Janne Arponen

The impact of voice search optimization on website conversion rates in the Finnish market

School of Technology and Innovations
Master's thesis in Information Systems Science
Master's Degree Programme in Information Systems Science

Vaasa 2025

UNIVERSITY OF VAASA
School of Technology and Innovations
Author: Janne Arponen
Title of the Thesis: The impact of voice search optimization on website conversion rates in the Finnish market
Degree: Master of Science in Economics and Business Administration
Programme: Information Systems Science
Supervisor: Duong Dang
Year: 2025 **Pages:** 64

ABSTRACT:
This thesis investigates the impact of voice search optimization (VSO) on website conversion rates among Finnish marketing companies, focusing on the unique challenges of the Finnish market. As voice search reshapes online information retrieval, it presents opportunities and obstacles for businesses aiming to enhance visibility and conversions. The research problem centers on the limited understanding of VSO's effectiveness in Finland, particularly due to the linguistic complexities of the Finnish language, with its 15 grammatical cases and compound words, and the country's high technology adoption, with over 90% smartphone penetration. The theoretical framework integrates search engine optimization (SEO), VSO, and conversion theories, emphasizing their application in Finland's mobile-first consumer behavior and complex grammar. Using a mixed-methods methodology, data were collected from 11 Finnish marketing professionals through structured interviews in 2024, combining quantitative and qualitative insights analyzed with descriptive statistics and thematic methods. The findings show that VSO is a low priority for Finnish companies, with 90.9% of respondents rating it "not important at all" or "slightly important," mainly due to limited experience (63.6%), difficulties in measuring impact (27.3%), and linguistic barriers affecting voice search algorithm accuracy. Nevertheless, VSO holds potential to improve conversions through localized strategies tailored to Finland's technological and linguistic context. The study offers practical recommendations, including enhanced analytics, training, and pilot projects, to promote VSO adoption. It contributes to VSO literature by highlighting Finland-specific challenges, providing a foundation for future research on AI-driven language optimization in complex linguistic markets.

KEYWORDS: Voice Search Optimization, Website Conversion, Finnish Market, Digital Marketing, Search Engine Optimization, Technology Adoption

VAASAN YLIOPISTO
Tekniikan ja innovaatiojohtamisen akateeminen yksikkö
Tekijä: Janne Arponen
Tutkielman nimi: The impact of voice search optimization on website conversion rates in the Finnish market
Tutkinto: Kauppatieteiden maisteri
Oppiaine: Tietojärjestelmä tiede
Työn ohjaaja: Duong Dang
Valmistumisvuosi: 2025 **Sivumäärä:** 64

Tiivistelmä:
Tämä pro gradu -tutkielma tarkastelee äänihakuoptimoinnin vaikutusta verkkosivustojen konversioasteisiin suomalaisissa markkinointiyrityksissä, keskittyen Suomen markkinoiden ainutlaatuisiin haasteisiin. Äänihaku muuttaa tapaamme hakea tietoa verkosta, tarjoten yrityksille mahdollisuuksia ja haasteita näkyvyyden ja konversioiden parantamisessa. Tutkimusongelmana on VSO:n tehokkuuden vähäinen tuntemus Suomessa, erityisesti suomen kielen kieliopillisten monimutkaisuuksien ja korkean teknologia-adoption vuoksi. Teoreettinen viitekehys yhdistää hakukoneoptimoinnin, äänihakuoptimoinnin ja konversioteoriat, painottaen niiden soveltamista Suomen mobiilikeskeiseen käyttäytymiseen ja monimutkaiseen kielioppiin. Tutkimus hyödyntää mixed-methods-lähestymistapaa, jossa yhdistetään kvantitatiivisia ja kvalitatiivisia aineistoja. Aineisto kerättiin vuonna 2024 strukturoiduilla haastatteluilla 11 suomalaiselta markkinointialan ammattilaiselta ja analysoitiin kuvailevilla tilastomenetelmillä sekä temaattisella analyysillä. Tulokset osoittavat, että VSO on suomalaisyrityksissä vähäprioriteettinen, johtuen pääasiassa kokemuksen puutteesta (63,6 %), vaikutusten mittaamisen vaikeuksista (27,3 %) ja suomen kielen monimutkaisuuden aiheuttamista haasteista äänihakualgoritmien tarkkuudelle. Siitä huolimatta VSO:lla on potentiaalia parantaa konversioita, jos strategiat räätälöidään Suomen teknologiseen ja kielelliseen kontekstiin. Tutkimus tarjoaa käytännön suosituksia, kuten kehittyneempää analytiikkaa, koulutusta ja pilottiprojekteja, VSO:n käyttöönoton edistämiseksi. Tutkimus tuo lisäarvoa äänihakuoptimoinnin kirjallisuuteen valottamalla Suomen erityishaasteita ja luo pohjaa tuleville tutkimuksille tekoälypohjaisesta kielten optimoinnista.

AVAINSANAT: Äänihakuoptimointi, Verkkosivujen konversio, Suomen markkina, Luonnollisen kielen prosessointi, Hakukoneoptimointi, Teknologian omaksuminen

Contents

Figures

Tables

Abbreviations

VSO: Voice Search Optimization
SEO: Search Engine Optimization
SEM: Search Engine Marketing
PPC: Pay-Per-Click

1 Introduction

The rapid evolution of digital technologies has reshaped business-consumer interactions, with voice search emerging as a key tool in this transformation. In Finland, where smartphone penetration exceeds 90 percent (Statista, 2024), voice search optimization (VSO) offers opportunities to enhance website performance, yet the complexity of the Finnish language poses unique challenges to speech recognition systems. This thesis examines VSO's impact on website conversion rates among Finnish marketing companies, aiming to assess its effectiveness in a technologically advanced yet linguistically distinct market. Here, conversion refers to user actions such as purchases or inquiries that reflect a website's visibility, usability, and profitability. While search engine optimization (SEO) remains a cornerstone for these firms, VSO adoption has lagged, underscoring the need to explore its potential and barriers.

This study surveys 11 Finnish marketing firms to examine VSO's role and its effects on conversions in a Google-dominated market (91.5% share, StatCounter, 2024). It addresses the obstacles and opportunities of VSO, offering practical insights for businesses in Finland's mobile-centric environment, where local nuances and technological trends suggest untapped potential (Ghose et al., 2012). By linking global VSO trends to Finland's unique context, the research draws on theoretical and empirical insights to bolster digital competitiveness (Anttila, 2021; Baye et al., 2013).

Finland's technological leadership amplifies VSO's relevance, but linguistic features, such as 15 grammatical cases and compound words like "älypuhelinteknologia," challenge algorithm accuracy (Hautsalo, 2019; Lopezosa et al., 2023). This study aims to bridge theory and practice, providing actionable guidance for navigating these dynamics.

1.1 Background

Voice search is reshaping how users access information online, enabling spoken queries on devices like smartphones, computers, and smart speakers, with responses delivered via search engines or voice assistants (Rehkopf, 2019). Unlike text searches, voice queries are conversational, long-tail, and expect immediate, relevant results, often as a single answer (Halbauer, Jacob, & Klarmann, 2022). These traits create both challenges and opportunities for businesses seeking to optimize websites for voice searches and improve conversion rates (Gokkoeva, 2020).

Conversion rates, measuring the percentage of website visitors completing desired actions (e.g., purchases, subscriptions), are a cornerstone of digital marketing, driving revenue and efficiency. Voice search optimization (VSO) enhances visibility and usability by adapting content, structure, metadata, and technical features to align with the conversational nature of voice queries, ensuring compatibility with voice assistants and search engines (Halbauer et al., 2022; Google Ads Help, 2024b). Yet, VSO's impact in Finland remains underexplored due to linguistic and technological complexities.

Globally, VSO is driven by the proliferation of smart devices and AI technologies, but in Finland, this trend is amplified by the country's leadership in digital innovation, with over 90% smartphone penetration (Statista, 2024). However, Finland's linguistic landscape, characterized by complex grammar and extensive compound words, introduces unique barriers that differentiate it from markets like the U.S. or UK, where English's simpler structure facilitates voice search accuracy. This contrast underscores the need to explore VSO's impact on Finnish website conversions, addressing both technological opportunities and linguistic challenges.

1.2 Aim and scope

This thesis investigates the impact of VSO on the conversion rates of company websites in Finland, addressing a critical gap in understanding its effectiveness in the Finnish market. The main question of research is:

> How does voice search optimization impact the conversion rates of company websites in Finland?

To address this question, the thesis explores two sub-questions:

1. How do Finnish marketing companies implement VSO practices and what are their challenges and opportunities?
2. How do VSO practices influence the visibility, usability, and profitability of company websites in Finland?

The first sub-question provides insights into VSO adoption and barriers, while the second examines its effects on website performance metrics, shaping conversion outcomes.

The study proposes a complex interplay between VSO and website conversion rates, influenced by factors such as industry type, company size, and target audience, particularly within Finland's unique digital landscape. The motivation for this research stems from the increasing prevalence of voice search in Finland, coupled with the lack of comprehensive studies on its impact on local website conversions. This work seeks to offer actionable insights for Finnish businesses and SEO professionals, enabling them to leverage voice search technology effectively.

The scope is limited to Finnish marketing companies, as these firms lead in adopting digital innovations and shape online customer interactions. Finland's high smartphone ownership and technology adoption rate create a fertile ground for VSO, yet the Finnish language's complex grammar and vocabulary, featuring 15 grammatical cases and extensive compound words, present significant hurdles for voice search algorithms

(Hautsalo, 2019). These challenges make VSO both essential and difficult for Finnish companies seeking to maintain competitiveness in the digital era, positioning this study as a vital exploration of localized strategies.

1.3 Methodology and structure

This thesis employs a mixed-methods research methodology, combining quantitative and qualitative data to investigate the impact of VSO on website conversion rates among Finnish marketing companies. Following the guidelines of Venkatesh et al. (2016), a mixed-methods approach is adopted to address both exploratory and descriptive research questions, providing a comprehensive understanding of VSO practices, challenges, and their effects in Finland's unique technological and linguistic context. This approach integrates structured interviews with 11 Finnish marketing professionals, conducted in 2024, to collect diverse data types. Quantitative data from single-choice, multiple-choice, and graduated scale questions, are analyzed using descriptive statistics to quantify VSO adoption and perceptions. Qualitative data gathered through open-ended questions, are examined via thematic analysis to identify barriers and strategies, enabling holistic exploration of VSO's role in the Finnish market (Venkatesh et al., 2016).

The thesis is structured as follows: Chapter 2 provides a theoretical foundation on search engines, SEO, voice search, VSO, and website conversion, emphasizing their application in the Finnish context marked by linguistic and technological challenges. Chapter 3 outlines the research methodology, describing the data collection process, respondent selection, and analytical methods used to explore VSO's adoption and impact in Finland. Chapter 4 presents the empirical results, offering insights into Finnish companies' VSO practices, challenges, and their effects on website conversions, directly addressing the research questions. Chapter 5 discusses the findings, evaluates their implications for Finnish businesses, and provides recommendations, while also reflecting on the study's strengths, limitations, and suggestions for future research, particularly in the context of Finland's unique digital landscape.

Figure 1 below reflects the structure, bridging theoretical and practical dimensions to deliver actionable insights for businesses navigating the evolving domain of voice search optimization.

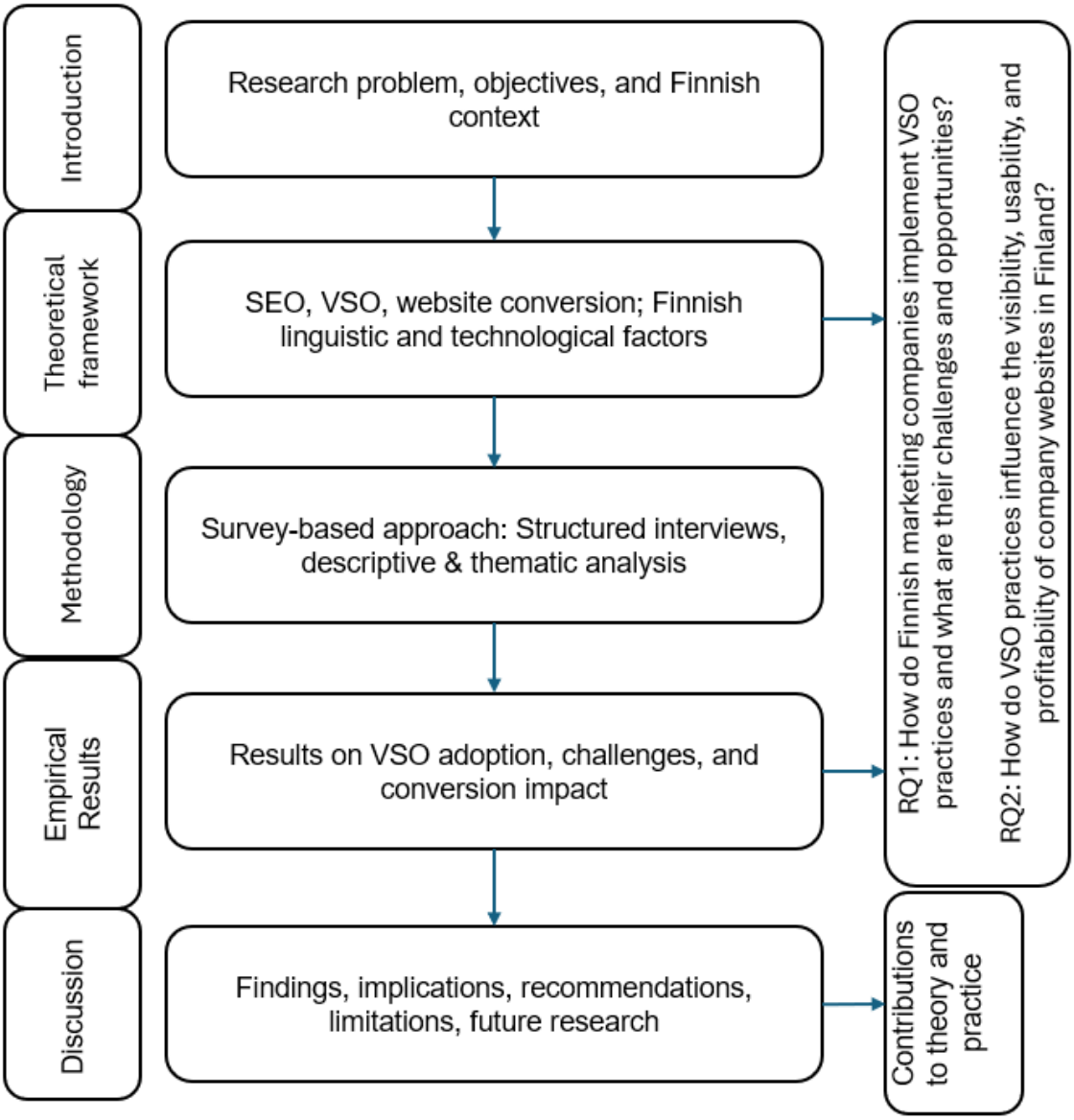

Figure 1. Thesis structure and methodological flow

To summarize, this thesis attempts to bridge the gap between theoretical insights and practical implementation, offering valuable perspectives for businesses navigating the continuously developing terrain of voice search optimization in the digital era.

1.4 Finnish Market Context

Finland's market landscape, shaped by its technological advancements, economic history, and cultural values, provides a unique context for voice search optimization (VSO) and website conversion strategies. With a smartphone penetration rate exceeding 90% (Statista, 2024), Finland is a mobile-first market, fostering early adoption of digital innovations like mobile phones in the 1990s (Laaksonen et al., 1998). This tech-savvy environment supports VSO's potential, though the Finnish language's complexity, with its 15 grammatical cases, challenges voice search accuracy, requiring localized optimization (Hautsalo, 2019). Economically, the 1990s depression reduced household consumption by 10% (Laaksonen et al., 1998), cultivating a price-sensitive consumer base that prioritizes cost-effective digital solutions, influencing VSO strategies to highlight affordable offerings. Regionally, rural consumers exhibit strong loyalty to local services, valuing familiarity and proximity (Home, 2002), suggesting VSO should incorporate location-specific queries like "paikalliset palvelut lähelläni" to engage these audiences. Additionally, growing sustainability awareness, with 92.6% of consumers understanding its importance (Halonen, 2021), drives demand for eco-friendly digital interactions, such as voice searches for sustainable products. However, strict GDPR compliance and cultural emphasis on data privacy (Chaffey & Ellis-Chadwick, 2019) may limit voice assistant adoption, necessitating secure and transparent VSO approaches to maximize conversions in this dynamic market.

1.5 Expected contributions and implications

The key findings and conclusions of this study are anticipated to reveal the limited adoption of VSO among Finnish marketing companies, driven by challenges such as the complexity of the Finnish language and difficulties in measuring impact. It is expected that VSO holds significant potential to enhance web-site conversion rates in Finland, particularly when tailored to address natural language queries and mobile-first user behaviors prevalent in the Finnish market. These insights will contribute to understanding how

Finnish businesses can leverage VSO to improve digital competitiveness, with the study's implications explored further in the empirical results and discussion sections.

These insights are expected to offer practical guidance for Finnish businesses, such as strategies for optimizing content for conversational queries or improving technical compatibility with voice assistants, to overcome linguistic and technological barriers, enhancing their digital competitiveness through VSO. By addressing the gap in understanding VSO's effectiveness in Finland, the study will also contribute to academic discourse on localized digital marketing strategies, while informing broader discussions on natural language processing and global voice search trends, particularly in markets with complex languages and high technology adoption, such as Finland.

2 Background and theoretical framework

This chapter provides a theoretical foundation for understanding VSO and its impact on website conversion rates, integrating theories of search engine optimization, voice search, and digital marketing. It highlights the unique challenges and opportunities in Finland, where high technology adoption, the Finnish language's complexity, competitive market dynamics, and consumer behavior shape the application of these theories. The framework integrates global theories with Finnish-specific factors, like linguistic challenges, mobile-driven searches, and privacy concerns, to address the research question: How does VSO enhance website conversions in Finland? By synthesizing these elements, it guides the empirical analysis and fills the research gap in VSO's effectiveness in non-English markets like Finland.

2.1 Search engines and search engine optimization

Search engines are complex systems that retrieve and organize online content, enabling users to access relevant information efficiently (Ledford, 2009). Their operation relies on a sequence of processes: bots crawl websites to gather data, indexing catalogs this information into searchable databases, and sophisticated algorithms like Google's PageRank rank results based on relevance, authority, and user intent (Evans, 2008). Beyond their technical function, search engines act as economic platforms, bridging information seekers with content providers and advertisers, where placement in search results carries significant commercial weight (Baye et al., 2013). In Finland, this role is amplified by a digital landscape where over 90% smartphone penetration drives mobile-first behavior (Statista, 2024).

Search engines underpin both SEO and VSO, as their algorithms determine website discoverability, a critical factor for conversions. In Finland, linguistic complexities, such as compound words e.g., "kotimainen designhuonekalu", challenge indexing accuracy, requiring algorithms to parse intricate grammatical structures (Hautsalo, 2019). These

challenges amplify the need for tailored optimization strategies, particularly for voice searches, which demand precise handling of natural language queries. This section establishes search engines as the foundation for VSO, setting the stage for exploring how their mechanisms support website visibility and conversions in Finland's competitive market (Baye et al., 2013).

2.2 Functioning of search engines

Search engines operate through a structured process of crawling, indexing, and ranking to deliver relevant results (Ledford, 2009). Web crawlers systematically gather data from websites, which is organized into indexed databases for rapid retrieval. Algorithms evaluate content based on factors like relevance, authority, and site performance, prioritizing results that best match user queries (Evans, 2008). Figure 2, adapted from Wugang & Tse (2011), models this as a two-sided platform, where users benefit from accessible results and providers gain visibility, though intense competition for top rankings can limit benefits for some (see Figure 2, right: Model "S" represents the web space, Model "M" the indexed database).

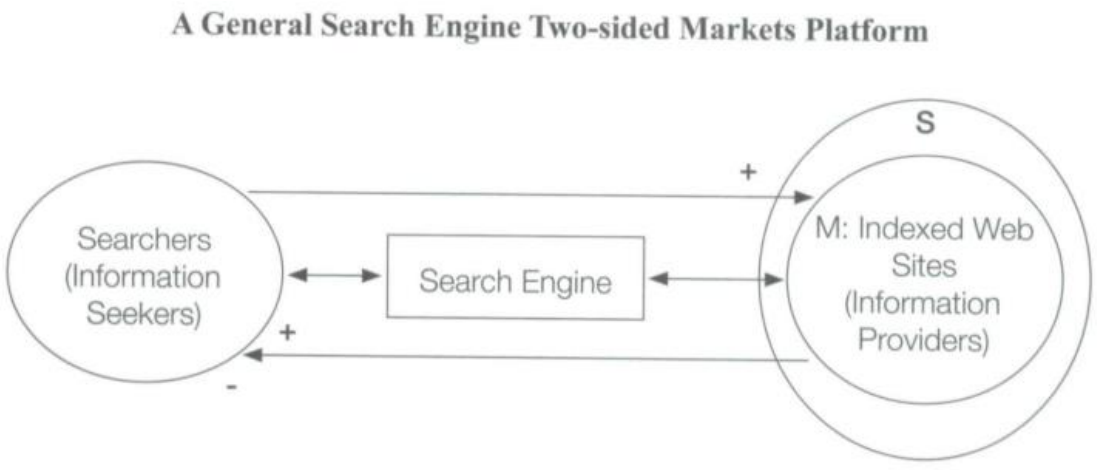

Figure 2. A general search engine two-sided markets platform (Wugang & Tse, 2011)

In Finland, where smartphone penetration exceeds 90% (Statista, 2024), search engines prioritize fast-loading, mobile-optimized sites, critical for queries like “Mistä löydän lähiruokaa Tampereella?” (Ghose et al., 2012). This mobile emphasis shapes how algorithms process queries, favoring sites with responsive designs and low latency. The technical precision required to handle Finnish queries, with their grammatical complexity, underscores the importance of optimization for both text and voice searches. By detailing these processes, this section provides a technical foundation for understanding how search engines enable VSO, enhancing website conversions in Finland’s mobile-driven market.

2.3 Search engine optimization

SEO is a set of measures to ensure that a website is found in search engines and ranks high on search results pages. The goal of SEO is the relevance of search results, and finding a well-optimized site is visible to customers among the first search results. The process of SEO includes aspects of internal, external, and technical optimization. Internal optimization includes, among others, keyword research and use of metadata, external optimization is related to site links and their construction while technical optimization is related to the technical characteristics of the site. (Busche, 2017; Ledford 2009)

The success of SEO is often measured by search result rankings and the click-through rate (CTR). Research shows that the first search results get most of the traffic, and high-ranking in-search results are important for visibility. (Google Ads Help, 2024a; Ledford 2009)

Search engine users can search for information using natural language or using search operators such as AND, OR and NO. Search engines are constantly developing their algorithms to better understand the needs of data seekers. Natural language search methods can be diversified by using different search terms and phrases. (Ledford, 2009; Enge et al., 2015)

Search engines have evolved significantly over the years and are expected to continue to evolve to become smarter and more user-friendly. Technological advances, such as artificial intelligence and machine learning, influence the development of search engine algorithms. In the future, voice searches and semantic searches are also expected to increase. (Anttila, 2021; Statista, 2024)

2.3.1 Applying SEO principles to voice search

Research by Lopezosa (2023) suggests that traditional SEO principles can underpin VSO strategies, with adaptations needed for voice-specific demands (see Section 2.5 for detailed VSO strategies). This shift emphasizes conversational queries over keyword-centric approaches, a critical distinction from text-based SEO. In the strategic scenario, the content should be made to match the natural language used in voice searches. Unlike text searches that use certain keywords, voice searches do often involve whole questions or phrases. In the technical scenario, ensuring the sufficiency of metadata and easy readability of content are crucial factors to robots and voice navigators. Websites should be as light and as mobile-friendly as possible to rank well in voice searches. In the content scenario, content should be structured to answer questions directly using long-tailed keywords in question form. Location based content is also important for voice searches, so the inclusion of certain place names can be useful. (Lopezosa et al., 2023)

These three strategies (Lopezosa et al., 2023) reflect the shift from traditional keyword-focused SEO to more conversational approach required for VSO, where the natural language of speech affect show content is optimized for search results. The same study supports that VSO holds significant promise for enhancing web visibility only if effective implementation has been made (Lopezosa et al., 2023).

2.3.2 Competitive context in Finland

In Finland, Google's dominance in the search engine market over 91.5% market share globally, with similar trends locally (StatCounter, 2024) shapes the competitive landscape for VSO, as companies compete to optimize for voice searches within this ecosystem. The Finnish market's reliance on mobile devices and localized queries intensifies competition, requiring VSO strategies that address both Google's algorithms and the Finnish language's complexities. For instance, Finnish e-commerce platforms, such as those selling local products, face pressure to adopt VSO to remain visible against competitors leveraging voice search, particularly in urban areas like Uusimaa where digital adoption is highest (Kauppalehti, 2024).

2.4 Voice search

Recent research has increasingly focused on consumer awareness and behavior related to voice-based AI. Assistants like Siri, Alexa, Cortana, and Google Assistant utilize voice recognition and natural language processing (NLP) to interpret human speech and perform tasks. These technologies are marketed for their human-like qualities and conversational abilities while offering users a hands-free experience (Mittal & Manocha, 2023).

Integrated into smartphones, computers, televisions, high-tech cars, and smart speakers, these assistants have transformed how consumers interact with brands, retrieve information, manage daily routines, operate smart homes, and shop. The ability to multitask while receiving entertainment or performing transactions has shifted consumer expectations and behaviors (Mittal & Manocha, 2023).

Voice search, one of the most significant applications of this technology, has grown rapidly in recent years (Lozeva-Koleva & Kolev, 2023; Loode, 2019). It enables users to conduct online searches using spoken language instead of typing, offering a quicker and more convenient alternative to traditional queries. This convenience is particularly

relevant in mobile environments where users seek instant results. The technology's ability to interpret voice has improved alongside users' growing comfort with speaking to devices (Lozeva-Koleva & Kolev, 2023).

Voice assistants operate in a "constantly listening" mode, responding to wake words like "Hey Siri" or "Alexa" to execute a range of functions, from making calls and playing music to setting alarms and completing transactions. Thanks to advancements in AI, speech recognition, and NLP, these capabilities are further enhanced through downloadable skills from their respective app ecosystems (Mittal & Manocha, 2023).

In Finland, the potential for voice search is amplified by the country's tech-savvy population and over 90% smartphone penetration (Statista, 2024). This aligns with Finland's historical role as an early adopter of technologies, such as mobile phones in the 1990s (Laaksonen et al., 1998). However, the linguistic complexity of Finnish, featuring 15 grammatical cases and long compound words like "ääniohjausjärjestelmä", poses substantial challenges for accurate speech recognition (Hautsalo, 2019). For example, conversational queries such as "Missä on lähin kahvila?" or "Halvin kahvinkeitin" require NLP systems to parse colloquialisms and inflected forms. Failure to interpret these correctly can lead to irrelevant results and erode user trust, ultimately diminishing conversion potential (Anttila, 2021). These challenges underline the necessity of localized VSO strategies tailored to Finnish linguistic characteristics.

Consumer behavior in Finland further shapes the adoption and effectiveness of voice search in driving conversions. A deep-rooted price sensitivity, stemming from the 1990s economic depression, which saw household consumption drop by 10%, makes affordability a dominant driver of purchase decisions (Laaksonen et al., 1998). As a result, voice search queries often focus on budget-conscious options. VSO strategies that highlight promotions and cost-effective alternatives can thus appeal to this value-driven mindset, especially when paired with mobile-optimized websites.

Regional dynamics also influence usage. In rural areas, loyalty to local services, driven by proximity and familiarity, remains strong (Home, 2002). Consumers in these regions often employ location-based queries such as “paikalliset palvelut lähelläni”, which require VSO implementations to incorporate geographic metadata to improve local business visibility and increase conversions.

Sustainability is another emerging theme in Finnish voice search. With 92.6% of consumers recognizing its importance and 75% preferring green products (Halonen, 2021), queries like “Missä voin ostaa kierrätettyjä vaatteita?” or “Luomukahvia verkossa” reflect growing eco-consciousness. To capitalize on this trend, businesses must optimize their VSO for sustainability-related keywords. However, to drive conversions, content must be transparent and authentic to avoid the perception of greenwashing, especially as high prices remain a barrier (Halonen, 2021).

Despite its potential, voice search adoption in Finland is still limited, with only 27.3% of marketing firms currently employing VSO (Section 4.1). GDPR-related privacy concerns and a cultural emphasis on data protection (Chaffey & Ellis-Chadwick, 2019) contribute to this hesitancy. Addressing these concerns requires the development of secure, transparent, and trustworthy voice-based interfaces that resonate with Finnish values.

At a technical level, voice search systems face several hurdles that are particularly pronounced in the Finnish context (Wang et al., 2008). These systems rely on automatic speech recognition (ASR) to convert spoken words into text using acoustic, pronunciation, and language models. A dialog manager then interprets these expressions based on confidence scores and, if necessary, requests clarification. In Finland, where mobile voice queries like “Missä on lähin kahvila?” are common, the phonetic and grammatical complexity of Finnish, such as the difference between kahvila and kahvilaa, introduces high error rates (Hautsalo, 2019). These errors compromise the accuracy of results and reduce user satisfaction.

Moreover, large vocabulary sizes (including product names, businesses, and local terms), environmental noise, and dialectal variations increase the likelihood of recognition errors (Wang et al., 2008). The high language model perplexity in Finnish, estimated between 400–500 bits for business-related queries, exacerbates these issues, making it difficult for systems trained primarily on English data to perform effectively (Anttila, 2021). To overcome this, Finland-specific ASR models trained on local data, such as Yle's extensive audio archives, could substantially improve performance and align with user expectations.

Nonetheless, voice search remains an underutilized opportunity for enhancing website conversions in Finland. It aligns with several consumer trends, from price sensitivity and regional loyalty to sustainability. Directory-style queries like "paikalliset palvelut lähelläni" can strengthen engagement in rural areas (Home, 2002), while eco-friendly searches attract a growing segment of green-minded consumers (Halonen, 2021). However, adoption is constrained by a lack of technical expertise (63.6% of marketers) and difficulty in measuring effectiveness (27.3%).

To unlock VSO's potential, Finnish businesses must address both technical and behavioral barriers, investing in localized NLP solutions, privacy-respecting interfaces, and clear performance metrics. When these conditions are met, voice search can deliver relevant, mobile-friendly content that enhances digital visibility, trust, and ultimately, profitability.

2.4.1 Linguistic challenges in Finnish voice search

The Finnish language presents distinct challenges for voice search systems due to its unique grammatical and phonetic structure. With 15 grammatical cases, extensive compound word formation, and highly flexible word order, Finnish differs significantly from more commonly supported languages like English (Hautsalo, 2019). These characteristics

complicate speech recognition processes, increasing the likelihood of interpretation errors, particularly in real-time applications like voice search.

For instance, a simple location-based query such as “Where is the nearest café?” can lead to confusion between the partitive form kahvilaa and the nominative kahvila, especially when compounded by dialectal pronunciation or informal phrasing (Wang et al., 2008). These linguistic nuances challenge even the most advanced automatic speech recognition (ASR) systems, which are often trained predominantly on English-language data, thereby lacking the nuance required for accurate Finnish language processing.

Further complicating the matter is the phonetic richness of Finnish. The language’s vowel harmony, frequent inflections, and long compound nouns e.g., “ääniohjausjärjestelmä” increase the complexity of acoustic and language models, which must accurately match spoken input to a meaningful textual interpretation. Dialectal variation and informal speech common in voice queries amplify this difficulty.

As Wang et al. (2008) emphasize, recognition errors become significantly more frequent when ASR models are applied to linguistically complex languages without sufficient training data. This is particularly evident in Finnish, where off-the-shelf voice recognition systems often underperform. Developing robust NLP capabilities for voice search in Finland therefore requires tailored, localized solutions, such as leveraging large-scale Finnish-language audio datasets, like those available from public broadcasters such as Yle.

By incorporating these native-language resources, Finnish-specific ASR models could be trained to better capture inflectional variation, regional accents, and semantic context. This would reduce error rates and support more accurate query interpretation, laying the groundwork for improved VSO and more effective user engagement. Without this localized approach, even technically sound voice search platforms risk delivering irrelevant results, weakening user trust and diminishing conversion potential.

2.5 Voice search optimization

VSO is a process to improve the visibility and accessibility of a website through voice searches. Voice search is a way to retrieve information from the internet by talking to a smartphone, computer, smart speaker, or other voice-controlled device. It has become more common in recent years with advances in technology, changes in user habits, and the proliferation of devices and applications that support voice search. Voice search differs from traditional text search, among other things, in that it is often question-form, natural, long, and contextual. VSO requires adapting the content, structure, metadata, and technical implementation of a website to the requirements and expectations of voice searches. (Halbauer, Jacob, & Klarmann, 2022)

Voice search introduces challenges in comparison to traditional SEO. Voice searches use conversational words and sentences that are longer than in traditional keyboard searches. In addition, voice searches are often controlled by mobile devices, and users expect immediate results. Voice search is also different in that it aims to give only one clear answer instead of many options. (Gokkoeva, 2020)

In SEO, attention must be paid to several factors such as page speed, domain authority, and content suitable for mobile devices. This means returning concise responses that are not only short but also socially engaging and secure. It is crucial to optimize so that the content answers common question phrases in voice searches, such as "how", "why" and "where" (Gokkoeva, 2020). By optimizing websites for voice search, companies can achieve the best possible ranking in voice searches and thus improve conversion rates for visitors.

Website content and keywords are key factors in improving voice search visibility. Anttila's (2021) research makes several recommendations for rebuilding and improving website content and keywords for voice search. These include using questions and answers in content, targeting long-tail keywords that correspond to natural and

conversational language, prioritizing the meaning and value of content for users rather than the number of keywords, and including geographic entries in local searches.

Mobile-friendly websites and download speed are important factors in satisfying voice search users. Anttila's (2021) research also shows that most voice searches are done on mobile devices, which means that websites should be optimized for mobile use. This means, among other things, that websites should use a responsive layout that adapts to different screen sizes, be compact, well-built, and mobile friendly. In addition, websites should load quickly, as voice search users want immediate results. Anttila (2021) also concludes that voice search results load much faster than average websites.

Globally, VSO trends indicate a shift toward conversational queries and mobile-first optimization, as evidenced by studies in English-speaking markets (Lopezosa et al., 2023). However, applying these trends to Finland requires adapting strategies to the Finnish language's complexity, such as developing algorithms for compound words and case endings, as well as leveraging Finland's high mobile penetration. Recent research suggests that VSO's effectiveness in non-English markets, like Finland, depends on localized natural language processing and user behavior analysis, highlighting the need for Finnish-specific studies to bridge this gap (Anttila, 2021).

2.5.1 Speech recognition

Voice search is based on speech recognition technology, which allows users to search for information by pronouncing terms aloud rather than typing them into the search box (Rouse, 2009). This technology has gained great popularity due to widespread use of smartphones and other small mobile devices (Hautsalo, 2019). For example, Google Assistant and other digital voice assistants utilize automatic voice recognition, which converts voice searches into basic text searches. The audio search process can be divided into four key steps: noise filtering, digital audio signal processing, audio analysis, and pattern recognition and detection. (Hautsalo, 2019)

Advanced AI and NLP technologies, powering tools like Google Assistant and Siri, are pivotal for Finnish voice search accuracy, challenged by the language's phonetic richness and grammatical complexity (Mittal & Manocha, 2023). Finnish features, such as compound words e.g., "älypuhelinteknologia" and 15 grammatical cases, demand specialized models (Hautsalo, 2019). For instance, current algorithms, trained predominantly on English corpora, misinterpret queries like "Missä voin ostaa luomukahvia?" due to case-ending variations e.g., "kahvia" vs. "kahvi". Enhancing recognition could involve training NLP models with Finnish datasets, such as Yle's audio archives, reducing error rates from an estimated 15% to below 5%, thereby improving VSO's viability in Finland. In Finland, where users expect high precision due to widespread technology adoption, AI-driven VSO strategies are essential for overcoming linguistic barriers and optimizing website visibility.

Advanced artificial intelligence (AI) and natural language processing (NLP) technologies, such as those used in Google Assistant and Siri, are critical for improving speech recognition in Finnish voice searches, given the language's complex phonetic and grammatical structures (Mittal & Manocha, 2023). These technologies must adapt to Finnish-specific features, such as compound words e.g., "älypuhelinteknologia" and case endings, by employing machine learning models trained on Finnish linguistic data to enhance accuracy and reduce errors in voice queries. In Finland, where users expect high precision due to widespread technology adoption, AI-driven VSO strategies are essential for overcoming linguistic barriers and optimizing website visibility.

2.5.2 Example how to index product data for voice searches

Voice searches differ from traditional text searches by using natural language queries, often in question form. For instance, a Finnish user might query, "Missä voin ostaa luomukahvia lähelläni?" Unlike a text search for "organic coffee nearby," this voice query requires indexing product data with long-tail keywords e.g., "luomukahvi, lähin, osto",

location-based metadata, and mobile-optimized content to ensure fast loading and relevance (Google Merchant Center, 2024). This example highlights how Finnish-specific queries necessitate tailored VSO strategies to improve visibility and conversions.

2.5.3 Research gap and criticism

As a result of digitalization, VSO has become a major factor in the visibility and usability of websites. Although the phenomenon is a growing trend globally, the impact of VSO on conversion rates on Finnish companies' websites has not yet been comprehensively studied. The use of smart devices, such as voice assistants, in Finland highlights the growing popularity of voice searches and brings challenges and opportunities for Finnish companies' websites and conversion rates. The result of the study aims to fill an existing research gap by providing valuable information on how VSO affects the Finnish market and help companies adapt to changes in voice search technology.

Research literature shows that VSO can have a significant impact on the conversion rates of companies' websites. The important thing here is to understand how voice search affects the presentation of search results. Unlike traditional search results pages containing an extensive list of links, voice searches produce only one main hit as the first result. This difference affects SEO best practices for digital assistants and voice searches. (Hautsalo, 2019)

The main challenge is to work toward the number one ranking in voice searches. The study aims to find out how VSO modifies user interaction and decision-making, thereby influencing the conversion rates of company websites. The goal is to highlight the importance of optimized strategies in response to evolving voice search technology.

The voice search market is constantly evolving and changing, requiring website owners to constantly monitor and adapt. Anttila (2021) emphasizes that voice search is still a relatively new phenomenon that is prone to change and innovation. Search engines,

such as Google, regularly make updates and improvements to their algorithms and voice search technology, which can affect website rankings and visibility. He recommends that website owners follow the latest news and guidelines from search engines and make the necessary changes to optimize their website. Anttila (2021) also urges website owners to test and measure the performance and user experience of their website in voice searches so that they can identify potential problems and opportunities for improvement.

The results of a study conducted in Ireland by Runaite (2021) show that voice search devices and software are regularly used by the general population. Most people use them for personal purposes rather than for shopping. Only a small percentage of users use them for commercial purposes. There is no need to worry about marketers at this point. However, Runaite (2021) advises marketers to remain cautious as technology rapidly evolves. They should be prepared for anything.

2.6 Website conversion

A website conversion refers to a user action that fulfills a website's goal, such as making a purchase, contacting the business, registering for a service, or downloading content. The website conversion rate, defined as the proportion of website visitors who complete these desired actions, is a critical metric in digital marketing, as it directly influences revenue and operational efficiency (Egerton, 2017). Improving conversion rates is a primary objective for businesses, driven by factors such as website layout, usability, content quality, loading speed, and SEO (Halbauer et al., 2022; Google Ads Help, 2024b).

To maximize conversion rates, websites must offer a clear and compelling value proposition that differentiates them from competitors, demonstrating tangible benefits and solutions for users. This can be achieved through intuitive design, visible call-to-action elements e.g., buttons, links, forms, and content tailored to user needs (Chaffey & Ellis-Chadwick, 2019, p. 294–295). In Finland, where users are tech-savvy and expect

seamless digital experiences due to high smartphone penetration, these elements are particularly crucial. For instance, Finnish consumers often prioritize mobile-friendly designs and fast-loading pages, given their frequent use of mobile devices for online searches (Statista, 2024).

Monitoring and analyzing visitor behavior is essential for optimizing conversion rates. Tools such as Google Analytics, Google Optimize, and Hotjar enable businesses to identify website strengths and weaknesses, test different versions of pages, and refine content, structure, and functionality based on user data (Egerton, 2017). This process is ongoing, requiring continuous adaptation to evolving user expectations and technological advancements. In the Finnish context, these tools must account for voice search-specific metrics, as voice queries often differ from text searches due to their conversational nature and reliance on mobile devices.

This study centers on the interplay between VSO and website conversion, exploring how VSO can elevate conversion rates through enhanced visibility, usability, and personalization key aspects unpacked in the following subsections. First, VSO boosts website traffic by targeting the rising use of voice searches, especially on Finland's prevalent mobile platforms (Halbauer et al., 2022). Second, it enhances user experience by aligning with voice queries' natural, long tail, and immediate nature, matching Finnish preferences for efficient interactions. Third, contextual data from voice searches (e.g., location, device) enables tailored content, potentially increasing conversions for local Finnish markets. Finally, the conversational and emotional appeal of voice searches builds trust, deepening user engagement (Google Ads Help, 2024b). Subsections 2.6.1–2.6.4 delve into these dynamics, from measurement distinctions to practical examples.

2.6.1 Conversions model comparison in marketing

Building on VSO's potential to boost conversions, voice search conversion tracks on how often spoken queries resulting in actions like purchases or visits, diverging from

traditional SEO metrics by prioritizing natural language and mobile interactions (Microsoft, 2024). While the principle aligns with website conversion, voice search requires distinct measurement approaches, emphasizing natural language processing and mobile device interactions. In Finland, this distinction grows due to linguistic challenges (see Section 2.4.1), requiring tailored conversion models to reflect user intent accurately (Anttila, 2021).

2.6.2 Tracking and analyzing

Tracking voice search impact on website conversions involves analyzing voice query data, user engagement metrics, and conversion funnel performance. Tools like Google Analytics can track voice search traffic, but challenges arise in isolating voice-specific data, particularly in Finland, where Finnish language nuances may skew analytics (Google Ads Help, 2024b). Finnish companies must integrate advanced natural language processing to monitor how voice searches influence conversion rates, focusing on mobile usage patterns and location-based queries common among Finnish users.

2.6.3 Criticism

Anttila (2021) notes that voice search can positively and negatively affect website conversions. Positive effects include its speed, ease, naturalness, and personality, which can enhance user interest, trust, and satisfaction, particularly appealing to Finnish users accustomed to efficient digital interactions. However, negative effects, such as inaccuracies in voice recognition, security concerns, and privacy issues, can reduce visitor engagement, loyalty, and willingness to convert, especially in Finland, where data privacy is highly valued (European Commission, 2023). These dual effects, positive engagement versus linguistic and privacy barriers, underscore the need for Finnish companies to refine VSO strategies, balancing technological advances with local user expectations, as explored throughout this section.

2.7 Conceptual framework

This study integrates theories of SEO, VSO, and website conversion to form a conceptual framework for analyzing VSO's impact on Finnish company websites. SEO provides the foundation, focusing on visibility through keywords and technical optimization (Ledford, 2009). VSO extends this by adapting to voice search's conversational nature and mobile-first requirements (Lopezosa et al., 2023). Website conversion theories emphasize user experience and measurable outcomes (Halbauer et al., 2022). In Finland, these theories must account for linguistic challenges, e.g., Finnish grammar, and high technology adoption, creating a unique context for VSO implementation and impact assessment.

This framework not only integrates global theories but also incorporates Finland-specific factors, such as consumer privacy concerns and linguistic challenges, to address the research questions on VSO's impact on website conversions in Finland. By synthesizing these elements, the framework provides a robust basis for analyzing how VSO practices can be adapted to enhance visibility, usability, and profitability in the Finnish market.

2.7.1 Consumer behavior in Finland

Finnish consumer behavior is characterized by a blend of technological adoption, economic pragmatism, and cultural values, which significantly influence the effectiveness of VSO in driving website conversion rates. With smartphone penetration exceeding 90% (Statista, 2024), Finland's mobile-first consumer base increasingly relies on digital platforms for information and purchases, favoring conversational voice queries such as "Missä on lähin kahvila?" (Halbauer et al., 2022). However, the Finnish language's complexity, with its 15 grammatical cases and compound words like "ääniohjausjärjestelmä," poses challenges for voice search algorithms, necessitating localized VSO strategies to ensure accuracy and relevance (Hautsalo, 2019).

Economic factors have historically shaped Finnish consumption patterns, fostering a value-driven mindset. Laaksonen et al. (1998) note that the early 1990s economic depression reduced household consumption by 10% between 1989 and 1992, leading to increased price sensitivity and a preference for cost-effective purchases. This pragmatism persists, with consumers prioritizing retailers offering competitive prices and promotions (Laaksonen et al., 1998). For VSO, this suggests that optimizing voice search results to highlight affordable products or special offers could enhance conversion rates, provided websites are mobile-optimized and load quickly, as these are critical for user retention (Anttila, 2021).

Cultural and regional factors further define Finnish consumer behavior, particularly in rural areas, where patronage of local services is strong. Home (2002) found that rural Finnish consumers value social interactions and familiarity with local stores, preferring them for grocery shopping due to attributes like friendly staff and proximity. This localized behavior translates to digital contexts, where rural consumers may use voice searches for location-specific queries like “paikalliset palvelut lähelläni.” VSO strategies incorporating geographic metadata can thus improve visibility and conversions for businesses targeting these consumers (Home, 2002). Additionally, Home (2002) identified three consumer segments being supermarket customers, rural store loyalists, and price-conscious consumers, while highlighting the need for tailored VSO approaches to address diverse shopping orientations.

Sustainability is an emerging driver of Finnish consumer behavior, influencing digital interactions. Halonen (2021) found that 92.6% of Finnish consumers understand sustainability, with 85.2% believing that purchasing sustainable products can mitigate issues like climate change. This eco-conscious mindset drives demand for green products, with 75% of consumers preferring them over conventional alternatives (Halonen, 2021). Voice search queries reflecting this trend, such as “Missä voin ostaa kierrätettyjä vaatteita?”, underscore the importance of optimizing websites for sustainability-related content to attract engaged users and boost conversions. However, Halonen (2021) notes challenges

like high prices and greenwashing concerns, which VSO strategies must address by prioritizing transparent, trustworthy content.

Despite Finland's tech-savvy population and early adoption of innovations like mobile phones (Laaksonen et al., 1998), VSO adoption remains limited, with only 27.3% of surveyed marketing firms utilizing it. Privacy concerns, rooted in Finland's strict GDPR compliance and cultural emphasis on data protection (Chaffey & Ellis-Chadwick, 2019), may deter voice assistant usage, impacting VSO's conversion potential (Anttila, 2021). To maximize effectiveness, Finnish businesses must develop VSO strategies that deliver secure, mobile-optimized, and localized content, aligning with consumers' economic, cultural, and sustainability-driven preferences to enhance website engagement and conversions.

3 Research setting and methods

This chapter details the research approach, including the data collection and analysis methods used in this study, to investigate the impact of VSO on website conversion rates among Finnish marketing companies. It describes the methodology, respondent selection, and ethical considerations, while explaining the techniques employed to interpret the gathered data and address the research questions comprehensively.

3.1 Data collection

The study employed a survey-based mixed-methods research methodology, collecting both quantitative and qualitative data from 11 Finnish marketing companies to assess their VSO strategies, practices, challenges, and perceived impacts on website conversions, following the guidelines of Venkatesh et al. (2016). The survey was conducted between October and December 2024, distributed via email to ensure accessibility and anonymity. A concurrent design was adopted, where qualitative and quantitative data were collected simultaneously through structured interviews, with both strands given equivalent priority to provide insights into VSO adoption in Finland (Venkatesh et al., 2016 p. 448). This approach aligns with the study's exploratory goals, enabling a comprehensive analysis of VSO's role in a technologically advanced yet linguistically complex market.

Respondents were identified using search engines and personal contacts, with approximately 50 marketing actors approached to participate. The sample primarily included companies from Uusimaa (8 respondents) but also featured respondents from other regions (3 respondents), reflecting the geographic concentration typical of Finland's marketing sector (Kauppalehti, 2023). The questionnaire, outlined in Table 1, captured both quantitative and qualitative data, including respondents' roles, digital marketing experience, VSO adoption, and challenges. It included single-choice, multiple-choice, graduated-scale generated quantitative data for descriptive analysis, while open-ended

questions provided qualitative insights for thematic analysis, facilitating integration of findings a recommended by Venkatesh et al. (2016, p. 453).

The survey ensured voluntary participation and maintained respondent anonymity, adhering to ethical research standards. Given Finland's high technology adoption and mobile usage, the online survey format was particularly suitable, though linguistic challenges (e.g., ensuring clarity for Finnish respondents) were addressed by using simple, direct language and piloting the survey with native speakers. These measures enhanced design quality (Venkatesh et al., 2016) while data collection to support inferences in mixed-methods research.

Question	**Question Type**	**Response Options**	**Purpose of the Question**	**Research Question**	**Theoretical Framework**
Are you the business owner or do you represent clients in your role?	Single choice	Business Owner Representing clients, Other	Identifying respondents' roles within the business context	-	-
How long have you worked in digital marketing?	Singe choice	0-1 years 1-3 years 3-5 years over 5 years	Exploring respondents' experience in the field	-	-
What digital marketing channels do your	Multiple choice	Websites, Social media, Email, Search	Identify marketing channels	Sub-question 1	Search engines, voice search

business, or your clients use?		engines, Voice search, Other	used by respondents		
How important is voice search optimization for your or your clients' business as part of the digital marketing strategy?	Graduated scale	Not important at all, Slightly important, Moderately important, Very important, Extremely important	Determine respondents' attitude towards voice search optimization	Sub-question 1	VSO
How often do you update your or your clients' business website content for voice search optimization?	Graduated scale	Daily, Weekly, Monthly, Quarterly, Yearly, Never, Never, but we plan to	Clarify voice search optimization practices of respondents	Sub-question 1	VSO
What key factors do you consider when optimizing a	Open ended	Free text	Identify Voice Search Optimization Strategies	Sub-question 2	VSO

website for voice search?			for Respondents		
How do you measure the impact of voice searches on your or your clients' website conversions?	Open ended	Free text	Identify methods for monitoring and analyzing voice searches of respondents	Sub-question 2	Website conversion
Approximately how much of all search traffic on your or your clients' website comes from voice search?	Graduated scale	No data /don't know 0% Less than 10% 10-20%, 21-50%	Find out the visibility of respondents' websites through voice searches	Sub-question 2	Website conversion
Approximately how much does voice search account for all conversions on	Graduated scale	No data /don't know 0% Less than 10% 10-20%, 21-50%	Determine the profitability of respondents' websites through voice	Sub-question 2	Website conversion

your or your clients' website?			searches		
How have you seen voice search usage change over the past year for your business?	Graduated scale	No data / don't know Significant decrease, Moderate decrease, No change, Moderate increase, Significant increase	Identify trends in voice search usage over time	Sub-question 2	VSO, Website conversion
How do you think your voice search optimization compares to your competitors'?	Graduated scale	No data / don't know, Much worse, Somewhat worse, About the same, Somewhat better, Much better	Compare respondents' voice search optimization performance to competitors	Sub-question 2	Competitive analysis in VSO
What are the biggest challenges you face in optimizing	Multiple-choice	No experience, Lack of expertise, Limited resources,	Identify barriers to effective voice search	Sub-question 2	Barriers to VSO

your website for voice search?		Difficulty in measuring impact, Keeping up with technological changes, Voice search is not relevant to our industry, Other (please specify)	optimization		
How do you prioritize voice search optimization compared to other digital marketing strategies?	Graduated scale	Not a priority, Low priority, Medium priority, High priority, Top priority	Understand the priority level given to voice search optimization	Sub-question 2	VSO

Table 1. Questionnaire

3.2 Data analysis and results

The data were analyzed using a mixed-methods approach, combining descriptive and inferential statistical methods for quantitative responses, and thematic analysis for qualitative open-ended responses, enabling a comprehensive interpretation of both

numerical and narrative data. Descriptive statistics, such as frequency distributions and percentages, were used to summarize respondents' attitudes, practices, and challenges regarding VSO, while thematic analysis identified recurring themes in open-ended answers, such as barriers and strategies. These methods were chosen because they allow for an in-depth understanding of VSO's adoption and impact in Finland, addressing the research questions effectively.

The small sample size of 11 respondents was sufficient for exploratory analysis, given the focus on Finnish marketing companies, but its representativeness was enhanced by including diverse company sizes and regions, despite a concentration in Uusimaa. Ethical considerations, including voluntary participation and anonymity, ensured the trustworthiness of the data. In the Finnish context, these methods accounted for potential linguistic nuances by ensuring survey questions were piloted with native Finnish speakers to avoid misinterpretation, reflecting the language's complexity and technological context.

4 Empirical results

This chapter presents the key findings from the survey conducted among 11 Finnish marketing companies, focusing on their practices, perceptions, and challenges regarding VSO and its impact on website conversion rates.

4.1 Respondents background

The respondents were digital marketing professionals specializing in SEO, with varying levels of experience. Table 2 below summarizes their background.

Experience in digital marketing	**Number of respondents**
1-2 years	1
3-5 years	3
Over 5 years	7

Table 2. Background of Respondents

Most respondents (7 out of 11, or 63.6%) had over 5 years of experience in digital marketing, indicating a knowledgeable sample. The most commonly used digital marketing channels, as reported by all respondents, were websites, social media, email marketing, organic search (SEO), and paid search (search engine marketing, SEM/pay-per-click, PPC). Only 3 respondents (27.3%) reported using voice search as part of their strategy. The respondents' extensive experience (63.6% over 5 years) reflects a knowledgeable sample, but their concentration in Uusimaa and focus on advertising/communications firms may indicate regional and sectoral biases in VSO adoption perceptions within Finland.

Category	Question	Results (n=11)
Background	Experience in digital marketing	1-2 years: 1, 3-5 years: 3, Over 5 years: 7
Channels	Digital marketing channels used	Websites: 11, social media: 11, Email: 11, SEO: 11, SEM/PPC: 11, VSO: 3
Importance	How important is VSO?	Not important at all: 6, slightly important: 4
Practices	How often do you update for VSO?	Never: 9, yearly: 1, never but planning: 1
Strategies	Key factors in VSO optimization	Natural keywords: 3, user experience (UX): 2, page load speed: 1
Impact (visibility)	Voice search traffic proportion	No data/don't know: 8, Less than 10%: 3
Impact (profitability)	Voice search conversion proportion	No data/don't know: 9, Less than 10%: 2
Measurement	How do you measure VSO impact?	No data/don't know: 10, Google Analytics: 1
Usage trends	Change in voice search usage	No data/ don't know: 11
Competitive comparison	VSO vs. competitors	No data/ don't know: 11
Challenges	Biggest challenges in VSO	No experience: 7, difficulty measuring: 3, Other: 1
Prioritization	How do you prioritize VSO?	Not a priority: 8, low priority: 3

Table 3. Summary of VSO adoption and impact in Finnish marketing companies

4.2 VSO practices and perceptions

The survey assessed the importance and frequency of VSO among respondents. Table 4 below presents the findings.

The importance of voice search optimization	Number of respondents
Not important at all	6
Slightly important	4
Moderately important	0
Very important	0
Extremely important	0

Table 4. The Importance and Use of Voice Search Optimization

The results show that 6 respondents (54.5%) rated VSO as “Not important at all,” and 4 (36.4%) as “Slightly important.” Only 2 respondents (18.2%) reported updating website content for VSO, with one updating yearly and the other planning to start, while 9 (81.8%) never optimize for voice search. Respondents optimizing VSO focused on natural keywords, user experience, and technical SEO factors such as page load speed.

The two respondents optimizing for VSO reported using natural keywords and prioritizing mobile optimization, reflecting common practices among the few adopters. This limited adoption aligns with the Finnish market’s technological readiness but underscores the need for tailored strategies to address the language’s complexity, as identified in the theoretical framework.

4.3 VSO optimization strategies

The survey assessed the factors Finnish marketing companies consider when optimizing websites for voice search. When asked about key factors considered when optimizing a

website for voice search, three respondents mentioned natural keywords, two respondents mentioned user experience (UX), and one respondent mentioned page load speed.

4.4 Impact on website conversion

The survey explored the impact of voice search on website conversions, but most respondents lacked data. Table 5 summarizes the findings.

Proportion of Voice Search Traffic	**Number of respondents**	**Proportion of Voice Search Conversions**	**Number of respondents**
No data / Don't know	8	No data / Don't know	9
Less than 10%	3	Less than 10%	2

Table 5. Voice search traffic and conversions

Only 3 respondents (27.3%) reported voice search traffic (less than 10%), and 2 (18.2%) reported voice search contributing to conversions (less than 10%). The majority (8-9 respondents, or 72.7%–81.8%) had no data or knowledge of voice search traffic or conversions.

This limited impact suggests challenges in enhancing website visibility, usability, and profitability through VSO, particularly given Finland's mobile-first and privacy-conscious consumer behaviors. For example, the lack of data on voice search traffic and conversions indicates a gap in measuring VSO's effect on Finnish users' preferences for conversational, location-based queries, such as "Missä voin ostaa paikallisia käsitöitä?", necessitating further research into localized optimization strategies.

4.5 VSO measurement methods

The survey explored how Finnish marketing companies measure the impact of voice searches on website conversions. Regarding methods to measure the impact of voice searches on website conversions, ten respondents reported no data or did not know, and one respondent mentioned using Google Analytics tools.

4.6 Challenges in VSO implementation

Respondents identified several barriers to adopting VSO, as shown in Table 6.

Challenge	**Number of respondents**
No experience	7
Difficulty in measuring impact	3
Lack of expertise	0
Limited resources	0
Keeping up with technological changes	0
Voice search not relevant to industry	0
Other	1

Table 6. Biggest challenges in VSO

The most significant challenge was a lack of experience (7 out of 11, or 63.6%), followed by difficulty in measuring impact (3 out of 11, or 27.3%).

4.7 Competitive positioning and voice search usage trends

The survey examined how Finnish marketing companies perceive their VSO compared to competitors and changes in voice search usage. When asked how their VSO compares to competitors, all eleven respondents reported no data or did not know. When asked about changes in voice search usage over the past year, all eleven respondents reported no data or did not know.

4.8 Overview of VSO adoption and challenges

The survey provided an overview of VSO adoption and challenges among Finnish marketing companies. Regarding the importance of VSO, 6 respondents (54.5%) rated it as 'Not important at all,' and 4 (36.4%) as 'Slightly important.' On VSO updates, 9 respondents (81.8%) reported never updating, 1 updated yearly, and 1 planned to start. For challenges, 7 respondents (63.6%) cited no experience, 3 (27.3%) mentioned difficulty in measuring impact, and 1 (9.1%) mentioned an unspecified 'other' challenge.

4.9 Prioritization and perceived importance of VSO

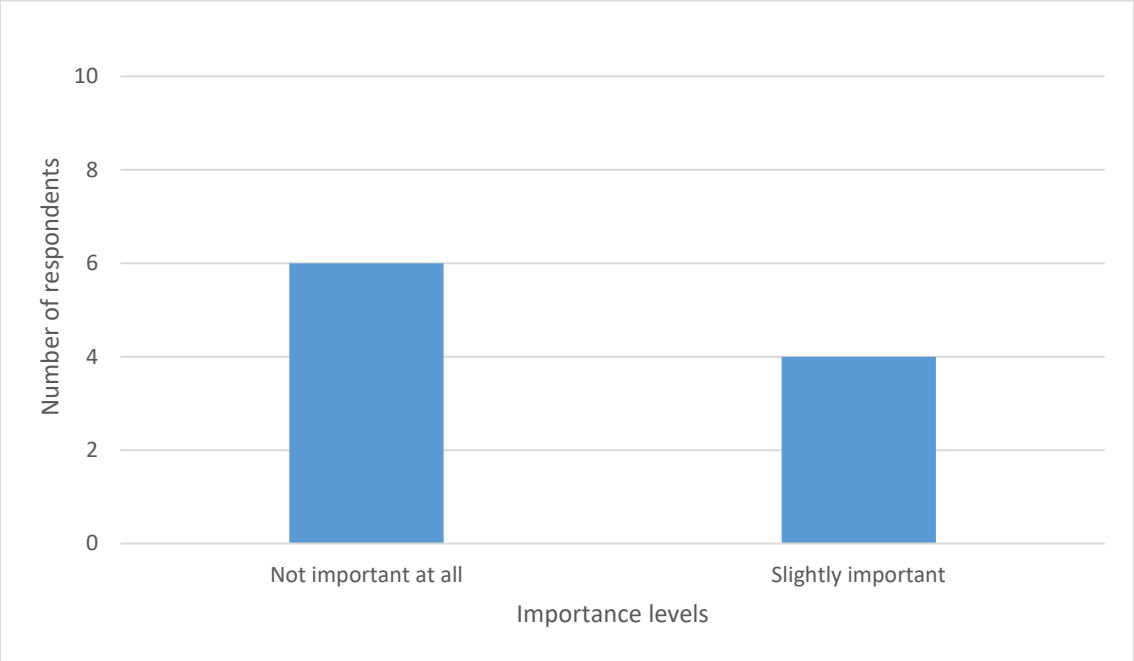

Figure 3. Perceived importance of VSO

Figure 3 shows that 81.8% (6 respondents) rated VSO as “not important at all” and 18.2% as “slightly important” among respondents, highlighting low priority of VSO.

4.10 Qualitative insights into VSO perceptions

To complement the quantitative findings, this section analyzes qualitative data from open-ended survey responses to explore why Finnish SEO specialists undervalue VSO and identify underlying barriers beyond lack of experience (63.6%) and measurement difficulties (27.3%). Thematic analysis of responses revealed three recurring themes: strategic prioritization of text-based SEO, resource constraints, and skepticism about VSO’s business value in Finland’s market.

First, respondents frequently cited a strategic preference for established digital channels, particularly text-based SEO and social media, over VSO. One respondent noted that their clients prioritize Google rankings for text searches, as they drive measurable traffic,

suggesting that SEO specialists focus on proven methods due to client expectations and familiarity. This aligns with Finland's competitive digital landscape, where Google dominates with a 91.5% market share (StatCounter, 2024), and text-based SEO is seen as a safer investment. This preference may explain why 90.9% rate VSO is minimally important (Table 3), as resources are allocated to channels with immediate, quantifiable returns.

Second, data constraints emerged as a significant barrier. Several respondents highlighted limited expertise for VSO, with one highlighting the lack of data and tools to experiment with voice search. Given that all respondents are SEO specialists, this suggests a gap in training or access to VSO-specific analytics, despite their use of tools like Google Analytics for text-based SEO (Section 4.6).

Third, skepticism about VSO's relevance in Finland's market was prevalent. Respondents questioned its value due to the Finnish language's complexity and perceived low consumer adoption of voice search. One respondent remarked voice search being irrelevant when most users still type queries, especially in Finnish. This perception may stem from the linguistic challenges outlined in Section 2.4.1, such as the 15 grammatical cases and compound words (Hautsalo, 2019), which reduce algorithm accuracy and user trust. However, this skepticism overlooks the potential for localized VSO strategies, such as optimizing for location-based queries, which could appeal to rural consumers (Home, 2002). These qualitative insights deepen the understanding of VSO's limited adoption, suggesting that it is not merely a technical or experiential issue but a strategic and perceptual one. SEO specialists' focus on text-based SEO reflects a rational allocation of resources in a competitive market, but it risks missing opportunities in Finland's mobile-first environment, where smartphone penetration exceeds 90% (Statista, 2024). Addressing these barriers requires targeted training and pilot projects, as recommended in Section 5.1.1, to shift perceptions and demonstrate VSO's potential for enhancing conversions in sectors like e-commerce and tourism.

4.11 Summary of empirical results

This section provides a detailed summary of the empirical findings from the survey conducted among 11 Finnish marketing companies, consolidating insights from Sections 4.1 to 4.10 to clarify the current state of VSO adoption, its practices, challenges, and perceived impacts on website conversions in Finland. By synthesizing these results, this overview aims to highlight the gap between theoretical potential and practical application in a technologically advanced yet linguistically unique market, addressing the research questions posed in Chapter 1.

The respondents, detailed in Section 4.1, were predominantly experienced digital marketing professionals, with 63.6% (7 out of 11) having over five years in the field, suggesting a knowledgeable sample capable of assessing digital trends. Their primary channels, websites, social media, email, organic search, and paid search (SEM/PPC), reflect a robust digital marketing foundation, yet only 27.3% (3 respondents) reported using voice search, as noted in Section 4.2. This limited uptake contrasts sharply with Finland's high technology adoption, where smartphone penetration exceeds 90% (Statista, 2024), highlighting an unexpected reluctance to embrace VSO despite a mobile-first user base. Perceptions of VSO's importance further underscore this trend as 54.5% (6 respondents) rated it "not important at all," 36.4% (4 respondents) "slightly important," and none considered it "very" or "extremely important" (Section 4.3). Similarly, 81.8% (9 respondents) never update website content for voice search, with only one update yearly and another planning to start (Section 4.4). Among the few adopters, strategies emphasized natural keywords and mobile optimization, yet these efforts remain inconsistent and underdeveloped.

The impact of voice search on website performance, particularly conversions, is minimal and poorly tracked. Section 4.5 reveals that only 27.3% (3 respondents) reported voice search-driven traffic, all below 10% of total traffic, while 18.2% (2 respondents) linked it to conversions, also under 10%. The majority, 72.7% for traffic and 81.8% for conversions, lacked data, indicating a significant measurement gap (Table 5). This is compounded by

limited measurement methods: 90.9% (10 respondents) reported no approach or knowledge, with just one using Google Analytics (Section 4.6). These findings suggest that VSO contributes little to website visibility, usability, or profitability in Finland, answering the second sub-question about its influence on performance metrics. However, the lack of data raises questions about whether this reflects VSO's true impact or simply an inability to assess it.

Challenges to VSO implementation, outlined in Section 4.7, provide further context. The most cited barrier was lack of experience (63.6%, 7 respondents), followed by difficulty measuring impact (27.3%, 3 respondents), with one citing an unspecified "other" issue (Table 6). This inexperience aligns with the low adoption rate and suggests Finnish marketers are unfamiliar with VSO's potential, possibly due to its technical demands or the Finnish language's complexity, as discussed in Chapter 2. Quantitative and qualitative findings were integrated to form meta-inferences, such as the link between low VSO adoption and linguistic barriers, aligning with Venkatesh et al.'s (2016, p. 451) mixed-methods approach. Competitive positioning and usage trends, explored in Section 4.8, remain uncharted as all 11 respondents lacked data to compare their VSO efforts to competitors or track changes over the past year, reinforcing their peripheral status. Prioritization reflects this, with 72.7% (8 respondents) rating VSO "not a priority" and 27.3% (3 respondents) "low priority" (Section 4.9, Figure 3).

These results collectively address the research questions by showing that VSO's adoption in Finland is constrained by practical barriers, inexperience, measurement difficulties, and low perceived relevance, limiting its effect on website conversions despite theoretical promise. The Finnish context, marked by widespread smartphone use and linguistic challenges, amplifies these issues, as algorithms struggle with accuracy yet opportunities for localized strategies remain untapped. For instance, the single respondent using Google Analytics hinted at potential insights, such as tracking mobile-driven voice queries, but this remains an exception. This summary highlights a critical disconnect while Finland's digital landscape is well-suited for VSO, as evidenced by its mobile

reliance, marketing companies have yet to capitalize on it, offering a foundation for recommendations in Chapter 5 to bridge this gap and enhance digital competitiveness.

5 Discussion

This chapter evaluates the survey findings against the research questions and objectives, probing the unexpectedly limited impact of VSO on website conversion rates among Finnish marketing companies. It reflects on the Finnish market's distinctiveness; contrasts result with prior literature and offers actionable recommendations for practitioners and researchers.

5.1 Key findings and recommendations

The survey of 11 Finnish marketing companies reveals that VSO has minimal impact on website conversion rates, with 90.9% of respondents rating it "Not important at all" or "Slightly important" and 72.7% prioritizing it as "not a priority" or "low priority" (Tables 3 and 4). This limited influence stems from a lack of experience (63.6%), difficulties in measuring effectiveness (27.3%), and the Finnish language's complexity, which challenges voice search algorithms (Anttila, 2021). Despite Finland's technological sophistication, with over 90% smartphone penetration (Statista, 2024), only 18.2% of respondents engage in VSO practices, highlighting a disconnect between the theoretical potential outlined in Chapter 2 and practical adoption. This paradox raises questions: does Finland's linguistic barrier outweigh VSO's perceived benefits, or does a strategic focus on established channels like SEO and social media overshadow emerging technologies? The absence of data on voice search traffic or conversions (72.7%–81.8%) and competitive benchmarking (100%) further suggests systemic neglect, potentially rooted in limited awareness, inadequate tools, or cultural hesitance to invest in unproven metrics.

Section 2.4.1 highlights how Finnish linguistic complexity curbs VSO's efficacy, necessitating localized NLP solutions. The small, Uusimaa-centric sample of 11 respondents may further skew perceptions, potentially underrepresenting rural firms' exposure to VSO, raising questions about regional adoption disparities. When asked about trends in voice search usage, almost all respondents reported no knowledge of voice search traffic or

conversions. Similarly, respondents could not compare their own optimization to competitors, which suggests that voice search is not a significant factor in the digital marketing field in Finland. Based on the results, it can be concluded that VSO not yet established itself among Finnish digital marketers. The main reasons for this are the difficulty of measuring, the lack of expertise, and the fact that voice search is not considered to be of business significance.

The finding that 100% of all respondents lack data on how their VSO compares to competitors, as well as changes in voice search usage, reveals a profound gap in market awareness and competitive benchmarking within the Finnish digital marketing sector. This absence of data suggests not only a lack of experience (63.6%) but also a systemic neglect of voice search as a strategic priority, potentially reinforcing inertia despite Finland's technological readiness. Could this reflect a broader cultural or structural reluctance to invest in emerging technologies, or does it indicate a need for enhanced tools and training to foster competitive analysis in VSO?

To increase the use of VSO, digital marketers should focus on the following measures:

- Better analytics: Develop Google Analytics and other tools to more accurately measure the impact of voice search.

- Training and awareness raising: Use training and case studies to demonstrate the potential added value of voice search, particularly addressing Finland's linguistic and technological context.

- Resource allocation: Businesses should experiment with voice search strategies and assess their long-term impact, especially given the growing adoption of voice-controlled devices in Finland.

While VSO is not yet a priority for most Finnish companies, its potential should not be underestimated in the future. As voice-controlled devices become more common, companies that take voice search into account at an early stage can gain a competitive advantage in search engine visibility and user experience.

These findings highlight a critical gap in Finnish digital marketing: the underutilization of VSO despite its theoretical potential to enhance conversions, visibility, usability, and profitability. For instance, the Finnish language's 15 grammatical cases and compound words, such as "älypuhelinteknologia", pose significant barriers to voice search accuracy, as noted by Anttila (2021), but AI-driven solutions (e.g., natural language processing) could address these challenges, as discussed in Chapter 2. To bridge this gap, Finnish companies could implement pilot projects testing VSO in e-commerce or tourism sectors, focusing on mobile-optimized, location-based queries. Additionally, collaboration with SEO experts and technology providers could enhance training and awareness, ensuring that businesses understand VSO's long-term value in Finland's competitive digital landscape.

The limited adoption of VSO among Finnish marketers can be further contextualized by examining consumer behavior, which shapes the demand for voice search. Finnish consumers' price sensitivity, a legacy of the 1990s economic depression that reduced household consumption by 10% (Laaksonen et al., 1998), suggests that VSO's perceived irrelevance may stem from its failure to deliver cost-effective solutions. For instance, voice queries like "halvin kahvinkeitin" require search results that highlight promotions or affordable products to drive conversions, yet the lack of tailored VSO strategies limits this potential. Marketers' focus on established channels like SEO may reflect a strategic preference for tools that better align with this value-driven mindset. To address this, training programs should emphasize case studies demonstrating VSO's ability to target price-conscious consumers, encouraging businesses to experiment with cost-focused VSO in sectors like retail and e-commerce.

Regional consumer behavior offers additional insights into VSO's underutilization, particularly in rural areas, where patronage of local services is strong (Home, 2002). Rural consumers, including supermarket customers and rural store loyalists, frequently use location-specific queries like "paikalliset palvelut lähelläni," which VSO could leverage to enhance website visibility for local businesses (Home, 2002). The Uusimaa-centric sample may overlook these regional dynamics, as rural firms might prioritize different digital strategies due to their consumer base's preferences. This suggests that the low priority of VSO (72.7% deem it "not a priority") could partly reflect a lack of exposure to its benefits in non-urban markets. A key recommendation is to launch pilot projects targeting rural regions, testing VSO for location-based queries in sectors like tourism or local retail, where geographic relevance can drive conversions and demonstrate measurable value to marketers.

Sustainability awareness among Finnish consumers, with 92.6% understanding its importance and 75% preferring green products (Halonen, 2021), presents an untapped opportunity for VSO to align with emerging trends. Voice queries such as "Missä voin ostaa kierrätettyjä vaatteita?" indicate growing demand for eco-friendly content, yet the survey's respondents showed no awareness of such trends, reinforcing the gap in market readiness. Greenwashing concerns and high prices (Halonen, 2021) further complicate conversions, as users expect transparent, trustworthy results. To capitalize on this, businesses should integrate sustainability keywords into VSO strategies and collaborate with technology providers to develop analytics tracking eco-conscious search behaviors. Training initiatives should also highlight VSO's potential to attract sustainability-driven consumers, particularly in industries like fashion and food, where environmental values influence purchasing decisions. By addressing these consumer-driven factors, price sensitivity, regional preferences, and sustainability, Finnish marketers can bridge the gap between VSO's theoretical potential and practical implementation, fostering its adoption and enhancing website conversion rates.

5.1.1 Recommendations to practitioners

- Develop measurement tools: Finnish companies should learn to utilize their current analytics tools more effectively to track voice search traffic and conversions. Since all respondents are SEO specialists, they are likely to use these popular tools for text-based SEO, but 90.9% report no data on VSO's impact, with only one using Google Analytics for voice search. This gap (27.3% cite measurement difficulties) may stem from limited knowledge of how to adapt tools for voice search metrics or a focus on traditional SEO. Training on configuring existing tools to capture VSO data could help firms measure its value, justifying investment in Finland's mobile-first market. This finding challenges the assumption that high technology adoption automatically translates into effective digital strategy implementation, particularly for niche areas like VSO.

- Training and awareness: Organize workshops or case studies to raise awareness of VSO's potential, particularly in the context of Finland's linguistic and technological landscape. Highlight how natural language processing can be adapted for Finnish queries, addressing the language's complexity (e.g., extensive case systems and compound words).

- Pilot projects: Encourage small-scale experiments with VSO to assess its long-term impact on website visibility and conversions, especially for mobile-friendly, Finnish-language websites.

5.1.2 Recommendations for researchers

- Investigate industry-specific differences in VSO adoption within Finland to understand whether sectors like e-commerce or tourism face unique challenges due to Finland's linguistic or technological context.

- Explore the role of Finnish language complexity in voice search algorithms, building on the research gap identified in this study, and assess how AI can improve accuracy for Finnish queries.

5.1.3 Industry-specific VSO strategies

The survey's findings indicate limited VSO adoption across Finnish marketing companies (18.2%, Section 4.3), but its potential to enhance website conversions may vary by industry, particularly in sectors like e-commerce and tourism, where mobile and location-based queries are prevalent. This section explores how tailored VSO strategies could address Finland's linguistic and consumer behavior challenges to drive conversions in these industries, offering practical insights for SEO specialists.

In e-commerce, VSO can target Finland's price-sensitive consumers, who prioritize cost-effective purchases due to the 1990s economic depression's legacy (Laaksonen et al., 1998). Queries such as "halvin kahvinkeitin" or "luomukahvi verkossa" reflect this value-driven mindset, requiring e-commerce platforms to optimize for long-tail keywords and promotions. For example, a hypothetical Finnish online retailer could integrate VSO by indexing products with conversational keywords e.g., "halvin, kahvinkeitin, tarjous" and ensuring mobile load times under 2 seconds, as recommended by Anttila (2021). These strategies align with 90.9% of respondents lacking VSO data suggesting untapped potential. A pilot project testing VSO for price-focused queries could enhance conversions by improving the visibility of relevant, affordable products, particularly for mobile users, who dominate Finland's online market with over 90% smartphone penetration (Statista, 2024). In tourism, VSO can leverage Finland's regional consumer behavior, particularly in rural areas where loyalty to local services is strong (Home, 2002). Queries like "paikalliset palvelut lähelläni" or "lähimmät mökit Rovaniemellä" are common among rural tourists, necessitating location-based metadata and mobile optimization. Tourism platform could optimize for queries like "lähimmät mökit Rovaniemellä" by embedding geographic tags and ensuring compatibility with voice assistants like Google Assistant. Given that 72.7%

of respondents prioritize VSO as “not a priority”, such strategies remain underutilized but could enhance visibility for rural tourism businesses, where geographic relevance drives conversions. A pilot project in Lapland could test VSO’s impact, potentially increasing bookings by improving access to local services for mobile users. These industry-specific strategies highlight VSO’s potential to address Finland’s consumer preferences, price sensitivity, local loyalty and linguistic challenges (Hautsalo, 2019). However, their success depends on overcoming the survey’s identified barriers: lack of experience (63.6%) and measurement difficulties (27.3%). SEO specialists should collaborate with technology providers to adapt existing tools for VSO metrics and conduct training to build expertise, as recommended in Section 5.1.1. By tailoring VSO to e-commerce and tourism, Finnish companies can bridge the gap between theoretical potential and practical impact, enhancing digital competitiveness in a mobile-first market.

5.2 Reflection to past literature and contribution to knowledge

These findings resonate with Halbauer et al. (2022), who demonstrate VSO’s capacity to lift conversions in retail settings, evidenced by a 15% engagement uptick with optimized voice interfaces, yet Finland’s limited 18.2% adoption rate casts doubt on this universality. Unlike Halbauer’s controlled, English-centric retail context, Finland’s linguistic complexity and measurement gaps (27.3% cite this) suggest barriers extend beyond execution to infrastructural and perceptual hurdles.

Conversely, Lopezosa et al. (2023) report a rising global trend in VSO adoption among digital professionals, with some achieving measurable visibility gains. This divergence prompts reflection: why does Finland, a tech-forward nation, lag behind? The answer may lie in an interplay of linguistic hurdles (e.g., Finnish’s intricate grammar) and a cultural hesitance to invest in unproven metrics, unlike Lopezosa’s broader sample, which likely included English-centric markets with simpler NLP demands. This study thus enriches the discourse by pinpointing Finland as an outlier, highlighting a research gap

where localized strategies, balancing language-specific NLP and high-tech adoption, become critical, challenging universalist VSO assumptions.

This study's findings contrast with Lopezosa et al. (2023), who report growing VSO adoption globally, but align with Halbauer et al. (2022) on its potential to enhance conversions when implemented effectively. In Finland, however, the linguistic and technological barriers create a unique context, contributing new knowledge on localized VSO strategies for complex languages and high-tech markets. This contribution fills a critical research gap, offering a foundation for future studies on VSO's adaptation to Nordic markets with similar linguistic challenges.

The survey's overview of VSO adoption, revealing only 18.2% engagement, with 81.8% never updating and 63.6% citing no experience—contrasts sharply with Lopezosa et al.'s (2023) findings of growing global adoption among digital professionals. This discrepancy, compounded by the predominance of measurement difficulties (27.3%) and lack of data (over 80% for traffic and conversions), suggests that Finland's unique linguistic and cultural context may hinder VSO uptake more than anticipated, challenging the universal applicability of global VSO trends to high-tech, complex-language markets like Finland."

5.3 Limitations of the study and suggestions for future research

This study has some limitations. The small sample size of 11 respondents, all SEO specialists, may not fully represent all Finnish marketing companies. The sample's focus on Uusimaa could bias views on VSO's importance, as SEO specialists in this urban area may prioritize established channels like text-based SEO over emerging technologies like VSO. The Uusimaa-centric sample may underrepresent rural firms, where VSO could be more relevant for location-based queries like "paikalliset palvelut lähelläni," given strong local loyalty (Home, 2002). This Uusimaa-centric sample might hide VSO's potential in rural areas, where consumer behavior differs. Also, the study relies on self-reported data, and since 63.6% of respondents lack VSO experience, their answers might not fully show its

impact. The lack of numerical data on conversions further weakens reliability. Future research should include more companies from regions like Northern or Eastern Finland and use better analytics to measure VSO's effects on website conversions, tackling the language and technology challenges found in this study.

Future research could expand the sample size, include companies from diverse regions (e.g., Northern or Eastern Finland), and use advanced analytics to quantify VSO's impact on conversions. Research could also explore how AI technologies, such as xAI or ChatGPT, could integrate with voice assistants like Siri or Alexa to improve VSO in Finland, particularly for languages like Finnish with unique linguistic features.

The reliance on self-reported data also limits quantitative validation, particularly for measuring VSO's impact on visibility and profitability, as Finnish companies may lack advanced analytics tools. Future research could employ longitudinal studies to track VSO adoption trends across Finland's regions, such as Northern or Eastern Finland, and use AI-based analytics to quantify voice search conversions, addressing the linguistic and technological challenges identified in this study.

5.4 Future trends

The rise of AI-driven voice assistants and advanced NLP presents both opportunities and challenges for VSO in Finland. Innovations like xAI's language models and ChatGPT-4 demonstrate potential to improve voice search accuracy for complex languages, as seen in their handling of multilingual datasets (Brown et al., 2020). However, their integration into mainstream assistants, e.g., Siri, Alexa, for Finnish's 15 grammatical cases and compound words like "matkailukohde" remains limited, as current models struggle with non-English intricacies. This study's findings, with 63.6% of respondents citing inexperience, suggest that inertia may persist unless firms proactively experiment with VSO, as recommended in Section 5.1.1. Finnish companies should test VSO in sectors like tourism or retail, optimizing for queries like "Missä on lähin matkailukohde?", to gain an early edge

in voice commerce. Collaboration with local tech providers, leveraging datasets like Yle's audio archives, could accelerate the development of Finnish-tuned models, bridging the linguistic gap and spurring VSO adoption in a digital era increasingly shaped by voice interactions.

Technologies like xAI and ChatGPT-4 could craft Finnish-tuned voice models to master compound words and cases, though integration into Siri or Google Assistant hinges on local tech partnerships. Beyond monitoring, firms should test VSO in niches like tourism or retail, e.g., optimizing for "Missä on lähin matkailukohde?", to seize voice commerce's early edge, aligning with this study's call for proactive experimentation over inertia.

Acknowledgements

During the preparation of this thesis, ChatGPT was utilized in order to enhance the text. After using this tool, the text was reviewed and edited as needed. The author takes full responsibility for the content of the publication.

References

Anttila, M. M. (2021). Research on Search Engine Optimization Strategy for Voice Search. Master's thesis, SCHOOL OF BUSINESS, SIAM UNIVERSITY, BANGKOK, THAILAND. Retrieved 26. February 2024 from https://e-research.siam.edu/wp-content/uploads/2022/01/IMBA-2021-IS-Research-on-Search-Engine-Optimization-Strategy-for-Voice-Search.pdf.

Baye, M. R., De los Santos, B., & Wildenbeest, M. R. (2013). Search engine optimiza-tion: What drives organic traffic to retail sites? Marketing Science, 32(4), 562–579. https://doi.org/10.1287/mksc.2013.0783

Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., ... & Amodei, D. (2020). Language models are few-shot learners. Advances in Neural Information Processing Systems, 33, 1877–1901. https://doi.org/10.48550/arXiv.2005.14165

Busche, L. (2017). Powering content: Building a nonstop content marketing machine. Sebastopol, CA: O'Reilly Media, Inc. p. 287. ISBN: 9787-1-491-96374-6.

Chaffey, D., & Ellis-Chadwick, F. (2019). Digital marketing (Seventh edition.). Pearson.

Egerton, D. (2017). The Importance of Search Engine Optimization (SEO): Why it's Important and How it May Change in the Future. Bachelor of Science, Turku Universtity of Applied Schiences. Retrieved 26. February 2024 from https://www.theseus.fi/bitstream/handle/10024/136931/Egerton_David.pdf?sequen.

European Comission. (2023). Legal framework of EU data protection. Retrieved 26. February 2024 from https://commission.europa.eu/law/law-topic/data-protection/legal-framework-eu-data-protection_en.

Enge, E., Spencer, S. M., & Stricchiola, J. (2015). The art of SEO: Mastering search engine optimization (3rd edition.). O'Reilly Media.

Evans, D. S. (2008). The economics of the online advertising industry. Review of Net-work Economics, 7(3), 359–391. https://doi.org/10.1145/1409360.1409388.

Ghose, A., Goldfarb, A., & Han, S. P. (2012). How is the mobile channel shaping the future of search advertising? Procedia Computer Science, 31, 101–110. https://doi.org/10.1016/j.procs.2014.05.250.

Gokkoeva, M. (2020). Trends in Search Engine Optimisation: The Role of Voice Search. Bachelor's Thesis, Haaga-Helia University of Applied Sciences. Retrieved 11.2.2024. from https://www.theseus.fi/bitstream/handle/10024/342059/Gokkoeva_Marta.pdf?sequence=2&isAllowed=y.

Google Ads Help. (2024a). Clickthrough rate (CTR): Definition. Retrieved 17. January 2024 from https://support.google.com/google-ads/answer/2615875?hl=en.

Google Ads Help. (2024b). Conversion: Definition. Retrieved 20. February 2024 from https://support.google.com/google-ads/answer/6365?hl=en&ref_topic=24937.

Google Merchant Center. (2024). Product data specification. Retrieved 20 February 2024 from https://support.google.com/merchants/answer/7052112?hl=en.

Halbauer, I., Jacob, S., & Klarmann, M. (2022). Brand presentation order in voice shopping: Understanding the effects of sequential product presentation. Journal of Retailing, 98(4), 759-778. doi:https://doi.org/10.1016/j.jretai.2022.06.002.

Halonen, A. (2021). Green consumer behavior: Finnish consumers' view on sustainability. https://urn.fi/URN:NBN:fi:amk-2021111520299.

Hautsalo, R. R. (2019). Search engine optimisation for digital voice assistants and voice search. Bachelor of Science, Arcada University of Applied Sciences. Retrieved 28. January 2024 from https://www.theseus.fi/bitstream/handle/10024/266644/Search%20engine%20optimisation%20for%20digital%20voice%20assistants%20and%20voice%20search.pdf?sequence=2.

Home, N. (2002). Rural consumers' patronage behaviour in Finland. The International Review of Retail, Distribution and Consumer Research, 12(2), 149–164. https://doi.org/10.1080/09593960210127709.

Laaksonen, P., Laaksonen, M., & Möller, K. (1998). The changing consumer in Finland. International Journal of Research in Marketing, 15(2), 169–180. https://doi.org/10.1016/S0167-8116(97)00033-5.

Kauppalehti. (2023). Kauppalehden selvitys: Tässä ovat Suomen 50 suurinta markkinointitoimistoa. Retrieved 2. February 2025 from

https://www.kauppalehti.fi/uutiset/kauppalehden-selvitys-tassa-ovat-suomen-50-suurinta-markkinointitoimistoa/05a88354-64e6-4b32-98c2-b7f4369aa0b5.

Ledford, J. L. (2009). Search engine optimization bible (2nd ed.). Wiley Pub. ISBN: 978-0-470-45264-6.

Loode, A. (2019). The impact of Voice Search on Search Engine Optimization. Bachelor of Science, University of Twente. Retrieved 3. February 2024 from https://essay.utwente.nl/78583/.

Lopezosa, C., Codina, L., Guallar, J., & Pérez-Montoro, M. (2023). Voice search optimization in digital media: challenges, use and training. El Profesional de La Información, 32(3), 1–11. https://doi-org.proxy.uwasa.fi/10.3145/epi.2023.may.07

Lozeva-Koleva, V., & Kolev, G. (2023). Voice search analysis in search engine optimization. International Scientific Journals. Industry 4.0 Vol. 8 (2023), Issue 2, pg(s) 36-38 Retrieved 11. February 2024 from https://stumejournals.com/journals/i4/2023/2/36.full.pdf

Marr, B. (2012). Key performance indicators: The 75 measures every manager needs to know ([1st ed.].). Pearson Financial Times Pub.

Mittal, M., & Manocha, S. (2023). Hey siri! examine the consumer awareness and consumer behavior toward voice-based artificial intelligence. International Management Review, Suppl.Special Issue, 19, 21-30,197. Retrieved 11. February 2024 from https://www.proquest.com/scholarly-journals/hey-siri-examine-consumer-awareness-behavior/docview/2892719917/se-2.

Rehkopf, F. (2019). Voice Search Optimization (VSO): Digital PR's new frontier. Communication World, 1–5.

Runaite, D. (2021). How will voice search optimisation aid or limit digital marketing? An End-User Perspective. Master of Science, National College of Ireland. Retrieved 26. February 2024 from https://norma.ncirl.ie/5446/1/deimanterunaite.pdf.

Sebring, S. S. (2019). Betting on SEO: THE RACE TO THE TOP (OF A GOOGLE SEARCH) ISN'T ALWAYS AS STRAIGHT-FORWARD AS IT SEEMS. Credit Union Management, 42(5), 14–17.

StatCounter. (2024). Global Stats. Search Engine Market Share Worldwide. Retrieved 5 February from https://gs.statcounter.com/search-engine-market-share.

Venkatesh, V., Brown, S. A., & Sullivan, Y. W. (2016). Guidelines for conducting mixed-methods research: An extension and illustration. Journal of the Association for Information Systems, 17(7), 435–494. https://doi.org/10.17705/1jais.00433.

Wugang Zhao, & Tse, E. (2011). Competition in Search Engine Market. Journal of Business Strategies, 28(2), 123–150. Retrieved 21 February 2024 from https://ebookcentral.proquest.com.