PROSPECTS FOR PLAYORTHO PROJECT IN CONDITIONS OF UKRAINIAN MARKET

by

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A thesis submitted in partial fulfillment of the requirements for the degree of

MA in Business and Financial Economics

Kyiv School of Economics

2020

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Date _____

ACKNOWLEDGMENTS

I would like to express my deep gratitude to professor Gvozdiov for guidance, support, sincere interest and inspiration for the idea presented in this thesis.

I wish to thank Elena Besedina who gave the first direction for implementing the idea. I am greatfull to KSE teachers, who made the experience of studying in KSE fundamental and qualitative.

Special thanks to my partner Irina Gergel for sharing this start up experience with me and our development team.

I should also like to express my sincere appreciation to my family for their support and backup.

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LIST OF ABBREVIATIONS

BMI Business Monitors International agency

SSSU State Statistical Service of Ukraine

WHO World Health Organization

CAC Client Acquisition Cost

PU – Potential Users

R&D Research and Development

PM Purchase Business Model

ISM In-app purchase and Subscription Business Model

BEP Breakeven point

CHAPTER 1. INTRODUCTION

The efficiency of orthodontics treatment is highly correlated with patients' compliance. While treating kids orthodontists use different appliances, that should be activated on the regular basis with a sequence from 2 times a day till 1 time in two weeks. Activation should be made by parents at home. Every month patient comes for check-ups in the orthodontists' office. If patients failed to activate the appliance treatment targets are not attained.

PlayOrtho Application is designed to remind patients about activation sequences and other orthodontics recommendations (such as hygiene, exercises). Accuracy in the disbursement of these recommendations makes treatment effective. The Application is designed to achieve better compliance in the follow-up of orthodontics treatment. .

This study aims to estimate the market potential for mobile application PlayOrtho and to create a business model, that will be efficient for developing and operating the application.

This research provides information on the perspectives of PlayOrtho application development. Results from estimating market potential showed the Ukrainian market is not big but has enough potential for running the project. The author built up and compared financial models on different monetization strategies to come up with some contradictory results.

The global tendency in increasing healthcare mobile applications becomes even more relevant due to COVID19 pandemics. Engagement in using mobile phones gives new possibilities to create behavioral habits, increasing treatment effectiveness.

Further analysis will be directed to create a business model and financial model for PlayOrtho, including scenario analysis, SWOT, and investment strategies. The value of PlayOrtho is justified by problems it solves for orthodontists and patients.

1.1. Problem and project description.

Several factors impact patients' compliance. In the early stage of the treatment patients are more compliant. A positive correlation was observed between compliance and parents' interest, supervision and control, and social motivation from peers.[1]

The situation with Covid19 locked up and delay in checkups connected with them highlighted the necessity of applications that could help patients to stick to the treatment plan.

PlayOrtho application target all three agents of the problem. PlayOrtho will develop three products for each target audience and all these products will be synchronized to make the most use of the data.

Children prefer games and get tired and uninterested in serious monotonic actions. The aim of PlayOrtho to make the treatment process connected with a fun activity. Product 1 includes functional for children.

Product 1 includes functional for children.

1. Enhances engagement in treatment process
2. Motivation
3. Personal coaching
4. Always with a kid
5. Progress tracking
6. Gamification

[1] American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics · July 2017 -"Compliance with removable orthodontic appliances and adjuncts: A systematic review and meta-analysis "

Parents are overloaded with day-to-day tasks. The main task is the health of their children. Now they come to orthodontists, pay money, and find out they have to do even more tasks for treatment to be effective.

Product 2 – for parents:

1. Makes possible to track child performance, when not at home
2. Adjusts reminder setting for convenient day agenda
3. Individual reminders for each child in a family

Product 3 – for doctors.

Features of product 3 are focused to help doctors:

1. Reduces paperwork
2. Assists in managing data about the patients
3. Track the accuracy
4. Statistical Analyze for effectiveness of his protocols in different clinical cases in private practice.
5. Statistics of doctor's personal effectiveness are his patient's compliance, does he hit treatment targets.
6. Improves work efficiency.
7. Improves communication efficiency with patients.

Problem Measurement.

The main indicator we are going to track is the usability of the App. To measure if application improves business processes in the clinic.

Compare if time for a business process in clinic will decrease with using PlayOrtho.

1. How many steps does it take to use the app for prescription fill? (efficiency)

2. How many steps does it take for a doctor to get patients history? How many minutes to fill it?

3. Compare the retention rate of patients in treatment process without PlayOrtho (historical data) and with PlayOrtho in a clinic. The retention rate should show positive dynamic of growth.

Application Measures

1. Do improvements made in development based on patient-encounter data will increase the accuracy of prescription implementation (compare data on accuracy on the same patient? (effectiveness)

2. Does accuracy higher in case of using PlayOrtho Kids and PlayOrtho Parents, compared to using one product only. Will accuracy increase, when synchronized with PlayOrtho Doctors.

3. Will any trainings be required for patients and clinicians to become adept with the app? (ease of learning)

1.2. Monetization Strategies:

1. Pay to download Apps – charges the price for download an app.

2. In-App Advertising – app remains free, app publisher receives revenues from the advertisers.

3. In-App Purchase – app download is free as basic functions; additional functions can be bought independently.

4. Subscription – App is paid for a certain period (monthly, yearly).

5. Purchase – the download is free, as basic functions, but customer can pay once for the whole functional of the app including future updates.

6. Selling basic functional of application and individualizes functions for each user.

The business model may include several monetization strategies. For PlayOrtho we will be analyzing In-App purchase + subscription model + Purchase.

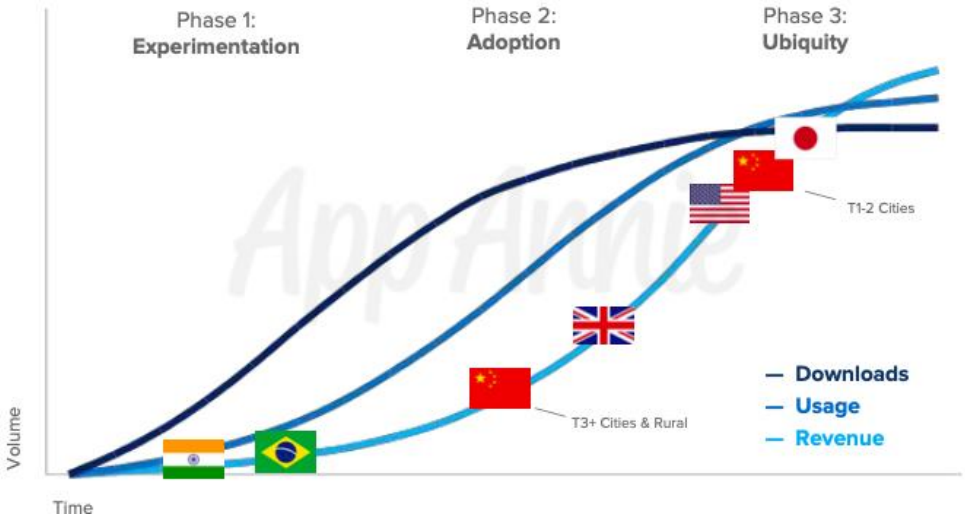
CHAPTER 2. INDUSTRY OVERVIEW AND RELATED STUDIES

2.1. Overview of mobile application industry.

In the last two years, the Mobile application market decreased its growth. All in all, the Mobile application market is divided into three categories depending on its maturity.[2]

1. Experimentation – Russia, Countries of Latin America, Ukraine.
2. Adoption – European Union countries, the United Kingdom
3. Ubiquity – USA, Australia, Canada, Japan, China.

Figure 1 Market Maturity Curve



Source: AppAnnie.com

Countries are divided depending on the mobile adoption phase.

Experimentation phase – smartphone users tend to download a lot of apps, test them, discover which are the most useful, enjoyable, valuable, but monetization is low.

[2] (The State of Mobile 2019 - AppAnnie.com)

In the Adoption phase, consumers form a habit of using the apps, the engagement in certain apps growth, meaning they are ready to spend more for the apps they find useful.

Ubiquity is when consumers are heavily engaged, and strong consumer spend. Countries with most of the consumers in the Ubiquity and adoption phase represent mature markets. In Emerging markets – consumers are mostly in the experimentation phase.

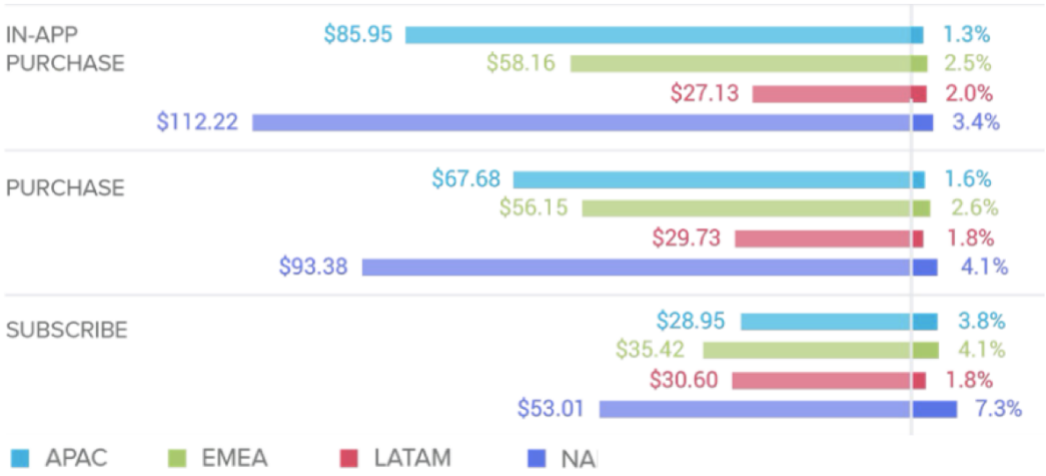
It is important to consider in developing a strategy on entering these markets, as they vary in cost in the acquisition of a customer (CAC), average purchase spent on mobile applications. CAC is calculated marketing expenses divided into the number of customers acquired.

$$CAC = \frac{marketing\ expences}{\text{number consumers acquired}}$$

CAC varies depending on the monetization strategy of the app.

The average global user spends $0.50 a month per app with purchase activity (spend includes all transactions that occur in-app). A regional comparison puts Asian users ahead of every other region, with a $0.70 average spend, followed by North American users who spend $0.61. Europe and Latin America trail far behind. The same pattern holds when isolating spend on iOS and Android, and when looking at the average purchase value.

Figure 2 CAC in regions



Source: Liftoff.com

At 112.76, the cost to acquire a user in the U.S. is marginally more expensive

than in Japan (111.64). Canada and Australia with a nearly identical price tag of 104 USD.

Among Adoption countries, Germany is the most expensive -70$ – a full 6.2% more than France and 9.2% more than the U.K. However, acquiring users in Italy, coming in 35.8% cheaper than their German counterparts.

Once again, Experimentation countries Russia and Brazil offer the lowest costs.

Mature markets accustomed to mobile commerce and shopping naturally take the lead, but the mix has shifted. This time it's Canada (107 USD) in the first place, 16.7% more than the U.S., and 16.8% more than Japan.

Among Phase 2 countries, Italy becomes closer to its neighbors. Significantly, the average cost to acquire a user who makes a purchase costs an average of 60.33 USD (70% of the price Japan and the U.S. combined).

Russia is close to Europe with an acquisition price of 43 USD.

Mature markets that were hard to win over for purchases are a pushover for subscriptions. At 53.59, the cost to acquire a subscriber in the U.S. is 41.7% cheaper than the cost to acquire a purchaser.

It's a similar situation in Japan.

Among Adoption countries, Germany is the most expensive in Europe (70 USD). The U.K. is attractive, but post-Brexit conditions may harm market growth.

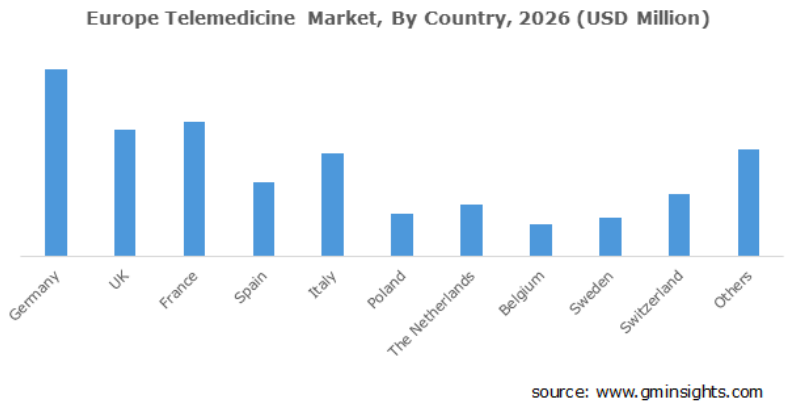
However, the Experimentation country Russia ($22.49) offers the biggest bargain of them all. [3]

Ukraine is in Experimentation phase. Market has the lowest acquisition cost, retention rate, development cost and the lowest spending on mobile application from the consumers side.

The global mobile medical apps market is forecasted to grow 21,4 % annually. It was estimated at $1.40 billion in 2016 is expected to reach a value of $11.22 billion by 2025. According to Abdul Wahid, Lead Analyst at BIS Research the fastest-growing markets are Asia Pacific and Latin America with CAGR of 22.1% and 23.1% from 2017 to 2025. But the main contributor to the global mobile medical applications market is Europe, and its share (31,4 %) is expected to grow with a CAGR of 29.7%. This high growth rate can also be explained by the rising number of government initiatives aimed at assessing the efficacy of medical apps for the benefit of public health. Government initiatives to use mobile applications for the benefit of public health drive the growth rate of the market.

[3] Liftoff - Mobile App Trends Report (a growing mobile economy) 2019.

Figure 3. Europe Telemedicine Market



Telemedicine industry growth is even higher due to covid19 pandemics. The USA has the largest market share among all countries. USA experience showed improvement in patients' quality of life, reduced health care spending while increasing efficiency through improved management. Using mobile applications helps patients to be active in personal health management and change health behaviors. eHealth solutions allow quick access to patients' records, improved decision support, provide clinical alerts, and quality reporting.

Growth drivers for Medical Application markets:

1. Increasing adoption of the smartphone, coronavirus epidemics lead even to higher rates.
2. Continued heavy investment into the digital health market.
3. Popularization of health and fitness lifestyle
4. Overload of doctors
5. High price for sometimes unnecessary visits.
6. Traveling.
7. Due to changes in lifestyle, and desire to reduce load on doctors and charges for the visit on patients.
8. Lock downs decreased the ability to visit doctors.
9. Government support of the field.

2.2. Overview of related studies.

Medical studies were taken into account to justify the methodology of the application.

Clinical trials conducted by Omar H Alkadhi and coauthors showed that active reminders of oral hygiene instructions on the mobile application were significantly more effective compared to verbal oral hygiene instructions[4].

Janneke F M Scheerman and coauthors' results showed that oral hygiene in adolescence can be improved when usual care is combined with a mobile app that provides oral health education and automatic coaching.[5]

Analysis of the customers using fitness apps showed that the performance-tracking apps help to stay focused on the exercises. But no significant difference in impact on motivation was found between performance-tracking and game-based applications.[6]

[4] https://pubmed.ncbi.nlm.nih.gov/31291683/

[5]https://pubmed.ncbi.nlm.nih.gov/28705122/?from_term=effectiveness+of+mobile+applications+in+dentistry&from_pos=2

[6] https://pubmed.ncbi.nlm.nih.gov/26362539/

CHAPTER 3. METHODOLOGY

The research aims to analyze perspectives for the project PlayOrtho. The first step is to conduct Market analysis to understand Market volume in product and in money terms, will its volume be enough to cover investments and operating costs of the project. To make these conclusions following methodology was used.

Estimating market potential. Market potential has been estimated in two ways: first – estimate the potential of the market for kids from 7-13 years old who need orthodontics treatment, which will give a review on market for orthodontics as a service. Second estimate the market from the perspective of how many patients are already in active treatment as they are the target audience.

Competitors overview. The search for competitors has been made in the Apple store in categories: Medical application, Fitness, and Lifestyle. As direct competitors were not found, the author decided to study applications with similar functions as PlayOrtho may include in the future.

The business Model. The business Model Canvas of Alexander Osterwalder was used to build a business model and check if it is realistic to implement it.

Financial Model. The previous analysis of financial models built separately for the purchase model and In-App purchase + subscription model showed a different impact on the cashflows. For more thorough analysis the author decided to include all three monetization strategies in the revenue-generating process in the model presented in the results.

ISM Revenues will be estimated from total downloads of the application with the conversion rate for the subscription (30%) and In-App purchase (15%). The retention rate for the users is 65% and 15% is the year average, and to this number new users will be added.

D – downloads

RRs -Retention rate for subscription

Cs – costumers using subscription.

Ca – customers using in-app purchase

CRs – conversion rate for subscription

CRa – conversion rate for in-app purchase.

RRa – retention rate for in-app purchase

Ps – price for subscription

Pa – price for in-app purchase

R – revenues

Formulas used for revenue estimation.

$R_{y1} = Cs_{y1} * Ps_{y1} + Ca_{y1} * Pa_{y1}$

$Cs_{t1} = D_{(t1)} * CRs_{(t1).}$

$Cs_{t2} = Cs_{t1} * RRs + D_{t2} * CRs_{t2}$

$Cs_{y1} = Cs_{t12}$

$Cs_{tN} = C_{(tN-1)} * RRs + D_{(tN)} * CRs_{(tN)}$

$Ca_{t0} = D_{(t0)} * CRa_{(t0).}$

$Ca_{t1} = Ca_{t1} * RRa + D_{t2} * CRs_{at2}$

$Ca_{tN} = Ca_{(tN-1)} * RRa + D_{(tN)} * CRa_{(tN)}$

$Rp = Cp * Pp$

$Cp = D * CRp$

For implicitly of the analysis, seasonal variations were not included. Analysis was taken on the year bases.

The total amount of downloads a year does not accede the number estimated in calculating market potential. Five years forecasted period has been chosen by the author and includes two years of development of the application, two years of growth, and one-year mature company operations.

R&D will include the development of a Minimum Value Product (MVP). And phases of functional development of application of all three products. R&D is calculated from the developer's hourly rate and hour needed for the particular product.

COGS include a commission from the Appstore and Google Play and Acquisition cost for traffic.

Operating expenses include salaries for all departments, office rent from year 2. Office rent will be included later, from year 2.

Capital expenditures include the necessary computers for developers. Straight-line depreciation was used.

No intangible assets have been included in the model.

The financing option of 20% own funds, 40% equity financing, and 20% from retained earnings have been calculated.

Scenario analysis included base, pessimistic and optimistic scenarios, based on the number of downloads and monetization. As there are three monetization strategies, to distribute fixed cost among these options for breakeven point calculation weights were put according to percentage contribution to the revenues from each monetization strategy.

Discounted cash flow analysis will be conducted for the valuation of the scenarios. Wacc will be estimated based on a 9,22 % average rate for 15 years of Ukrainian bond, beta and country premium values from Damodaran.com, cost of debt on-lend indicators.

SWOT Analysis of the PlayOrtho was conducted.

CHAPTER 4. DATA

• State Statistics Service of Ukraine. http://ukrstat.gov.ua

Statistical information about a number of households in Ukraine with children from 7-13. For the analysis, the author has chosen the data of the Number of households in 2018 with children with both parents in big cities. The explanation behind is orthodontic treatment is mostly available in big cities.

39% of population in Ukraine live in big cities, 28 % in small and 33 % in villages.

Table 1. Number of Household.

Living in:	Households, th	with children from 7-13 y.o., %	with children from 7-13 y.o, th
Big cities	5879,9	7,2%	423,35
Small cities	4181,4	7,7%	321,96
Villages	4873,6	7,2%	350,89
Households with income above 8000 UAH	1028,9		74,08

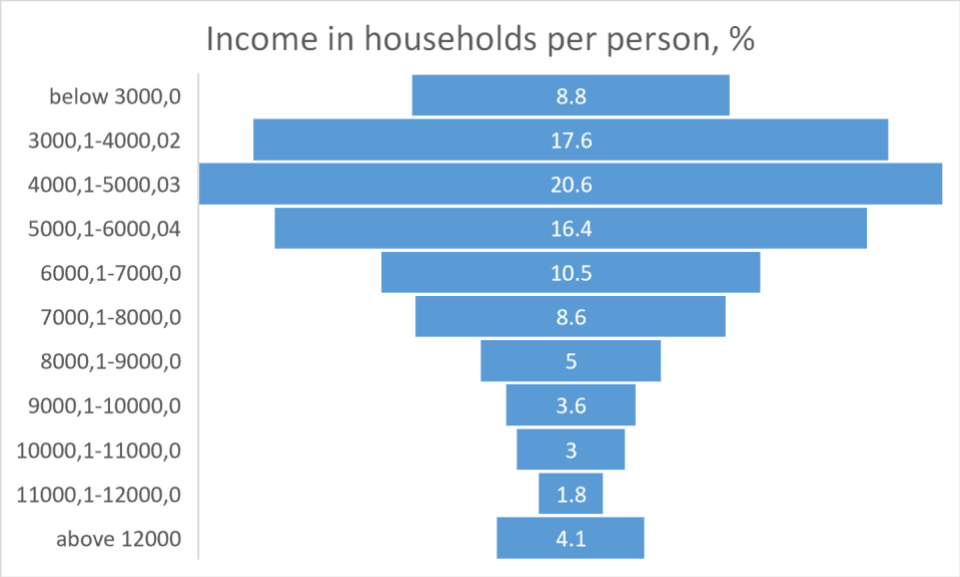
• Center for Health Statistics Ministry of Health of Ukraine. . http://medstat.gov.ua

The Number of orthodontists in Ukraine is 3,6% of the total dentists.

• National Center for Biotechnology Information Epidemiological statistics about prevalence of orthodontics disorders. https://www.ncbi.nlm.nih.gov

Not all children need orthodontics treatment. To estimate more accurate numbers for the market author used statistics in malocclusions prevalence for the region.

Figure 4. Income distribution in Ukraine



•In financial model global benchmarks from http://Damodaram.com for Software and application industry were used. And values from the industry reports described in Industry overview.

•https://www.tandfonline.com/doi/full/10.1179/1465313313Y.0000000052?scroll=top&needAccess=true.

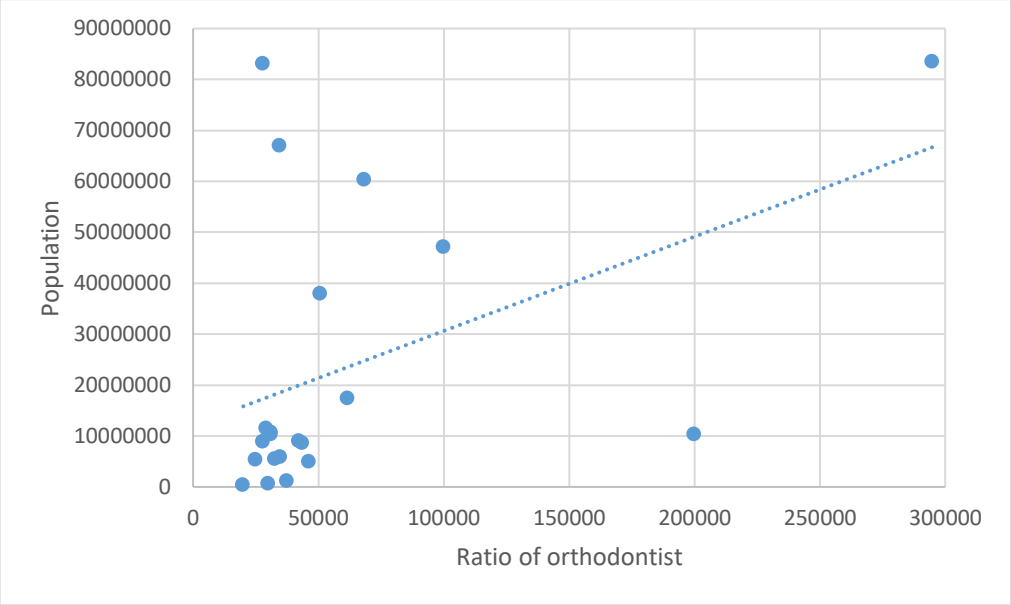
The research covered all types of mobile applications available in the Apple Store and Google Play. The author checked out and made the new search as well, including applications not referring to orthodontics, but that can help to achieve treatment goals. Criteria to choose a competitor was similar functionality of the applications, updated applications, easy in use. Applications with bugs, once published, but not running were dropped out of the sample.

•EUFOSA – European federation of orthodontic specialist association http://www.efosa.eu

The data on ratio of orthodontists in European countries was used to estimate the most prospective markets for future growth.

57% of countries has 1 orthodontist for less than 50 thousand citizens, 28 % has ratio from 50 to 70 thousand, 14 % ratio is more than 70 thousand. Median is 1:34000, mean is 1:60000. Correlation between population and ratio of orthodontists is positive, coefficient is 0,44.

Figure 5. Orthodontist to population in European countries



CHAPTER 5. RESULTS

5.1. Market Potential

PlayOrtho application complies with specific orthodontics appliance used in treating kids in a period of their active growth. The target audience is kids between 7-13 years old. The target category is orthodontists.

Geographic boundaries of the market. The author defined the market inside Ukraine borders. Service takes place mainly in large cities due to the structure of the provision of health care in Ukraine. We will take into account data on households in big cities and exclude remote areas.

Competition. Competitors are hard to find. Non direct competitors, but the closest one has been chosen for the analysis. Each of them represents some functions similar to PlayOrtho. Habitica is an application in the Productivity category. It is highly popular and has more than 1000000+ downloads. Toothy is the application in the health category and has 1000+ downloads. These applications are not perfect substitutes for PlayOrtho.

Table 2 Competitors prices

	1-month Subscription	3-month Subscription	6-month Subscription	12-month Subscription	Purchase
Habitica	4.99	14.99	29.99	47.99	
Toothy	2.99			11.99	29.99

Define Market size (N). The quantity of households in Ukraine big cities is 1089.21 thousand, 40% need orthodontics, which is 435,68 thousand. We can also define the size of patients that already have orthodontics. Due to the Ministry of the Health of Ukraine, we know that there are 24622 dentists in both government and private sector, orthodontists are 3.6 % which is 886 doctors. The author assumes that every doctor holds 30 patients per month - 26591 patients in active treatment with a monthly check-up.

Estimate market share (MS). Market share = 100/2 =50. Possible Market share forecast for PlayOrtho is 33%. 26591*0.33= 8777.01 active patients, 435.68*0.33=143.77 potential orthodontics patients.

Determine the average annual consumption (Q). The average treatment is 8 months. Average appliance per treatment – 2.

In terms of subscription average consumption will be 8 times, In-app purchases: 2 times and one purchase – 1 time.

Estimate an average selling price (P). Average selling price in Apple Store 1 USD. Average Price per month subscription. 2.99 and 4.99.

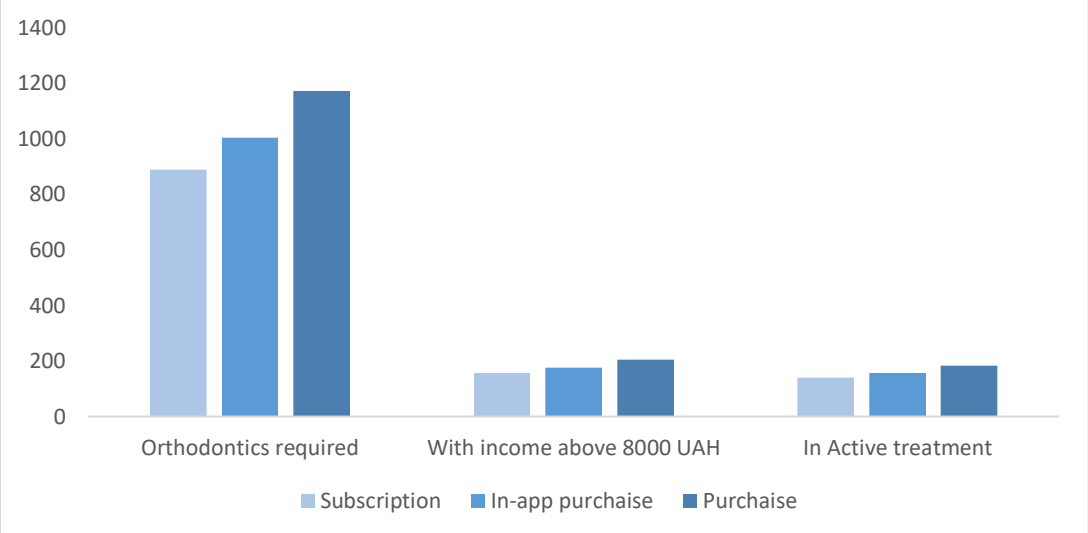
The average selling price is 1.99 USD per month subscription, In-App purchase appliance is 8.99 USD, one purchase is 20,99

Table 3. Estimating Market Potential results.

		PU of orthodontics service	PU with income above 8000 UAH
Housholds in Ukraine big cities with children from 7-13 years old		423145	74086
Rate of orthodontics needed		0,4	0,4
Competitors		2	2
Market share		0,5	0,5
PlayOrtho MS		0,33	0,33
MP=N*MS*P*Q			
Total number of potencial consumers	N	169258	29634,4
Market share	MS	55855	9779

Average selling price	P		
	P1 (subscription)	1,99	1,99
	P2 (in-app purchaise)	8,99	8,99
	P3 (Purchaise)	20,99	20,99
Average annual consumption	Q (per one user)		
Subscription	Q1	8	8
In-app purchase	Q2	2	2
One Purchase	Q3	1	1
Market Potintial (MP)	MP, USD,th		
Subscription		889,2	155,7
In-app purchaise		1004,3	175,8
Purchaise		1172,4	205,3

Figure 6. Market Potential of Ukraine.



5.2. Markets overview

The market potential of European countries was estimated using the same formula. Because of anthropological similarity, the treatment protocols are the same in countries chosen for the analysis. The number of orthodontists in a country is defined as the ratio orthodontist/population by the government departments that take functions of the Ministry of health. This Ratio varies over countries.

The most prospective markets in Europe are Germany, France with 472 thousand USD, 307. The USA market potential is close to the market volume of the sum of European Union countries and is about one and a half million USD. Ukraine, the UK, and Italy are of a similar volume of 140 thousand USD.

The cost of treatment varies over countries. Using PlayOrtho will increase the cost of treatment. Maximum PlayOrhto adds 10% to the treatment cost and a minimum of 1 %. Based on this data Author assumes in Ukraine most share will go to subscription and in-app purchase, and only a small amount for the purchase of the product. In European countries, Purchase and in-app purchases may be more popular as a result of higher market maturity. As a result of higher treatment costs the USA, France, and Germany are less sensitive to an increase in cost.

Figure 7 Alternative Markets Potential

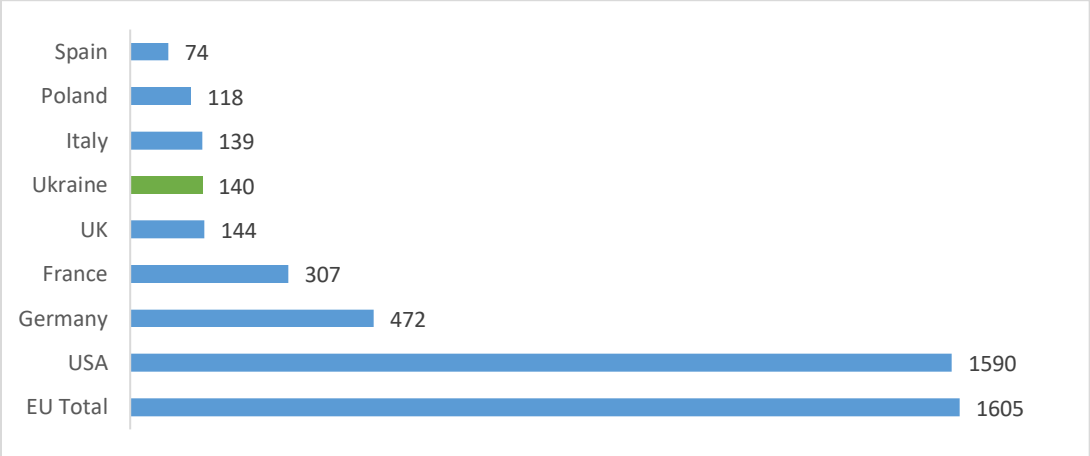
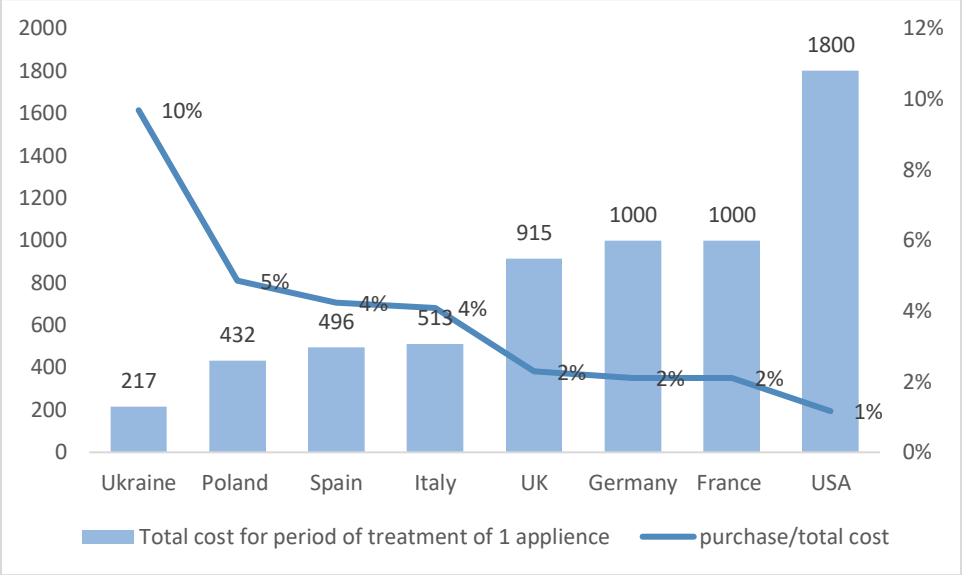


Figure 8 Cost of treatment in different countries and additional cost for PlayOrtho



5.3. Competitors overview

For competitors, the overview Author has chosen applications that has similar functionality to PlayOrtho.

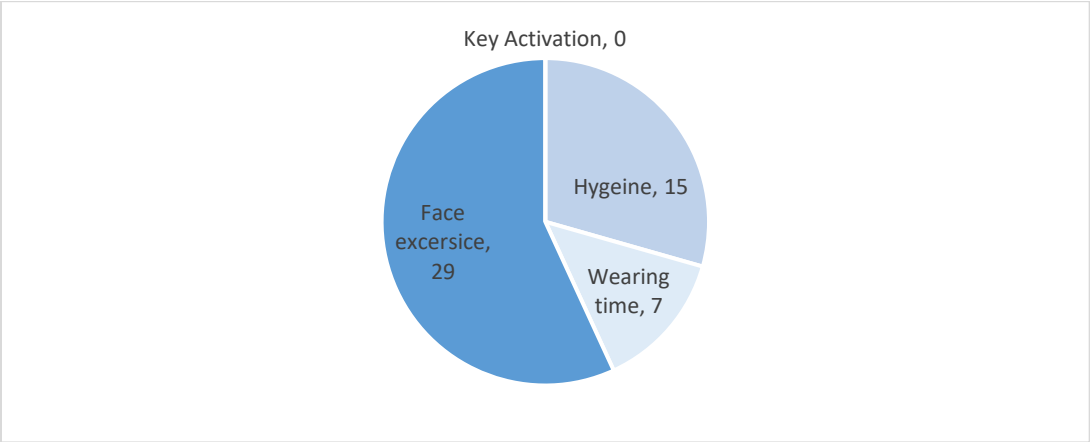
Group of Face-yoga apps uses video and instruction for exercises for muscles and face massage to keep face young. Children's fitness or application with exercise for children if they exist, they are hard to find.

Hygiene group – has fewer representatives. In most of them, hygiene tracker is additional value and is used in combination with find a dentist function, private practice application (Zablotsky), products selling (Oral-B, Colgate).

Wearing time group – is represented by applications accompanying treatment with aligners. Treatment with aligners is available after 14 years old. One application with wearing time for the appliance calendar was found, but it wasn't updated for 2 years and doesn't work.

The key activation function was not present in the mobile applications market.

Figure 9 Competitors overview



5.4. Results from business model analysis.

Customer Segments designed from all agents using orthodontics treatment:

Kids. Age from 6 to 13 – are the main users of orthodontic appliance.

Parents – are the main customers, who pay for treatment and wish to get the best results.

Orthodontists – are performing the treatment and is interested in the best health result for the patient and satisfied parents.

The main goal is child health. The idea of the PlayOrtho to flock all agents of the treatment to the same goal.

Value Propositions

PlayOrtho kids – Gamification (methodology is in development now) to make children interested, engaged in their treatment process, and track it by themselves.

PlayOrtho Parents – Everything parents need to remember about orthodontists' recommendations, will be in the application and remind in convenient time to unload memory.

PlayOrtho Doctors – give the doctors the clearer idea, what is going on between checkups, statistical analysis of treatments.

Channels:

Owned direct:

Website – landing page will be developed to direct clients from advertisings and social media and increase awareness of product.

Partner indirect:

Instructions with the appliance – keys for the devices are supplied to technicians, who make the appliance. From technician it is delivered to doctors. QR code, or additional informational brochure will be distributed to technicians to add to appliances.

The Doctors' recommendations to a patient – Doctors will be presented the application in social professional groups, exhibitions and conferences.

AppStore, Google Play -delivers value proposition to a customer

Account – Managers – provides post- purchase customer support.

Customer relationship

Acquire and retention – the aim is to acquire a customer and retain to the end of the treatment. As treatment goes over years the relations are long-term.

Revenue streams are described in detail in financial model.

Key Resources

Financial: R&D , Working capital. At year 1 main financial resource will need the development of 2 basic products PlayOrtho Kids and PlayOrtho Parents.

Human resources: Development team.

Key Activities

Development – Development of full functional of the app is crucial to create the most value for the customer.

Feedback and engagement monitoring – Usability of the application is expected to work intuitively and easy for kids and parents, thus some changes will be made after feedback and indicators analysis such as retention rate of the customer, time spent in using app, etc.

Marketing – active marketing should take place to hit BEP.

Key Partners

Development team – IOS, Android, Web-developer and UX/UI designers are the main partners in developing.

5.5. Organizational Chart

Oleksandra Dushyna and Irina Gergel will invest 30000 dollars and 20000 are expected from external financing. Strategic decisions will be taken on the board of directors.

Co-owners will share Top management positions. Irina will manage the product development and support department, Oleksandra will be responsible for covering marketing, financial and legal processes.

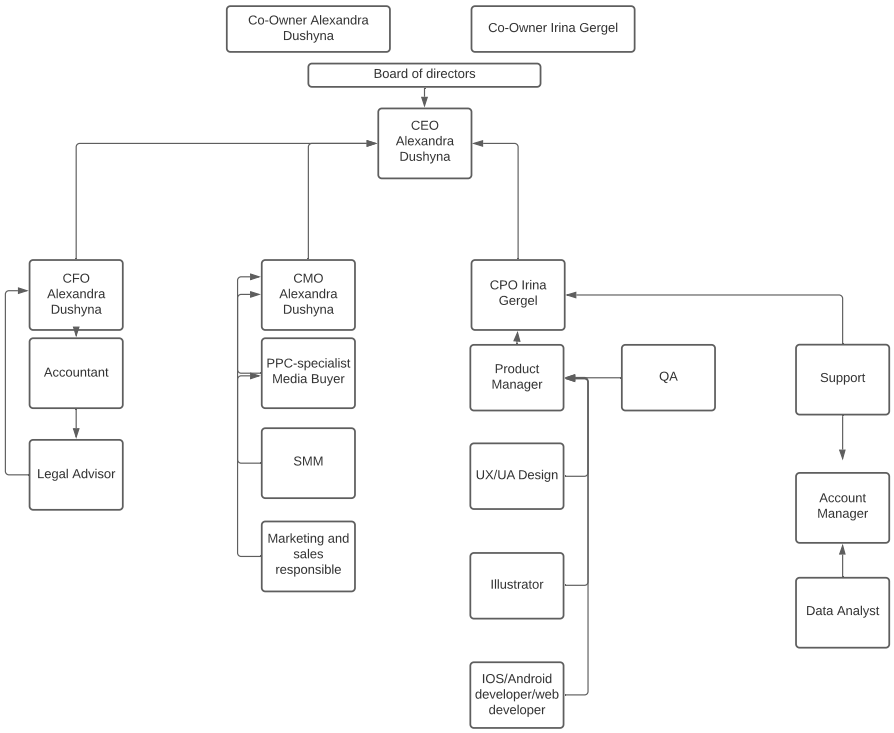
Maksim Grigoriev is IOS/Android and web developer.

The development team is engaged as a freelance.

Before launching the first product Account manager and PPC specialists will be hired for part-time bases. SMM and Data analyst before launching the second product. From Y3 all Accountant, Account Manager, Data scientist, Marketing, and sales

responsible will be hired on full-time basis. PPC and SMM will be outsourced on contractual bases.

Table 4 Organization chart



5.6. Financial Model and Scenario analysis results

Assumptions for the financial model.

Sales are based on monthly traffic growth and traffic conversion to customers. For conversion, the 15% rate was chosen for subscription and in-app, purchase. The retention rate of the customer was based on the average treatment period of 8 months. In this case retention rate for subscription is 65%, for in-app 15%. The number of customers to the end of the year is cumulative. New customers + retained customers. Incorporate income tax is taken 18 %.

Calculation of Breakeven point (BEP) showed 3100 customers are necessary to cover operating costs. 60% weights were put to subscription and 30% to in-app and 10% to purchase.

In the base scenario revenues year over year growth is 79% in year 2, 58%, and 57% in year 4 and year 5, with CAGR 200%. Gross profit margin grows from 62% to 69% and Net profit margin is 34-41% which shows business effectiveness. Damodaran benchmark is 64% and 10% accordingly. The operating margin is 41% in Y2, 47% in Y3, 60% in Y4.

COGS were calculated in adding acquisition cost for one customer to 30% of the commission to AppStore and Google Play. According to Damodaran.com COGS for Software (System and application) industry is 35%.

R&Ds are distributed according to the development schedule. Development for Product 1 needs 567 hours and Product 2 development process is 371 hours. Product 1 and Product 2 will take place in the first year of operations, phase 3 development needs– 914 hours in the third year.

Efficiency ratios showed Receivables turnover 5,5 times (equals 66 days sales in receivables) compared to 7 in 2020 (according to csimaket.com for Software and Programming industry), asset turnover ratio 1,3-2,4 at 0,54 – 0,7, what shows the model as efficient. The quick ratio is 1,32-2,01, working capital 2,49, and 2,4-1,3 in the base scenario, which represents a strong financial situation in the model.

Three scenarios were built up. Basic scenario – Sales in the first year will be less than BEP and will hit it in the second year of operations. Growth rate in traffic is 7% monthly. Pessimistic scenario – Sales are less than BEP till the third year of operations with traffic growth rate 5 %. Optimistic scenario – BEP is hit in the first year of operations as a result of traffic growth rate of 25% monthly.

The discount rate for valuation was estimated at 18 %, Ukrainian bond risk-free rate 9,22%, country risk premium 7,39%, a beta for the industry is 1,29. All three scenarios showed a 4-year payback period. IRR and NPV are positive in all three scenarios and 11%, 34%, and 63%.

5.7. SWOT Analysis

Strengths. More than ten-year experience of co-owners in Orthodontics gives a deep understanding of the problem and provides the possibility to create functionality based on treatment logic. Being active in communication with colleges gives an understanding of the lack IT products in the industry. The mix of treatment guidelines knowledge and working experience with medical applications of our UX/UI designer created good usability and strong UX/UI design.

While working on MPV we managed to incorporate in its basic function for the major number of appliances and connect progress with medical history. This gives an advantage in launching MPV as a product, it brings value for all three agents already. Also bringing the product to the market will give more feedback and information to analyze, what should be developed first from the point of view of our patients to increase loyalty of target audiences.

Opportunities. Social media gives new possibilities for all fields. For doctors, we have professional communities, international usually, where orthodontists share cases. Advertising PlayOrtho in these communities will let us bring the product to doctors in the fastest and most cost-effective way. Professional connections with doctors and key opinion leaders also will be used to spread the product. Technicians may also be involved in bringing products and instructions to use to the patient with the appliance.

Consumer behavior changes thanks to the technologies, lockdown during Covid19 stimulated using applications, such as online banking, telemedicine applications, etc. This trend may decrease resistance and increase interest and adoption of PlayOrtho in the treatment process and doctor-patient communication.

Weaknesses. Co-owners are full-time involved in the clinical process, 2-3 hours a day will be dedicated to PlayOrtho project during Y1. Among risks are developers are involved in freelance bases, which brings failure in keeping up the deadlines. The inexperience of co-owners in the IT industry results in weak team management and need of risk management. The uniqueness of the app is based on the idea and its realization in the product, but no special technologies, which could ensure monopoly advantage.

Threats. Complexity in telemedicine applications arises from Privacy Protection Policies, deontology, and bioethics. Even distributing history from patient to doctor, may be an issue, that will require legal regulations.

The orthodontics market is highly competitive from the side of suppliers of materials and doctors' side. The threat is that PlayOrtho may be acquired by a company with more resources to use PlayOrtho as a competitor advantage.

Strengths: 1. More than 10-year experience in Private practice, which gives deep understanding of doctor – patient – parent relationships. The lack of such products inside the sector. 2. Strong UX/UI design 3. MPV is a hybrid project that can be launched after testing as a first version of a product.	Weaknesses: 1. Owners' high involvement in other projects. 2.Unexperienced in the IT industry/Absence of partner experienced in IT industry. 3.Absence of legal advisor. 4.Product maybe easy to copy
Opportunities: 1. Involving doctors and technicians without high marketing cost 2. Consumer behavior change based on trends on telemedicine, that will help to adopt the application for consumers	Threats: 1.Acquisition by bigger companies. 2.New Privacy Protection Policies.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

1. Patients in active treatment are 15% of the number of children that need orthodontics in big cities. Households with income around average (from 8000 UAH) to whom treatment is affordable is around 17 %. Increasing awareness of the public may increase the market potential of Ukraine if it coincides with economic growth. Besides, PlayOrtho's goal is to increase the effectiveness of movable appliance (it has the least cost), which may engage a new audience and give new possibilities for low-resource and remote areas of Ukraine.

Mobile application contributes additional cost to the orthodontics treatment. The in-app purchase is the most advantageous for the patient in the one-year treatment period, but purchase is the most favorable in longer treatments. Subscription is assumed to be the most popular, as has a lower marginal cost in a month.

Ukrainian Market has enough potential, and low cost for developing and distributing the application. Its' volume allows to cover all development and operational costs in 4 years and has positive NPV and IRR. In the case of a pessimistic scenario, the extra investment will be needed to cover operational costs in year 1. In the case of base and optimistic scenarios, the project has positive cash flows from the first operational year. Marketing should target to reach at least 30% market share in faster terms.

Strategy to develop product 1 and 2 is justified by the research. The market potential of Ukraine for the product 3 is limited by the number of orthodontists. Retained earnings show stable growth with CAGR 185% during a forecasted period allowing to reinvest in R&D and minimize external financing of the project in years 3 and 4. It is relevant to consider product 3 as a separate project and conduct deeper research.

1. PlayOrtho has good potential for expansion to markets with higher frequency of using orthodontics treatment. For expansion, it is convenient to consider countries close with anthropologic characteristics, which leads to similar treatment protocols. Countries with the most potential are the USA, Germany, France, UK, and

Italy. Customization of the product should be developed in considering the culture of countries. The expansion will allow a faster payback period. Costs for entering markets differ due to the stage of maturity. The USA has the highest acquisition cost for clients among markets. Germany, France, and the UK are twice more affordable, although the most expensive in Europe.

Covid19 Pandemics gives boost to telemedicine products and stimulate growth of global market. EU governments relaxed regulations for practicing telemedicine. USA with its maturity and habit in using orthodontics may become one of the most perspective markets. Europe has government initiatives that support development of telemedicine.

2. Changes in organizational structure should take place in future approach. The freelance relationship may not be effective in the long run with key partners. The partnership may decrease R&D cost and increase motivation, that will stimulate faster growth of the project. Partnership with developers is sufficient to consider.

To minimize risks additional Risk evaluation from finance, operational, legal sides is necessary. A risk manager or partnership with experienced IT management is a way to cover.

The market has enough applications with functions necessary for PlayOrtho to fulfill the needs of treatment. Integrations may be a reasonable and efficient strategy for growth.

3. PlayOrtho offers great convenience to all treatment agents. The application will help patients to be active in personal health management and change health behavior. Doctors will achieve quick access to patients' records, improved decision making, provide clinical alerts, and quality reporting, increase effectiveness as a result of improved treatment management. These solutions are expected to boost the usage of PlayOrtho and increase its adoption on the market.

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The business Model Canvas. https://www.strategyzer.com

APPENDIX A

THE BUSINESS MODEL CANVAS

The Business Model Canvas
Designed for: Master Thesis BFE 2020 *Date: 09.10.20*
Designed by: Alexandra Dushyna *Version: 1.1*

<table>
<tr>
<td>Key Activities:
1. Development
2. Feedback and engagement monitoring
3. Mistakes correction
4. Marketing</td>
<td rowspan="2">Value Propositions :
1. PlayOrtho kids - Gamification
2. PlayOrtho Parents - organization
3. PlayOrtho Doctors</td>
<td>Customer Relationships:
1. Acquire
2. Retention</td>
<td rowspan="2">Customer Segments:
1. Kids from
2. 6 to 13 y.o.
3. Parents
4. Orthodontists</td>
</tr>
<tr>
<td>Key Resources:
1. Human: specialists in IT
2. Financial: R&D , Working capital</td>
<td>Channels:
1. Landing page
2. Instructions with the appliance
3. Doctor recommends to patient
4. AppStore, Google Play
5. Account Managers</td>
</tr>
<tr>
<td colspan="2">Cost Structure:
Fixed costs : R&D cost,
Variable cost : Commission to stores, acquisition expenses (Includes Marketing)</td>
<td colspan="2">Revenue Streams:
1. Purchase
2. In-app purchase
3. Subscription</td>
</tr>
</table>

APPENDIX B

WACC ESTIMATION

WACC	17,81%
Market return	
Ukrainian bond rate (risk free)	9,22%
Inflation (expected)	5%
Country(Market Risk) Premium=	7,39%

Market Return - Risk free rate From Damodaran Equity Risk Premium= Beta*Market risk premium	9,53%
Beta From Damodaran	1,29
re (cost of equity)	18,75%
Cost of debt	20%
corporate tax rate	18%
market value of equity/company value	60%

APPENDIX C

ASSUMPTIONS FOR FINANCIAL MODEL

Sales		Pessimistic	Base	Optimistic
Growth in traffic		5%	7%	25%
Convertion rate				
-For subscription		60%	60%	60%
-For in Purchase		30%	30%	30%
- For Purchase		10%	10%	10%
Retention rate				
-For subscription		65%	65%	65%
-For in Purchase		15%	15%	15%
- For Purchase				
Cost				
Aqcuisition cost		0,85	0,85	0,85
Commision for stores		30%	30%	30%
R&D				
Development				
P1	hours	567	567	567
P2	hours	371	371	371

P3	hours	914	914	914
Salaries				
Product manager	USD	20	20	20
UI/UX Designer	USD	20	20	20
Illustrator	USD	20	20	20
Masot desighn in 3d	USD	30	30	30
Video design	USD	20	20	20
IOS/Android developer	USD	30	30	30
web developer	USD	30	30	30
QA	USD	20	20	20
Taxes				
Income tax		18%	18%	18%

APPENDIX D

INCOME STATEMENT SUMMARY

	USD th	Pessimistic Y0	Y1	Y2	Y3	Y4	CAGR	Base Y0	Y1	Y2	Y3	Y4	CAGR	Optimistic Y0	Y1	Y2	Y3	Y4	CAGR
PROFIT & LOSS STATEMENT																			
				0,7785	0,489	0,463	-303,307			0,79444	0,58101	0,57146	-451,63627	#DIV/0!	1	0,81214	0,34596	0,3948	-742,45436
Sales with VAT	**USD th**	**0**	**29**	**129**	**252**	**470**	154%	**0**	**33**	**163**	**389**	**907**	200%	**0**	**76**	**406**	**620**	**1 025**	138%
Cost of Goods Sold	**USD th**	**0**	**12**	**40**	**77**	**145**	132%	**0**	**13**	**51**	**122**	**285**	183%	**0**	**30**	**130**	**193**	**312**	119%
Gross Profit	**USD th**	**0**	**17**	**88**	**175**	**325**	168%	**0**	**21**	**111**	**266**	**622**	210%	**0**	**47**	**276**	**427**	**712**	148%
Gross profit margin	**USD th**		*60%*	*69%*	*69%*	*69%*	5%		*62%*	*68%*	*69%*	*69%*	3%		*61%*	*68%*	*69%*	*70%*	4%
Operating expenses	USD th	7,8	36,2	45,4	95,2	77,9	21%	7,8	36,2	45,4	95,2	77,9	29%	7,8	36	45	95	78	29%
Operating profit		**-7,8**	**-19,2**	**42,9**	**79,6**	**247,5**	145%	**-7,8**	**-15,2**	**66,1**	**171,3**	**544,3**	218%	**-7,8**	**10,5**	**230,6**	**331,4**	**634,4**	293%
Operating margin	%		*-67%*	*33%*	*32%*	*53%*			*-46%*	*41%*	*44%*	*60%*			*14%*	*57%*	*53%*	*62%*	65%
Depreciation/Amortiza	USD th	**0,0**	**0,6**	**0,6**	**0,6**	**0,6**		**0,0**	**0,6**	**0,6**	**0,6**	**0,6**		**0,0**	**0,6**	**0,6**	**0,6**	**0,6**	
EBIT	**USD th**	**-7,8**	**-19,8**	**42,3**	**79,0**	**246,9**	171%	**-7,8**	**-15,8**	**65,5**	**170,7**	**543,7**	218%	**-7,8**	**9,9**	**230,0**	**330,8**	**633,8**	300%
EBIT margin	%		*-69%*	*33%*	*31%*	*53%*			*-47%*	*40%*	*44%*	*60%*			*13%*	*57%*	*53%*	*62%*	68%
Interest Expenses	USD th	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
Earnings before taxes	**USD th**	**-7,8**	**-19,8**	**42,3**	**79,0**	**246,9**	171%	**-7,8**	**-15,8**	**65,5**	**170,7**	**543,7**	218%	**-7,8**	**9,9**	**230,0**	**330,8**	**633,8**	300%
EBT margin	**%**		*-69%*	*33%*	*31%*	*53%*			*-47%*	*40%*	*44%*	*60%*			*13%*	*57%*	*53%*	*62%*	68%
Tax rate		*19,5%*	*19,5%*	*19,5%*	*19,5%*	*19,5%*		*19,5%*	*19,5%*	*19,5%*	*19,5%*	*19,5%*		*19,5%*	*19,5%*	*19,5%*	*19,5%*	*19,5%*	
Taxes	USD th			**8,26**	**15,40**	**48,14**				**12,8**	**33,3**	**106,0**				**44,8**	**64,5**	**123,6**	
Taxes/EBT	%	*0%*	*0%*	*20%*	*20%*	*20%*		*0%*	*0%*	*20%*	*20%*	*20%*		*0%*	*0%*	*20%*	*20%*	*20%*	
Net income from oper	**USD th**	**-7,8**	**-19,8**	**34,1**	**63,6**	**198,7**	163%	**-7,8**	**-15,8**	**52,7**	**137,4**	**437,6**	207%	**-7,8**	**9,9**	**185,1**	**266,3**	**510,2**	272%
Net income margin	%		*-69%*	*26%*	*25%*	*42%*			*-47%*	*32%*	*35%*	*48%*			*13%*	*46%*	*43%*	*50%*	57%