

## LEVEL 7 ASSESSMENT SPECIFICATION

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I, Yau Ka Chun, declare that this written assessment is written and supported by Generative AI.

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## Abstract

This study examines parental decision-making and market optimisation in Hong Kong's STEM education sector, focusing on extracurricular programs. It aims to identify factors influencing parental choices, evaluate the impact of socioeconomic and cultural elements, and provide actionable recommendations for education providers and policymakers. The research adopts a pragmatic framework, integrating quantitative surveys and qualitative interviews to capture a comprehensive picture of parental preferences and market dynamics. Key areas explored include consumer behaviour, market segmentation, branding, marketing communications, pricing strategies, customer relationship management, and competitive analysis. The study highlights the importance of practical, flexible, and ethically sound research outcomes, emphasising the need for continuous innovation and alignment with parental expectations. By addressing contemporary business and management challenges, the research offers insights for optimising STEM program design, marketing, and accessibility, ultimately enhancing students' educational experiences in Hong Kong. This work contributes to academic knowledge and practical applications in education management, providing a strategic foundation for improving STEM education quality and market positioning.

## 1.1 Proposal Title

*Studying how parents make decisions and how the market is optimized in the STEM education sector in Hong Kong.*

The study's key constructs included four aspects.

1. Parental Decision-Making
2. Market Optimisation
3. STEM Extracurricular Programs
4. Hong Kong's Education Sector

### 1.2.1 Research Objectives

1. To analyse the factors influencing parental decision-making in selecting STEM extracurricular activities for their children in Hong Kong.
2. To identify the critical elements of market optimisation that can enhance the attractiveness and effectiveness of STEM programs in Hong Kong.
3. To evaluate the impact of socioeconomic and cultural factors on parental preferences and choices regarding STEM education.
4. To provide actionable recommendations for education providers and policymakers to improve the design, marketing, and accessibility of STEM extracurricular activities.

### 1.2.2 Research Questions

1. What factors influence parental decision-making when choosing STEM extracurricular activities for their children in Hong Kong?
2. How do socioeconomic and cultural factors affect parental preferences and decisions regarding STEM education?
3. What are the critical elements of market optimisation that can make STEM programs more appealing and practical for parents and students in Hong Kong?
4. How can education providers design and market STEM extracurricular activities to better meet the needs and expectations of parents and students in Hong Kong?
5. What policy recommendations can be made to enhance the accessibility and quality of STEM extracurricular programs in Hong Kong?

## 1.3 Contextualising the Research within a Pragmatic Framework

### **Understanding Reality: Pragmatic Ontology in Parental Decision-Making**

From an ontological perspective, pragmatism asserts that reality is not fixed but is shaped by human experiences and actions. In this research context, parental decision-making in the Hong Kong STEM education sector is dynamic and multifaceted, influenced by various practical considerations and situational contexts. This perspective allows for a flexible understanding of the factors that drive parental choices, acknowledging that these factors can change and adapt based on new information and changing circumstances.

### **Knowledge through Practice: Pragmatic Epistemology in Research**

The epistemological stance of pragmatism is that knowledge is best gained through practical engagement with the world and is judged by its usefulness and applicability. This research adopts a pragmatic epistemology by generating knowledge that can inform and improve practice. It values quantitative and qualitative data, using a mixed-methods approach to capture a comprehensive picture of parental decision-making processes. The goal is to produce insights that are theoretically sound and practically useful for optimising STEM education programs and marketing strategies.

### **Valuing Practical Outcomes: Pragmatic Axiology in STEM Education Research**

Axiology in pragmatism emphasises research outcomes' practical value and ethical implications. This research is driven by the goal of producing actionable recommendations that can enhance students' educational experiences and meet parents' needs. The value placed on practical outcomes ensures that the research remains relevant and beneficial to stakeholders, including education providers, parents, and students. Maintaining ethical standards is crucial, as it ensures that the research honors the viewpoints and experiences of all participants, with the ultimate goal of enhancing the quality of STEM education in Hong Kong.

## **Methodological Flexibility: Mixed-Methods Data Collection Techniques**

In line with the pragmatic framework, this study uses a mixed-methods approach to collect data:

**Quantitative Methods:** Surveys collect extensive, generalisable data on parental preferences, behaviours, and attitudes toward STEM extracurricular activities. This quantitative data is essential for identifying crucial patterns and trends for market segmentation and strategy development.

**Qualitative Methods:** In-depth interviews and case studies offer detailed insights into parents' subjective experiences and motivations. These qualitative methods facilitate a deeper understanding of the complexities and nuances influencing decision-making processes.

Integrating these methods ensures that the research findings are well-rounded and practically applicable. The quantitative data offers a macro-level view of the market, while the qualitative data provides micro-level insights that can inform targeted interventions and strategies.

Analysing the research using the concepts of ontology, epistemology, axiology, and data collection techniques within a pragmatic framework highlights the study's practical, flexible, and actionable nature. This approach ensures that the research contributes not only to academic knowledge but also provides tangible benefits to the STEM education sector in Hong Kong.

## 1.4 Addressing Contemporary Business and Management Challenges through Research Design

### **Market Differentiation and Positioning: Insights for Competitive Advantage**

The research helps education providers understand how to differentiate their STEM programs in a competitive market. By identifying what parents value most, providers can position their offerings to meet these needs.

### **Developing Customer-Centric Strategies: Aligning with Parental Expectations**

Understanding parental decision-making processes enables the development of customer-centric marketing and program strategies. It ensures that STEM programs are designed and promoted to align with parental expectations and preferences.

### **Fostering Innovation and Adaptation: Staying Ahead in the Education Market**

The dynamic nature of the education market requires continuous innovation and adaptation. The research provides insights into current trends and future directions, helping education providers stay ahead of the curve.

### **Ensuring Ethical Marketing and Program Development: Building Trust and Relationships**

By emphasising the practical and ethical implications of the research findings, education providers can ensure that their programs are attractive and genuinely beneficial to students. This ethical approach helps build trust and long-term relationships with parents and students.

## **Strategic Resource Allocation: Maximising Returns on Investments**

The insights gained from the research can inform strategic decisions regarding resource allocation, ensuring that program development and marketing investments yield the highest returns.

## **Summary**

This study addresses contemporary business and management challenges through a pragmatic research design, providing valuable actionable and ethically sound insights. The mixed-methods approach ensures a comprehensive understanding of parental decision-making and market dynamics. It enables education providers to optimise their strategies and enhance the quality of STEM education in Hong Kong. This research thus contributes to both theoretical knowledge and practical applications in education management.

## 2.1 Literature Review

### 2.1.1 Overview of the Concepts & Theories

The research aims to offer valuable insights for businesses and organisations in the extracurricular activities sector by analysing sales and marketing topics related to parental customer behaviour when choosing extracurricular activities. The results will help refine sales and marketing strategies, improve customer satisfaction, and accomplish organisational objectives in the increasingly competitive extracurricular activity market.

Key areas to investigate include:

1. Consumer Behavior
2. Market Segmentation
3. Branding and Positioning
4. Marketing Communications
5. Pricing Strategies
6. Customer Relationship Management
7. Competitive Analysis

#### Consumer Behavior

This study focuses on the influence of psychological, social, and cultural factors and perceived value on parental decision-making about children's extracurricular activities. It will delve into parents' hopes and standards, attitudes toward education, personality traits, and emotional elements. The analysis will also examine social and cultural impacts such as norms, traditions, and the pursuit of status. The study will identify the various types of value parents seek in activities, encompassing educational and social advantages. Furthermore, it will explore the decision-making procedures and criteria parents use when selecting activities for their children, encompassing information searches, assessment methods, and family dynamics.

## Market Segmentation

Market segmentation categorises customers into subgroups based on demographics, psychographics, and behaviours. Regarding extracurricular activities, segmentation helps understand how parental preferences are influenced by age, income, education, lifestyle, attitudes, and usage patterns.

By grasping the differences between segments, activity providers can personalise their offerings to meet the distinct needs of each group. This involves directing efforts towards niche segments, creating tailored programs and marketing strategies, and adjusting pricing and promotions to align with different parental segments' specific characteristics and demands. Effective segmentation is essential for improving customer engagement and enhancing organisational competitiveness.

## Branding and Positioning

Extracurricular activities must have effective branding strategies to attract parents. A strong brand with a unique identity can increase value by building a good reputation and trust. The essence of positioning is identifying specific opportunities to stand out from rivals by meeting the particular needs of our customers. Also, building brand equity can create loyal customers through emotional connections and positive experiences.

By maintaining a consistent brand, we can reflect the values that match parents' aspirations, while strategic positioning and equity growth help us maintain a competitive edge in attracting and retaining students. Together, these ideas form the foundation for developing and satisfying customers in this market.

## Marketing Communications

Understanding the importance of marketing communications in influencing parental decisions on extracurricular activities is essential. Various approaches, including traditional methods such as television, radio, and print advertising, are being studied for their effectiveness across different regions and demographics. Additionally, digital strategies, like well-crafted websites, social media platforms, and email marketing campaigns, are being explored to engage parents effectively.

The influence of positive word-of-mouth and online reviews from other parents is also being examined. Lastly, the focus is on developing powerful messaging through storytelling, visual content, and educational materials to create emotional connections, build trust, and establish thought leadership within the target parent audience.

## Pricing Strategies

The following synopsis examines various pricing strategies relevant to extracurricular activities. It comprehensively analyses pricing models, such as hourly rates, monthly fees, and package deals. Furthermore, it delves into the concept of dynamic pricing based on changes in demand and seasonality. Similarly, it investigates the role of pricing tiers and options for accommodating different budgets. It also explores how pricing can impact parental perceptions of quality and value and how higher or lower pricing can influence prestige views.

In addition to pricing, factors such as convenience and reputation also play a significant role in parental decision-making. Similarly, discount and promotional strategies, including offers and referrals, can attract price-sensitive parents. Moreover, bundling multiple activities or enhancing core offerings with add-on benefits can improve the perceived value. Lastly, tiered pricing bundles and package options provide flexibility in catering to varying levels of engagement and commitment.

## Customer Relationship Management

Customer Relationship Management (CRM) aims to manage relationships with customers effectively. It focuses on building solid foundations based on trust, communication, and emotional connections. These crucial factors can significantly impact long-term loyalty and advocacy for the business. Furthermore, customer data collection allows for personalised interactions and customised offerings tailored to individual needs. Feedback mechanisms are vital tools that facilitate gathering customer satisfaction input. This way, such inputs help identify areas where service improvements are necessary.

In addition, retention strategies also play an essential role in maintaining loyalty—for instance, loyalty programs, ongoing engagement and rewards aid in fostering long-term customer commitment. Consequently, when appropriately implemented, all these CRM concepts enhance customer satisfaction, engagement and retention levels. As a result, this positive influence ultimately promotes business growth and increased profitability. Thus, a holistic CRM approach can create long-standing value and mutually beneficial relationships by addressing each aspect of the customer lifecycle. Overall, the comprehensive utilisation of customer relationship management practices helps manage customer relationships effectively.

## Competitive Analysis

Identifying direct and indirect competitors and evaluating their strengths, weaknesses, and positioning is essential to competitive analysis. This process entails conducting thorough market research, studying industry reports, and examining competitors' websites and customer feedback. Furthermore, distinguishing one's offerings involves locating gaps in the competitive landscape and creating unique value propositions. It is crucial for businesses to continuously monitor their competitors to adapt to changes and gather customer feedback to address competitive challenges. Michael Porter's value chain model offers a framework for analysing value creation through primary and support activities and their connections to enhance efficiency and competitive advantage.

### **2.1.2 Major Concepts and Theories in the Existing Literature**

#### **Consumer Behavior**

Consumer decision-making is a complicated process influenced by internal and external factors. Many research papers have investigated how the characteristics of a task, differences between individuals, and environmental factors affect purchasing behaviour. In 1983, Punj and Stewart proposed a framework emphasising the importance of examining task and individual variables to predict outcomes better. They argued that considering interaction effects often explains variances better than looking at single factors alone, even though such demonstrations were still relatively uncommon. Their classification of task dimensions, such as importance and risk, helped to consolidate existing knowledge, but there was still scope for further exploration of dimensions like cooperation in group decisions.

Hoyer and Cobb-Walgren (1988) furthered the understanding of interaction effects by suggesting that consumer decision-making varies across product categories due to task environments. They proposed that factors such as involvement modulate the influence of individual traits on information search, evaluation, and choice strategies. An empirical study supported this idea by revealing that individuals allocate more attention to attributes and employ more comprehensive decision processes for high-involvement products than for low-involvement options. Furthermore, variations in decision strategies were observed across different product categories.

Recent research has delved into cultural influences and available resources that impact choice processes. For example, Poplavskeya et al. (2018) found that Russian parents heavily relied on personal networks rather than formal sources when selecting extracurricular activities for their children. The study also highlighted that parents with higher cultural capital were more involved in research and decision-making than less prepared families. Additionally, orientations such as control-focused versus interest-focused also played a role in guiding priorities. The study emphasised that a one-size-fits-all approach overlooked differences in family characteristics.

These studies portray consumer decision-making as an interplay between intrinsic and contextual elements. While further research is necessary, recognising the variations across tasks, individuals, product types, cultures, and resources leads to a more comprehensive understanding that can inform marketing strategies. Future studies must continue exploring underexplored dimensions and interactions to build upon existing frameworks.

## Market Segmentation

Market segmentation is an essential tactic for providers of extracurricular activities to reach different groups of parents and children effectively. Dividing the more extensive market into smaller segments with shared characteristics makes customised offerings and communications possible.

While marketing may be easier to promote than making changes to the curriculum, the research indicated that it could fail to encourage actual program improvements (Greaves et al., 2023). Activity providers should balance attracting new customers through marketing and making substantial enhancements that satisfy their existing ones. Otherwise, segmentation could become irrelevant if it doesn't address consumer needs.

Advanced conjoint analysis helps uncover how combinations of attributes influence choices. Understanding the individual value of each aspect aids in predicting the response (Green & Krieger, 1991). Activity providers should utilise conjoint methods to gain deeper insights into segmentation.

Market segmentation allows for meeting varying needs and enhances competitiveness, awareness, loyalty, and communication. Targeting the appropriate segments sets the stage for success and fosters a better understanding of relationships. According to Singh (2013), Activity providers can optimise their targeting efforts by taking advantage of the benefits of market segmentation. Kara and Kaynak (1997) contend that improved segmentation leads to more excellent retention through customised products on a large scale, as opposed to traditional methods. While it may initially raise costs, overall marketing efficiency may surpass that of

competitors still adhering to outdated approaches. Furthermore, finely tuned-segmentation may bring relationship-building and negotiations into sharper focus.

## Branding and Positioning

Establishing robust and distinct brands is crucial within extracurricular activities, as they can influence parents' choices. Crafting brand robustness assessments encompassing financial and asset-centred viewpoints, such as brand recognition and inferred excellence, can assist activity providers in more effectively substantiating investments in brand development (Aaker, 1996).

Parents often connect specific values and beliefs with extracurricular activity brands, which play a role in their decision-making process. While previous models focused on factors such as skill development, a new framework has been introduced that emphasises brand dimensions consumers consider crucial to brand equity, including quality, preference, social influence, sustainability, and leadership (Baalbaki, 2012). Providers of these activities should consider aligning their brand identity and communication strategies with parents' desires for their children's development.

Creating brand loyalty involves fostering emotional bonds. Trust is established for intangible purchases, challenging revaluation through strong service brands. Brands that stand out from the competition by resonating with parents via robust positioning, high-quality products, and positive interactions can gain an edge in this industry. Enhancing branding strategies can be achieved by developing comprehensive measures of brand equity shaped by consumer viewpoints.

## Marketing Communications

Many businesses rely on traditional advertising to reach and influence parents. However, as consumers increasingly engage and exchange information online, digital strategies and word-of-mouth play a more substantial role in parental decision-making.

Research indicates that the widespread use of social media presents a significant opportunity for connecting with parents. Studies have demonstrated that sharing additional product details on social networks can boost the impact on purchasing choices. Furthermore, many customers acknowledge the influence of social media platforms when making decisions (Bashar et al., 2012).

Gilmore et al. (2007) highlight that businesses' online presence heavily relies on their websites. Harnessing the full potential of e-marketing is essential for small-to-medium enterprises. Many surveyed firms emphasise the critical role of an informative website in gaining a competitive edge (Negoit et al., 2018).

Close friends and family impact parental decisions more than distant acquaintances. Individuals in closely connected social networks favour the same brands for different products (Brown & Reingen, 1987). Both intrinsic factors, like finding joy in assisting others, and extrinsic incentives, play a role in electronic word-of-mouth (Hennig-Thurau et al., 2004).

In summary, effectively using digital platforms and leveraging word-of-mouth referral systems could help activity providers attract, involve, and retain parents. Refined social media tactics, websites, and relationship-building are essential to enhancing competitive advantages.

## Pricing Strategies

Effective pricing is crucial for educational institutions that provide after-school programs to appeal to students and enhance enrollment. Different pricing models and promotional tactics can influence parents' evaluation of the offering's worth and enrollment decisions.

Perceptions of parental quality can diminish the effectiveness of discounts. Discounts might imply a lower quality if there are no guarantees, but presenting offers as gifts sustains quality assessments and improves perceptions of value (Darke & Chung, 2005).

High fees require sound reasoning for superior quality, while low costs depend on alternative approaches and affordability to entice students. Selecting models that align with goals and available resources enables the efficient execution of plans. In general, thoughtfully crafted promotional strategies preserve the institution's prestige, improve the perceived value, and maximise involvement in extracurricular activities.

## Customer Relationship Management

Establishing strong connections with parents is essential for organisations providing extracurricular activities to secure long-term loyalty and advocacy. According to several studies, non-monetary elements such as attitude, meeting expectations, communication, customisation, and recognition play a crucial role in effective customer relationship management (CRM) and traditional measures like satisfaction and retention (Jain & Dhar, 2003).

In today's environment, where customers anticipate personalised experiences, using customer data with technologies such as big data presents opportunities for enhancing CRM strategies (Ansari et al., 2019). It enables the delivery of customised notifications, marketing, and services tailored to individual parents. It also facilitates the identification of patterns in parental behaviour and connections across various touchpoints to enhance decision-making.

Focusing solely on pleasing parents may compromise the quality of education, even though customer satisfaction is essential (Calma & Dickson-Deane, 2020). Providing quality education should focus on students' long-term development rather than just their short-term happiness. Involving parents in service design can promote accountability and positive outcomes.

Retaining parents requires sustained engagement and delivering value. The customer lifetime model emphasises profitability through retaining existing customers rather than acquiring new ones. In summary, a comprehensive CRM approach that balances financial and non-financial elements while providing personalised interactions and insights is essential for achieving optimal long-term outcomes for activity providers. Quality should be prioritised over parent satisfaction.

## Competitive Analysis

Examining rivals uncovered several difficulties, including the need for increased social engagement regarding feedback cycles and the necessity for most suppliers to bolster their presence on social platforms further.

While most of the literature on quality control has focused on manufacturing, studies have yielded inconclusive findings regarding the link between total quality management (TQM) practices and innovation (Bon & Mustafa, 2013). The application of TQM in the service industry may differ due to a greater emphasis on customer satisfaction and human-centred approaches. It has been recommended that this relationship be explored specifically for service-oriented organisations like educational providers using a suggested conceptual framework.

Research into online consumer behaviour has shown that competitiveness is best ascertained through customers' collective judgment rather than managerial perspectives (Li & Netessine, 2012). It is essential to effectively communicate distinctive strengths, such as quality, and differentiate effectively (Krzyżanowska & Tkaczyk, 2012).

To summarise, due to the competitive nature of extracurricular activities, it is essential to periodically reassess using different analytical viewpoints to detect present and future competitive challenges and move beyond initial assumptions. Improving competitiveness requires developing excellence, creativity, and adaptability to customer preferences.

### **2.1.3 Research Gaps in the Literature**

The literature has addressed various factors that influence parental selection of extracurricular activities. However, more research that delves explicitly into the decision-making process for STEM-related activities needs to be conducted. With the increasing emphasis on fostering science, technology, engineering, and math skills in the workforce, further investigation is warranted to comprehend the distinctive factors that steer parental enrollment decisions in these crucial activities. Gaining qualitative insights into parental attitudes, values, and incentives regarding STEM could offer valuable guidance for providers of such activities.

The literature review also found that most previous research used cross-sectional surveys to examine demographic variables such as age, income, and education level. However, parental preferences are likely to evolve with the emergence of new technologies and changes in attitudes. A more dynamic understanding of optimisation possibilities can be achieved by conducting longitudinal studies to track decision-making patterns and responses to marketing strategies. Additionally, exploring generational impacts through comparative analyses could further enhance this approach.

The evolving competitive landscape in the context of Hong Kong requires deep exploration and attention. Practical insights may be gained from qualitative case studies that examine different providers' real-world segmentation, positioning, branding, and competitive differentiation strategies. Furthermore, it is vital to consider the increasing role of digital technologies in parenting information sources and promotional touchpoints beyond traditional media. It entails exploring new channels and applications that effectively engage parents. Addressing these gaps through mixed-method empirical studies focusing on STEM extracurricular decision-making would significantly contribute to advancing theory and enabling evidence-based optimisation for activity providers in Hong Kong's crucial educational sector.

## 2.2 Reflecting on the Philosophical Foundations that Shape Research Inquiries

### Introduction

Research inquiries are deeply influenced by the philosophical foundations underpinning them. These foundations guide the formulation of research questions, the selection of methodologies, and the interpretation of findings. This reflection focuses on the philosophical dimensions of ontology, epistemology, and axiology, particularly within a pragmatic framework, as applied to the study titled “Studying how parents make decisions and how the market is optimized in the STEM education sector in Hong Kong”

### Ontology

Ontology concerns the nature of reality and what can be known about it. In the context of pragmatism, reality is viewed as dynamic and constructed through human experiences and interactions. This ontological stance shapes research inquiries by emphasising the phenomena' fluid and context-dependent nature.

### Implications for Research:

This ontological perspective suggests that parental choices are not static but evolve based on various situational factors in studying parental decision-making in STEM education. Recognising this fluidity allows the research to explore how different contexts (e.g., economic conditions, technological advancements, cultural influences) impact parental decisions. It leads to inquiries that are adaptable and responsive to changing realities.

## Epistemology

Epistemology deals with the nature and scope of knowledge, including how knowledge is acquired and validated. Pragmatism advocates for practical and applicable knowledge, emphasising the value of quantitative and qualitative data to address real-world problems.

### Implications for Research:

The pragmatic epistemology shapes this research by promoting a mixed-methods approach. By combining surveys (quantitative) and interviews/case studies (qualitative), the research seeks to generate comprehensive and actionable insights. This dual approach ensures that the findings are robust and can be directly applied to improve STEM education programs and marketing strategies. The focus is on generating knowledge that is theoretically sound and practically useful.

## Axiology

Axiology refers to the study of values and ethics in research. It considers what is valued in the research process and the ethical implications of research outcomes. In pragmatism, the focus is on the research findings' practical and moral value.

### Implications for Research:

The axiological stance of pragmatism influences this research by prioritising beneficial and ethically sound outcomes. The study aims to produce recommendations that enhance the quality of STEM education and meet the needs of parents and students. Ethical considerations ensure that the research respects participant perspectives and aims to improve educational practices responsibly. It includes being transparent about the research purpose, obtaining informed consent, and ensuring confidentiality.

## Data Collection Techniques

The philosophical foundations also shape the choice of data collection techniques. Pragmatism supports using methods that best address the research questions, regardless of traditional methodological boundaries.

**Quantitative Methods:** Surveys gather broad, generalisable parental preferences and behaviour data. This method is valuable for identifying patterns and trends that can inform market segmentation and strategy development.

**Qualitative Methods:** In-depth interviews and case studies delve into parents' subjective experiences and motivations. These methods provide rich, contextualised insights that complement the quantitative data, offering a fuller understanding of the factors influencing parental decision-making.

## 2.3 Considering the Implications of Different Philosophical Paradigms on Research Outcomes

Philosophical paradigms profoundly influence the research approach, shaping methodologies, data interpretation, and the nature of knowledge generated. This section explores the implications of four paradigms—positivism, interpretivism, realism, and pragmatism—on research outcomes, particularly in the study of “Studying how parents make decisions and how the market is optimized in the STEM education sector in Hong Kong”.

### Positivism

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ontology                           | Positivism posits an objective reality independently of human perception.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Epistemology                       | Knowledge is acquired through empirical observation and measurement. Positivists rely heavily on quantitative methods to uncover patterns and causal relationships.                                                                                                                                                                                                                                                                                                         |
| Axiology                           | This paradigm values objectivity and neutrality, aiming to minimise researcher bias and interference.                                                                                                                                                                                                                                                                                                                                                                       |
| Implications for Research Outcomes | Research outcomes would focus on statistical relationships and generalisable findings, with surveys and structured experiments as the primary methods. The study would likely develop predictive models for parental decision-making based on measurable factors such as socioeconomic status, educational background, and prior behaviour. However, while the findings aim to apply across different contexts broadly, they may overlook unique, context-specific factors. |

### Interpretivism

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ontology                           | Interpretivism holds that reality is socially constructed and subjective, shaped by individual experiences and interactions.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Epistemology                       | Knowledge is gained through understanding the meanings and interpretations individuals attach to their experiences. Qualitative methods are preferred.                                                                                                                                                                                                                                                                                                                                                                                                  |
| Axiology                           | This paradigm values the subjective perspectives of participants and the context-specific nature of knowledge.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Implications for Research Outcomes | The research outcomes would provide rich, contextual insights into the personal and social dimensions of parental decision-making regarding STEM extracurricular activities. By employing qualitative methods, such as in-depth interviews and case studies, the study would capture the nuances of individual experiences and cultural contexts. These detailed insights would highlight unique, context-specific factors that quantitative methods might overlook, offering a comprehensive understanding of the motivations and concerns of parents. |

## Realism

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ontology                           | Realism posits that reality exists independently of human thoughts and perceptions but acknowledges that sensory experiences and social constructs mediate our understanding of this reality.                                                                                                                                                                                                                                                                                                                                         |
| Epistemology                       | Knowledge is gained through empirical observation and theoretical interpretation. Realists often use both quantitative and qualitative methods to understand complex phenomena.                                                                                                                                                                                                                                                                                                                                                       |
| Axiology                           | Realism values a balanced approach that acknowledges objective measurements and subjective interpretations, aiming to provide a deeper understanding of the phenomena.                                                                                                                                                                                                                                                                                                                                                                |
| Implications for Research Outcomes | Research outcomes would provide a comprehensive understanding by integrating both quantitative data and qualitative insights through surveys, case studies, and mixed-method designs. The study would aim to explain how various factors influence parental decision-making, considering both measurable variables and underlying mechanisms. As a result, the findings would offer well-rounded recommendations that account for general patterns and specific contextual factors, leading to more robust and applicable strategies. |

## Pragmatism

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ontology                           | Pragmatism views reality as dynamic and shaped by human actions and experiences. It emphasises practical consequences and applicability.                                                                                                                                                                                                                                                                                                                                                                                |
| Epistemology                       | Knowledge is acquired through practical engagement with the world, using methods that best address the research questions. Both qualitative and quantitative methods are valued.                                                                                                                                                                                                                                                                                                                                        |
| Axiology                           | Pragmatism values the practical and ethical implications of research, aiming to produce actionable and beneficial outcomes.                                                                                                                                                                                                                                                                                                                                                                                             |
| Implications for Research Outcomes | Research outcomes would focus on providing actionable insights and practical recommendations for improving STEM education programs and marketing strategies. The study would gather comprehensive and applicable insights by employing a combination of surveys, interviews, and case studies. The findings would have practical relevance, directly applying to real-world contexts and offering specific strategies for education providers to enhance their offerings based on parental preferences and motivations. |

## Conclusion

Different philosophical paradigms yield varied research outcomes by shaping the questions researchers ask, the methods they use, and the interpretations they make. Positivism emphasises generalisable, objective data; interpretivism focuses on rich, contextual understanding; realism integrates objective and subjective insights to explain complex phenomena; and pragmatism prioritises practical, actionable knowledge. In studying parental decision-making and market optimisation in the Hong Kong STEM education sector, the paradigm choice will depend on the research goals—whether the aim is to predict behaviours, understand meanings, explain phenomena, or provide practical solutions. Each paradigm offers unique strengths and perspectives, enriching the overall understanding and application of research findings.

## 2.4 Theoretical and Practical Contributions of the Study

Conducting a study on “Studying how parents make decisions and how the market is optimized in the STEM education sector in Hong Kong” has the potential to make significant theoretical and practical contributions. This section highlights and discusses these contributions to illustrate the value and impact of the research.

### Theoretical Contributions

#### **Advancement of Decision-Making Theories**

The study could refine existing models of parental decision-making by integrating factors specific to STEM education, including the influence of cultural values, socioeconomic status, and perceptions of STEM’s future benefits. By analysing how parents weigh the costs, benefits, and risks associated with STEM extracurricular activities, the research can contribute to behavioural economics theories, particularly those related to education investments.

#### **Educational Theory Development**

The study can help develop or enhance theoretical frameworks that explain how extracurricular STEM activities contribute to students’ overall educational development and career aspirations. Insights into what motivates parents to enrol their children in STEM programmes can inform theories on student engagement and academic motivation, particularly in extracurricular learning.

#### **Market Optimisation Theories**

The research can contribute to marketing theories by identifying distinct segments within the parental market based on their preferences and decision-making processes. By examining how parents choose and evaluate STEM programmes, the study can enhance understanding of consumer behaviour in the context of educational services.

## Practical Contributions

### **Improved Educational Practices**

The findings can provide educators and programme designers with actionable insights into developing STEM extracurricular activities that align with parental expectations and student needs, enhancing programme relevance and effectiveness. Understanding parental decision-making can guide the development of curricula that appeal to parents and students, potentially increasing enrolment and engagement in STEM activities.

### **Enhanced Marketing Strategies**

The study can help educational institutions and programme providers create more effective marketing strategies by identifying factors influencing parental choices. For example, it can help tailor marketing messages to address parents' concerns and highlight the benefits of STEM education. Insights into parental preferences and expectations can improve customer relationship management practices, ensuring that parents feel supported and valued throughout their engagement with STEM programmes.

### **Policy Implications**

The research can inform policymakers about the factors driving parental decisions in STEM education, leading to policies that support the growth and accessibility of high-quality STEM programmes. By highlighting the importance of specific characteristics (e.g., affordability, programme quality), the study can advocate for increased funding and support for STEM extracurricular activities, ensuring they are accessible to a broader range of students.

## **Business and Industry Impact**

The study can provide insights into market demand and growth opportunities for businesses operating in the STEM education sector, guiding investment and development strategies. By understanding parental decision-making, companies can differentiate their offerings to gain a competitive advantage in the market.

## **Parental Guidance and Support**

The study can produce materials and resources that help parents make more informed decisions about their children's STEM education, enhancing their ability to choose programmes that best fit their children's needs and interests. Insights from the research can foster better communication and engagement between parents, educators, and programme providers, creating a more supportive community around STEM education.

## **Conclusion**

The study “Studying how parents make decisions and how the market is optimized in the STEM education sector in Hong Kong” promises to make substantial theoretical and practical contributions. Theoretically, it can refine and expand upon existing decision-making models, educational frameworks, and market optimisation theories. Practically, it can improve educational practices, enhance marketing strategies, inform policy, impact businesses, and support parents in making informed decisions. These contributions highlight the study's potential to advance knowledge and practice in STEM education, benefiting students, parents, educators, and the broader educational community.

The research onion method, developed by Saunders et al. (2009), provides a structured approach to designing and conducting research. It consists of six layers: research philosophy, research approach, research choices, research strategy, time horizon, and techniques and procedures.

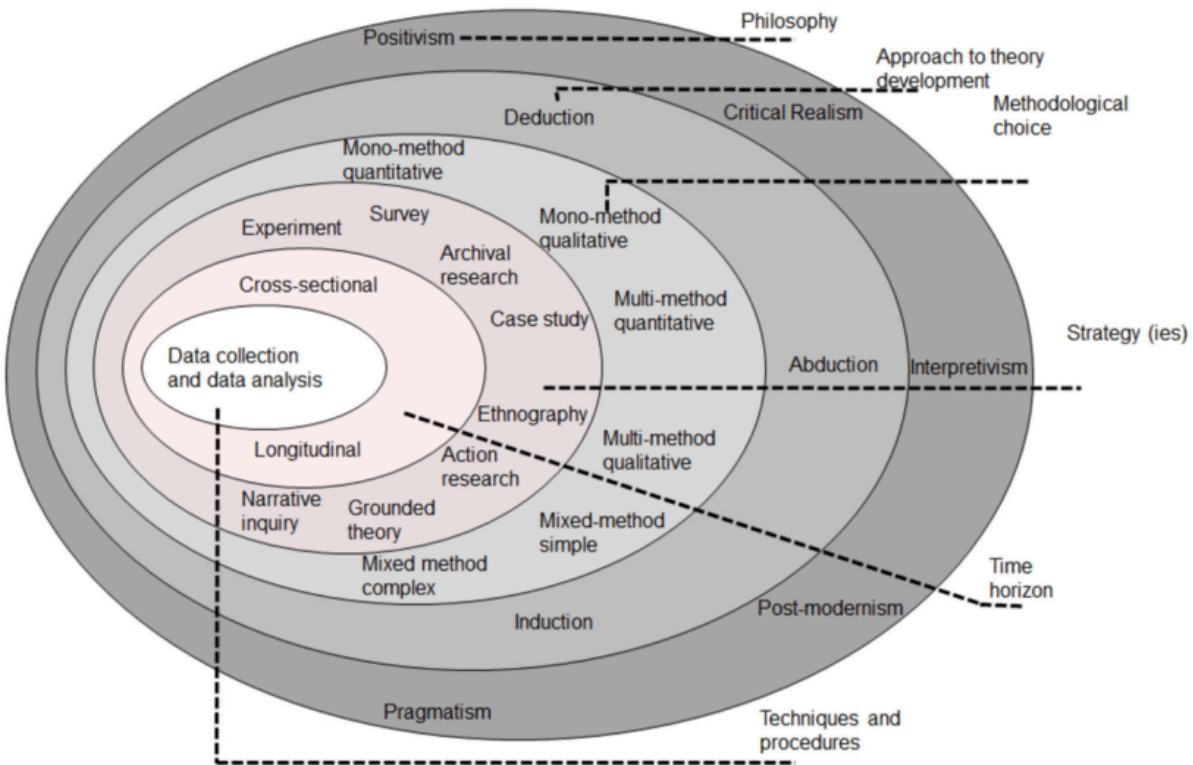


Figure 1 The Research Onion (Saunders et al., 2009, p.108)

Below is an analysis of your research proposal through the lens of the research onion method:

### Research Philosophy

Pragmatism is suitable because the research aims to solve practical problems in the STEM education sector. It combines qualitative and quantitative methods to provide actionable insights. Pragmatism allows flexibility and multiple methods to understand the research problem from different perspectives.

## **Research Approach**

The mixed methods approach combines deductive (testing hypotheses derived from theory with quantitative data) and inductive (exploring themes and patterns in qualitative data) approaches to provide a comprehensive understanding. Primary survey data (quantitative) and secondary social media/forum data (qualitative) align well with this approach.

## **Research Choices**

Employing multi-method quantitative and qualitative choices involves using surveys to gather statistical data about parental demographics, attitudes, and behaviours and analysing social media discussions and forum posts to explore sentiments, themes, and trends.

## **Research Strategy**

The strategy includes a survey and case study. The survey collects quantitative data from parents in Hong Kong to understand their attitudes and behaviours towards STEM extracurricular activities. At the same time, the case study uses secondary social media and forum data to provide contextual and in-depth qualitative insights.

## **Time Horizon**

The research is designed to capture a snapshot of current attitudes, behaviours, and sentiments at a specific time rather than over an extended period, making it cross-sectional.

## **Techniques and Procedures**

Data collection involves gathering primary data through surveys distributed to parents to collect quantitative data on demographics, attitudes towards STEM education, and participation in extracurricular activities. Secondary data is collected from social media platforms and forums using web scraping tools, APIs, or manual collection. Data analysis includes quantitative analysis with descriptive statistics (e.g., mean, median, mode) and inferential statistics (e.g., chi-square tests, ANOVA, correlation, regression analysis), and qualitative analysis with sentiment analysis using NLP tools and thematic analysis using qualitative analysis software like NVivo or MaxQDA.

The inferential statistics methods—chi-square tests, ANOVA, correlation, and regression analysis—are crucial in hypothesis testing.

### Chi-Square Test

The Chi-Square Test aims to determine if there is a significant association between two categorical variables. This test is essential for understanding relationships between categorical variables, making it particularly useful in survey data to explore connections between demographic factors and preferences.

|                                    |                                                                                                                                                                                                                                                                                                   |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The inferential statistics methods | Chi-Square Test                                                                                                                                                                                                                                                                                   |
| Research Question                  | Is there an association between parents' income levels (low, middle, high) and their preference for different STEM activities (robotics, coding, science experiments)?                                                                                                                            |
| Null Hypothesis ( $H_0$ )          | There is no association between income levels and STEM activity preferences.                                                                                                                                                                                                                      |
| Alternative Hypothesis ( $H_1$ )   | There is an association between income levels and STEM activity preferences.                                                                                                                                                                                                                      |
| Procedure                          | <ol style="list-style-type: none"><li>1. Create a contingency table with income levels as rows and STEM activity preferences as columns.</li><li>2. Calculate the expected frequencies for each cell in the table.</li><li>3. Use the chi-square formula to compute the test statistic.</li></ol> |

## ANOVA (Analysis of Variance)

The purpose of ANOVA (Analysis of Variance) is to compare the means of three or more groups to determine if at least one group's mean is significantly different. This method is ideal for analysing multiple groups' survey responses, as it helps identify significant differences across these groups.

|                                    |                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The inferential statistics methods | ANOVA (Analysis of Variance)                                                                                                                                                                                                                                                                                                                                                                  |
| Research Question                  | Do parents' satisfaction levels differ based on the STEM activity their child participates in (robotics, coding, science experiments)?                                                                                                                                                                                                                                                        |
| Null Hypothesis ( $H_0$ )          | The mean satisfaction levels are equal across all types of STEM activities.                                                                                                                                                                                                                                                                                                                   |
| Alternative Hypothesis ( $H_1$ )   | At least one type of STEM activity has a different mean satisfaction level.                                                                                                                                                                                                                                                                                                                   |
| Procedure                          | <ol style="list-style-type: none"><li>1. Collect satisfaction ratings from parents for each type of STEM activity.</li><li>2. Calculate the mean satisfaction level for each group.</li><li>3. Use ANOVA to compare the between-group variance to the within-group variance.</li><li>4. If the F-statistic is significant, perform post-hoc tests to determine which groups differ.</li></ol> |

## Correlation

Correlation measures the strength and direction of the relationship between two continuous variables. This method is proper for preliminary analysis to identify potential predictors by assessing how strongly and in what direction the variables are related.

|                                    |                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The inferential statistics methods | Correlation                                                                                                                                                                                                                                                                                                                                                         |
| Research Question                  | Is there a relationship between the number of hours a child spends on STEM activities and their academic performance?                                                                                                                                                                                                                                               |
| Null Hypothesis ( $H_0$ )          | There is no correlation between hours spent on STEM activities and academic performance.                                                                                                                                                                                                                                                                            |
| Alternative Hypothesis ( $H_1$ )   | There is a correlation between hours spent on STEM activities and academic performance.                                                                                                                                                                                                                                                                             |
| Procedure                          | <ol style="list-style-type: none"><li>1. Collect data on hours spent on STEM activities and academic performance scores.</li><li>2. Calculate Pearson's correlation coefficient (<math>r</math>).</li><li>3. Interpret the correlation coefficient to understand the relationship's strength (weak, moderate, strong) and direction (positive, negative).</li></ol> |

## Regression Analysis

Regression analysis aims to examine the relationship between a dependent variable and one or more independent variables. It goes beyond correlation by modelling and predicting the dependent variable based on several predictors, providing insights into the relative importance of different factors.

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The inferential statistics methods | Regression Analysis                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Research Question                  | How do family income, parent's education level, and hours spent on STEM activities predict parents' satisfaction with STEM programs?                                                                                                                                                                                                                                                                                                                                     |
| Null Hypothesis ( $H_0$ )          | Family income, education level, and hours spent on STEM activities do not affect parents' satisfaction.                                                                                                                                                                                                                                                                                                                                                                  |
| Alternative Hypothesis ( $H_1$ )   | Family income, education level, and hours spent on STEM activities affect parents' satisfaction.                                                                                                                                                                                                                                                                                                                                                                         |
| Procedure                          | <ol style="list-style-type: none"><li>1. Identify the dependent variable (parents' satisfaction) and independent variables (family income, education level, hours spent on STEM activities).</li><li>2. Use multiple regression analysis to fit the model.</li><li>3. Estimate the regression coefficients (<math>\beta</math> values) and test their significance.</li><li>4. Assess the overall model fit using R-squared and adjust the model if necessary.</li></ol> |

These inferential statistics methods allow us to rigorously test the hypotheses and draw meaningful conclusions.

## Frequency Analysis

Frequency analysis is a valuable technique in qualitative research, particularly when analysing text data. It involves counting the occurrence of specific keywords or phrases to quantify their presence in a dataset, which helps identify prevalent topics, sentiments, or themes. This method is beneficial in the context of research on STEM education, where understanding the most common issues and themes expressed by participants can provide crucial insights. The main goal of frequency analysis is to determine the frequency of specific words or phrases within a text corpus, aiding in identifying dominant subjects and sentiments.

### **Data Collection**

Data collection involves gathering text data from various sources such as surveys, social media posts, forum comments, and interview transcripts. The data must be cleaned and preprocessed to ensure accuracy and relevance by removing stop words, punctuation, and irrelevant information.

### **Define Keywords or Phrases**

Identify a list of relevant keywords or phrases that are important to your research questions, such as “satisfaction,” “cost,” “benefits,” and “activities.” These keywords can be derived from theoretical frameworks, literature reviews, or initial exploratory analysis to ensure they are closely related to your investigating topics.

### **Count Occurrences**

Use text analysis software or programming languages like Python or R to count the frequency of each keyword or phrase in the text corpus. Tools such as NVivo MAXQDA can be utilised.

### **Analyse Frequencies**

Create a frequency table or chart to visualise the occurrence of each keyword or phrase. It will help to identify the most and least frequently mentioned topics.

## **Interpret Results**

Analyse the results in the context of the research questions to determine which topics are most prevalent and consider why these topics might be significant to the participants. Look for patterns and insights that can inform further qualitative or quantitative analysis.

## **Example Application**

The first step in addressing the research question, "What are the prevalent topics and concerns among parents regarding STEM extracurricular activities in Hong Kong?" is data collection. Text data will be collected from surveys where parents provide open-ended responses about their experiences and opinions on STEM activities. Additionally, data will be gathered from social media posts and comments on platforms like Facebook, Instagram, and relevant forums discussing STEM education. This comprehensive data collection will ensure a broad understanding of parents' perspectives.

Next, it will define keywords and phrases to focus the analysis. Relevant keywords and phrases include "satisfaction," "cost," "quality," "engagement," "learning outcomes," "accessibility," and "teacher quality." These terms will help identify and quantify the most prevalent topics and concerns among parents regarding STEM extracurricular activities in Hong Kong.

### 3 Exploring Diverse Philosophical Stances

Positivism is grounded in the belief that reality is objective and can be measured through empirical observation and quantitative methods. This stance emphasises the importance of objectivity, reproducibility, and generalizability in research, often relying on experiments and surveys to uncover patterns and causal relationships.

In contrast, interpretivism posits that reality is socially constructed and subjective, shaped by individual experiences and cultural contexts. This approach values the depth of understanding that qualitative methods, such as interviews and ethnographies, can provide. Interpretivists seek to uncover individuals' meanings and interpretations of their experiences, emphasising context-specific insights over generalisable findings.

Realism combines elements of positivism and interpretivism. It acknowledges that while an objective reality exists independent of human perceptions, our understanding of it is inevitably filtered through our subjective experiences and social contexts. Realist researchers often use quantitative and qualitative methods to explore how individuals perceive and interact with the objective world, aiming to bridge the gap between observable phenomena and individual interpretations.

Conversely, pragmatism focuses on the practical application of research and the usefulness of the knowledge produced. Pragmatists believe that reality is not fixed but is shaped by human experiences and actions. This approach values methods and theories that can deliver actionable and practical outcomes, integrating quantitative and qualitative data to address real-world problems. Pragmatism emphasises flexibility, practicality, and the ethical implications of research, aiming to produce theoretically sound and practically beneficial insights.

## 4 How These Approaches Shape Research Methodologies

A researcher's philosophical stance profoundly influences the choice of research methodologies and the interpretation of findings. In positivism, the emphasis on objectivity and measurement leads to the preference for quantitative methods, such as structured surveys, experiments, and statistical analysis, which aim to produce generalisable and replicable results. The rigorous control of variables and the search for causal relationships are central to this approach.

Interpretivism, focusing on subjective experiences and social contexts, favours qualitative methods like in-depth interviews, participant observations, and case studies. These methods allow researchers to explore the complexities of human behaviour and social interactions in their natural settings, providing rich, detailed insights specific to the context studied.

Realism acknowledges both the existence of an objective reality and the influence of human perception on our understanding of that reality. Realist researchers often employ quantitative and qualitative methods to investigate how individuals perceive and interact with the objective world. This dual approach helps bridge the gap between observable phenomena and individual interpretations, offering a more nuanced understanding of the research subject.

Pragmatism, on the other hand, focuses on the practical application of research and the usefulness of the knowledge produced. Pragmatists believe that reality is not fixed but is shaped by human experiences and actions. This approach values methods and theories that can deliver actionable and practical outcomes, integrating quantitative and qualitative data to address real-world problems. Pragmatism emphasises flexibility, practicality, and the ethical implications of research, aiming to produce theoretically sound and practically beneficial insights.

By understanding these diverse philosophical stances, researchers can choose methodologies that best align with their research goals and the nature of their study phenomena.

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