noted that the goal of this paper is to provide a naturalistic research design so as to allow a real-life in-depth appreciation of analytics-based NPD in a banking context, for practice-oriented case-based reasoning. The proposed mixed method approach can be a further work that extends from this study.

6. Conclusions

This paper presents a theory-driven NPD approach backed by the empirical literature. The case study expounded in this paper looks at a real-life banking NPD process, using segmentation-based marketing analytics that leverages on marketing intelligence capabilities.

The notable lack of theoretically underpinned work on an end-to-end analytics-driven NPD process provides research novelty and value to this work. The significance of this research is that, through an instrumental case study approach, the paper presents a theory-guided naturalistic banking case study where a regional Singapore bank utilized unsupervised client segmentation analytics techniques to establish a differentiated new product. Basing upon an explicit and well-developed conceptual framework, the step-by-step analytical process is underpinned by theories to allow nomothetic inferences beyond the case study to encourage theoretical generalization in research and practice.

The theory-driven approach comprises a conceptual theoretical framework that integrated five theories, each accounting for the five different end-to-end NPD stages, spanning from the leveraging on marketing intelligence to progress customer orientation for competitive advantage to the assessment of customer behavior to study post-launch product success. The five theories are, namely: (i) market orientation theory, (ii) information processing theory, (iii) schema theory, (iv) adoption theory, and (v) attribution theory.

In terms of future work, this study proposes the following research extensions, namely: (i) for managerial practitioners, the use of case-based reasoning for practice-oriented NPD design, planning, and diagnosis efforts, and (ii) for researchers, the testing of the validity and robustness of an analytics-driven NPD process in a step-by-step process granularity level, in terms of assessing factor influences, examining relationships, and identifying insights. Further, this study hopes to drive more research interests that address the broader research question of "*how may we establish a theory-driven approach for an analytics-driven process*", across the extensive range of analytics-driven processes.

Case studies can be used vehicles to construct and support theoretical generalizations. To theoretically underpin an analytics process, there still exist much work to be conducted on methodological practices, in terms of analytics processes, case selection, and role of causal mechanisms as a basis of explaining relationship between theories and the analytics process step. The benefits of drawing up concrete and pertinent methodological practices will be a worthy pursuit.

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