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Table of Contents

INTRODUCTION

The starting point for this thesis was an idea of a product which helps children under ten years old to be physically active in today's world when the use of mobile devices is becoming more extensive and screen time is increasing from year to year making children's behavior more sedentary. Playing games and watching videos on the tablet is addictive and seems more appealing for a child rather than doing some exercises. Although in a long-term perspective the lack of physical activities might lead to different diseases, poor academic performance and well-being in general.

The idea itself is not enough to launch new business even if it seems truly promising. Without knowing actual needs of target audience and market offerings it will be difficult to get this idea off the ground. Moreover, the probability of failure increases significantly.

The main purpose of the diploma thesis is to analyze market potential and feasibility of creating products aimed to improve a child's lifestyle.

The following topics will be covered in thesis:

- Market evaluation
- Competitor analysis
- Product functional and technical description
- Business model definition
- Financial analysis

Sales and marketing strategy is out of scope.

CHAPTER 1. PROBLEM STATEMENT

Mobile is the new normal. Not only for adults but for children as well. The research shows that almost 98% of families with kids aged under 8 years in the USA have a type of mobile device such as a smartphone or a tablet. This number increased from 52% in 2011. The findings also established that 42 % of children this age nowadays have their own tablet device – up from 7% in 2013 and less than 1% in 2011 [1]. The expansion is rapid.

It was calculated that 59 % of 5 to 8 year olds have their own tablet, and 43% of 2 to 4 year olds. Having an own smartphone is not so popular among young children – 7 % of 5 to 8 year olds have one and only 3 % between the ages of 2 and 4. [1].

The overall amount of media use has not changed a lot during past years although we can see a distinct shift in how children are using media. The average daily time spent with mobile devices has tripled from 5 minutes in 2011 to 15 minutes in 2013 and to 48 minutes in 2017. In general, children under 8 years old spend approximately 2.75 hours a day with screen media [1].

On the one hand, smartphones and tablets bring a lot of benefits. They provide a lot of opportunities for education. Many useful applications can be downloaded for free which makes the learning process accessible to all families.

A number of parents from a study conducted in Australia in 2018 believe that screen time improved cognitive outcomes in their children. Almost half of all interviewed noticed that the time a kid spends with the screen is important for relaxation. Also, it was said that screen time is as helpful as a babysitter, it allows a parent to fulfill other responsibilities or just to have some break. 32% of interviewed parents reported this [2].

On the other hand, screen-based devices might affect a child's health including physical activity, sedentary behavior and obese. It depends on different factors among

which the amount of screen time, the type of device and the type of content a kid has access to.

In one of the recent researches, reduction in health-related quality of life in adolescents and lower level of physical activity were connected to screen-based media devices [3]. Another study pointed out that the excessive use of screen-based media leads to lifetime obesity and now this connection is observed starting from early childhood [4].

Interesting data was found when examining children between the ages of 7 and 11 and portable device use. The study indicates that those children who used smartphones or tablets at the age of 7 were more likely to become heavy device users by 11 [5]. Such findings show that not only screen-based devices have become widespread, but children start using them to a greater extent. Furthermore, many young children significantly exceed screen time recommendations.

Only four out of ten children between the ages of 8 and 11 met the recommendations of the guidelines for both screening duration and physical activity, consequently further showing correlation with increased age and decreased physical activity [6].

Many young kids engage in excessive amounts of sedentary behavior, particularly in the form of screen time and do not get enough physical activity. The opportunity for children to be physically active both at home and after school is extremely important in stimulating a healthy lifestyle.

Despite being huge advocates for traditional play we need to understand that screens are all-over in children's lives. Technology should be a part of the solution which gets children to move more on a daily basis. Our objective is to turn time with mobile devices into active time, replace sedentary video and game consumption with movement.

CHAPTER 2. PROPOSED SOLUTION

Adults use mobile devices to strengthen education, improve health and gain many other useful skills. At the same time children spend screen time mostly for entertainment. They adore consuming funny videos, playing interactive games through mobile devices. The idea is to inspire them to move in the place where they are.

There is no doubt that active play itself has a positive impact on children. Many studies found that physical activities yielded big improvements in child performance, focus and behavior at the same time decreased risk of chronic diseases such as obesity and others.

Nowadays when screen time is increasing from year to year parents should pay more attention to children's health and ways to stimulate active play. The World Health Organization in the report of 2016 indicated that children should engage in at least one hour of moderate or vigorous physical activity every day. If they do not meet this recommendation, they are at a higher risk for diseases including high cholesterol, high blood pressure and adiposity. Non-sedentary activities associated with screen-based devices are one of the ways to address this issue.

Increased physical activity and limited sedentary behavior were linked to children's healthy growth and development, including reduced obesity and improved motor development, emotional health and academic performance [7].

Parents identify the range of benefits from active play among which there is cognitive development, supporting the immune system, opportunities to foster imagination and enjoyment [2].

The study recognised crucial development differences between preschool and later childhood and established that early child screen encounters can be formative [8].

- Extensive use of screen-based devices may be habit-forming and can increase the likelihood of overuse in further life.

- Daily health routines, including media use, form more easily in early childhood than later on [8].
- Screen use tends to increase over time to contain more entertainment activities [9].

The findings show that child caring programs should consider using entertaining, age-appropriate movement (e.g., yoga, dance) and fitness apps to integrate more physical activity into daily routines [11].

From year to year more children at the age under 8 have access to mobile devices. Parents often feel guilty letting kids play with tablets or smartphones as they understand the negative impact of overuse. Although "application" will soon become a household word for children as well it is for adults now. If screen time is used wisely it promotes physical activities and when a child follows movement guidelines a mobile will become a friendly assistant to a parent in terms of kid health.

The suggested solution is a mobile application which helps a child develop healthy habits including active play. Plenty of interactive content will be available for a child with motion tracking in real-time with the help of a device camera. Smart recommendations based on a child's daily schedule will help one keep organized, follow daily routines and encourage physical activities in a child friendly way.

CHAPTER 3. MARKET EVALUATION

3.1 US market evaluation

As the first market to launch I chose the United States, therefore all the following data is related to this specific market.

A target audience of the mobile application consists of parents who have children between the ages of 3 and 10. This age group is considered in further calculations.

Based on U.S. Census Bureau data there are 74 million children, 48.8 millions of which are between the ages of 1 and 11.

Table 3.1

Number of children ages 0–17 in the United States by age in 2018 and projected 2019-2023

Number (in millions)	2018	2019	2020	2021	2022	2023
All children	**73.4**	**73.8**	**74.0**	**74.1**	**74.3**	**74.4**
Age						
Ages 0–5	23.8	24.3	24.5	24.6	24.8	24.9
Ages 6–11	24.6	24.4	24.3	24.3	24.3	24.4
Ages 12–17	25.0	25.0	25.2	25.2	25.1	25.1

*Source: U.S. Census Bureau, Current Population Reports
https://www.childstats.gov/americaschildren/tables/pop1.asp

Since the initiator of our solution is one of the parents, I decided to check the numbers of families with kids. The findings showed that there were 14M of families with one child, 13M with two children and 7M with three or more children in 2019

(Fig.3.1). Having seen that dynamics almost did not change for the last couple of years we can say that there are approximately 34M families with kids.
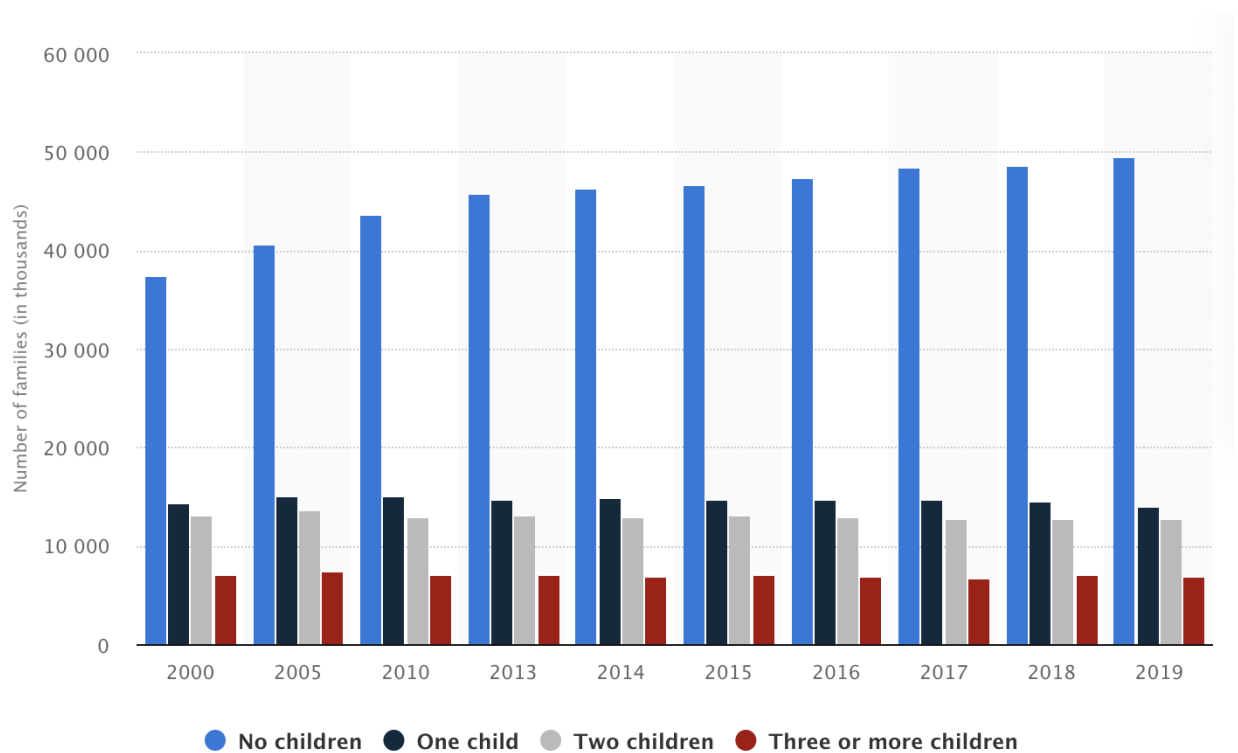
Figure 3.1. Number of families in the United States by number of children under 18 living in the household from 2000 to 2019 (in thousands)

Source:

https://www.statista.com/statistics/183790/number-of-families-in-the-us-by-number-of-children/

Parents who adopt a healthy lifestyle and do physical activities on a regular basis are more likely to care about children to do the same. They understand that such activities as well as healthy habits have an impact on overall wellbeing.

The results of the National Health Interview Survey conducted by the National Center of Health Statistics show that 53.3% of adults aged 18 years and over met the Physical Activity Guidelines for aerobic physical activity and 23.2% of adults aged 18 and over met the Physical Activity Guidelines for both aerobic and muscle-strengthening activity (1, National Health).

The guidelines say that adults should do at least from 2 hours and 30 minutes to 5 hours a week of moderate-intensity or from 1h and 15 minutes to 2 hours and 30 minutes a week of vigorous-intensity aerobic physical activity. This includes running, swimming, bicycling, jumping rope, exercise classes like vigorous step aerobics or kickboxing and others. As a conclusion we can say that adults who meet guidelines for aerobic activity can be considered as our target audience.

Mostly those people who live together as a family have similar lifestyles. Therefore, the approximate number of families with children in the US who are more likely to encourage their kids to do more physical activities is 26.6% of all or 9 million.

The research results show that in 2017 95% of families in the US had at least one mobile device [1]. Since each year more and more people have access to smartphones and tablets, we assume the approximate number is close to 100%.

However, we consider 9 million families as our target audience, parents of the children who have their own devices are more likely to have a stronger need in our solution as their kids spend more time sedentary playing games or watching videos. 45% of children under 10 have their own mobile device [1]. Consequently, 4.05 million families in the United States stand for the market which we will try to conquer.

SellCell conducted a survey with 623 respondents on how much children spend on in-app purchase per month in 2020 (Fig. 3.2). The Majority spend less than $10 per month.
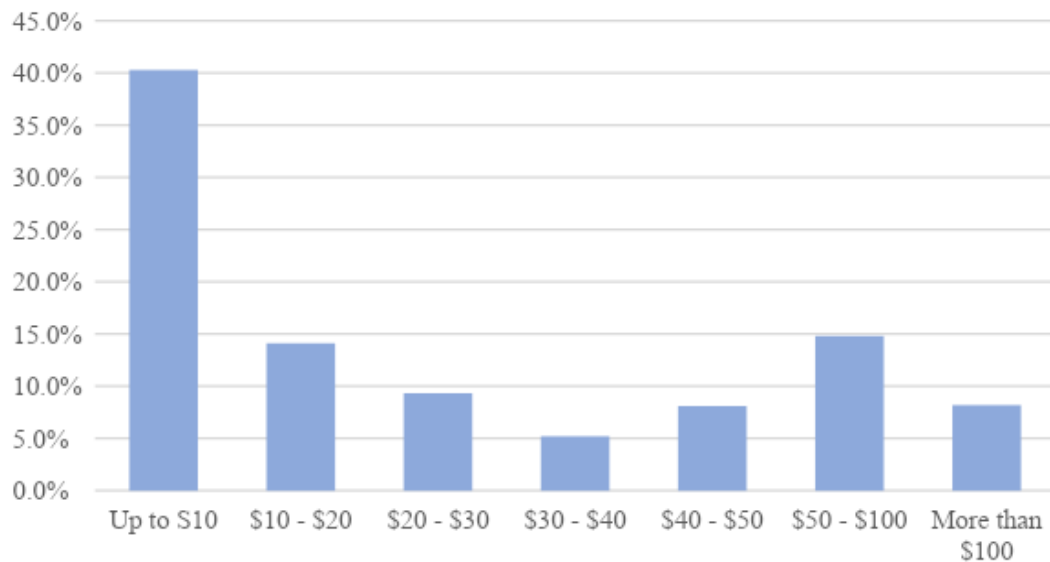
**Figure 3.2. Spending on In-App Purchase in Children Applications**

Source: SellCell
https://www.sellcell.com/blog/more-than-two-thirds-of-parents-worry-kids-overspending-on-in-app-purchases/

Health and fitness app market for children is not saturated, although there are many players in this domain which are targeted adults.

According to the State of Mobile report issued by App Annie a consumer spent 1.5B in Health and Fitness apps in 2019 which is 130% more than in 2017. Those applications offer new pathways to meal planning, training regimes, exercise tracking and meditation. This trend seems promising for us as parents who care about their own wellbeing will do the same for their kids.

Health & Fitness applications became more popular generating more revenue for their creators. Spending in this category grew 75 percent over the years, to be more specific it grew to $2.70 per device in 2018 from $1.60 as it had been the year before. (Fig.3.3)
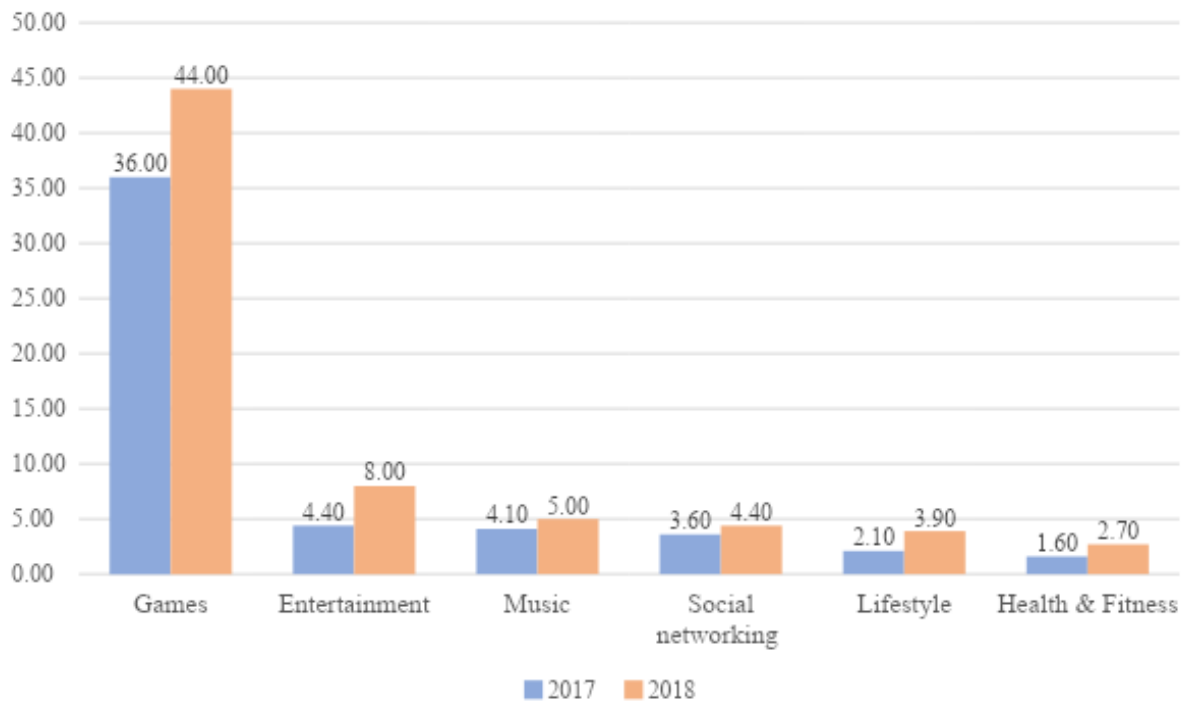
Figure 3.3. Average In-App spending Per Active US iPhone – Top 6 categories

Source: SensorTower https://sensortower.com/blog/revenue-per-iphone-2018

Our solution will be initially available as an iOS and later on as an Android application. There are different ways to monetize applications. In the last couple of years a subscription model became the most popular one which we plan to adapt in our solution.

On iOS in the United States 97% of non-gaming consumer spending was driven by applications with subscriptions in 2019. That was slightly lower on Google Play, 91% [13].

2%

19%

2%

77%

iOS Subscription
iOS Non-Subscription
Google Play Subscription
Google Play Non-
Subscription
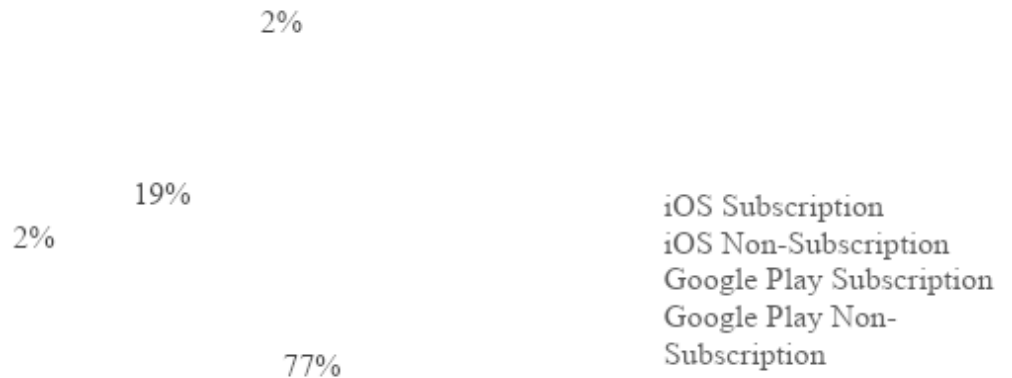
Figure 3.4. Distribution of Consumer Spend in Top 205 Non-Gaming Apps between Apps With Subscription and Apps Without Subscription in US in 2019

According to statistics iOS is dominant in the United States with 60% of total market [15]. As we start with iOS applications our target audience in absolute numbers is 2.5 million users.

3.2 Managerial Conclusions

Market evaluation is based on assumptions and many factors that should be taken into account to make it more accurate. Although you can't consider each parameter to calculate precise numbers. Sometimes that's because of the lack of information and sometimes it's just not necessary to go so deep in detail because it might take more time to investigate than to bring value. That's important to feel what is a "good enough" depth which allows you to make a decision.

Another point was the difficulty to choose the one category for the application I aim to develop. It includes elements of game, fitness, lifestyle. If the market is relatively new the most similar types of product should be found to be able to research the market. The closest domain is Fitness & Health as the main goal of an app is to get children moving and developing at the same time healthy habits. Fitness

& Health applications are growing from year to year with more adults using them. This will result in the market growth for applications that target children's physical activity.

CHAPTER 4. COMPETITOR ANALYSIS

4.1 Competitor parameter analysis

The main problem I aim to solve is how to increase physical activity and active play for children between the ages of 3 and 10 in circumstances when the screen-based device use is constantly increasing. Any outdoor play or other hands-one, creative activity with parents or friends definitely have a positive impact. In my case I focus on a solution which is an application for a smartphone or a tablet without additional hardware therefore I will consider competitors in this domain for further analysis.

The initial list of competitors was a combination of mobile applications who aim to increase children's physical activity and develop healthy habits. I did not consider applications which 1) were not updated during the last year or 2) had no functionality besides a set of videos to watch or games description.

Below there is a list of competitors which were chosen for deep analysis.

- GoNoodle Games
- Just Dance
- NFL Play 60
- Sworkit Kids
- Workouts & Exercises at home
- Habitz

GoNoodle Games

An Application is developed by GoNoodle Inc. company which was founded in 2010. Initially they developed short interactive videos which were accessible through their application. Nowadays they report 14 million children playing GoNoodle each month. In March 2020 a company launched GoNoodle Games which is a mobile application which includes 4 movement-based games. Having used open-source

computer vision and machine learning system OpenCV they detect movements and bring children into action.

Having nice graphics and exciting user experience the application catches child attention and makes it interesting to play.

Among the drawbacks there is a small number of games (only four as for May 2020) and poor gamification techniques which are more likely to have a negative impact on user retention.

As a benefit the company has a huge number of existing users and a high brand awareness level in the domain of movement-based applications. That helps them lower acquisition costs.

During the first two months after release GoNoodle Games reached Top 1 ranking in AppStore in 4 countries in the category Ages 6-8 (Kids) and Top 5 in 10 countries in the category Kids.

Just Dance

This is a dance game which allows users to choose preferred dance and mimic its moves of the on-screen dancer. It was launched by game publisher Ubisoft. In 2009 it had more than 10 million installs purely on Google Play.

In order to dance a user will need additionally to connect to a computer or TV to see a video. A smartphone is used as a motion tracker.

The application is not limited to children's use, the audiences are both adults and children. Moreover, gameplay and user experience aim to target more adults or adolescents.

Top 1 in one country Top 5 in 52 countries and Top 10 in 90 countries in the category Music (Games). No ranking in Health and Fitness.

NFL Play 60

NFL Play 60 was created by the American Heart Association together with the National Football League to promote a healthy lifestyle and encourage kids to move

at least 60 minutes a day. Since 2007 the NFL has committed more than $352 million to youth health. This application is more likely to be social rather than commercial.

The application includes a couple of games where you can either move physically either just tap the screen. Also, there are workout training sessions which shows a kid what to do and a check-in tab to input manually daily activities.

Gameplay looks good as there are scores and presents as a reward for activities and the ability to personalize your user.

The main drawback in terms of physical activity is that a child can just click play and do nothing, but the application will think that you are training. There is no actual tracking.

As of May 2020, AppStore statistics showed that the application reached Top 100 in 11 countries in the category Aged 6-8 (Kids) and Top 500 in 1 country in the category Health and Fitness.

Sworkit Kids

A fitness application which is an addition to a Sworkit workout app for adults. Sworkit was founded in 2010 with total funding of $2.4M.

The application includes different training sessions for kids in the form of video. For children a specific set of different workouts is combined so that they are not bored. Although there is no tracking if a child is actually doing something or not.

Among the advantages of the current solution there is a presence of many different trainings, reminders, statistics on the number of minutes and calories burnt and integration with Apple Health and Strava.

Besides all good points the application is not user friendly for kids and has no gamification which should be a crucial part in getting retention since our target user is a child.

Workouts & Exercises at home

This is a fitness application with a funny character and a predefined set of training based on a user goal. There is an option to create your own workout or choose a 30-day challenge.

A user has to mimic the character moves on the screen and follow its commands until training is done. Afterwards simple statistics will be present in the calendar. For such types of applications auto reminders play a crucial role. In this case a user can set a reminder for the next training only manually.

Rewards are present in the app as achievements. Although gamification looks more or less good for adults but not for children who need more interactive and entertaining user experience and graphics.

The application was ranked as Top 1 in the category Health and Fitness in 18 countries in AppStore during 2015-2016. As of May 2020, it reached Top 100 in one country and Top 500 in 15 countries in the same category.

Habitz

This is an application that empowers kids to develop healthy habits. Parents select from pre-set goals which, children track their activity in the app and get rewarded for hitting goals. Rewards can be monetary and selected from the Habitz store or parents can designate some non-monetary rewards.

Design is really neat and the user experience is kid friendly and easy to understand.

Regarding physical activities there is one set of exercises which is a bit long for a child to do at once and not customizable. The application doesn't track a child via camera or other techniques, it is possible for a child to actually workout or just to sit aside and wait until the end when coins are added.

Parameter analysis results

Our findings show that the market which we aim to enter is not saturated and new players are able to get their own niche by offering solutions to parents' pain points regarding physical activity of their kids which require just a smartphone or tablet use.

Having gathered the information about competitors (Appendix 1) we can say that all of them target children between the ages of 3 and 4.

Free version is available for each application, although most have in-app purchases. The most popular business model is subscriptions. But a user can also buy individual workout or app coins which then are converting into additional services.

Type of content is divided into a couple of categories: games, dances and workouts.

The most important part of an application for children is a presence of rewards and achievements for motivation to get back and do activities. Almost all applications incorporated gamification in some way or another. The most interesting approach adopted by Habitz, they suggest, is that earned coins are converted into real toys or games.

Some applications do not have a movement tracker and allow just to submit the progress when doing nothing in reality. Such apps work for adults who are self-conscious and motivate themselves to do exercises, but other techniques should be applied to children to obtain results.

Having analyzed user feedbacks of existing applications there are following drawbacks:

- crash frequency of an application is high;
- it's not fun, not enough entertainment;
- "useless app because you can just hit the button and it will say that you did workout";
- many ratings were related to high pricing strategy and little functionality for free;

● no ability for both parents to have access to children's progress.

4.2 Harvey Ball Table

Below there is a comparison graph which shows similarities and differences of analyzed applications.

Table 4.1

Competitor Functionality Comparison Table

Functionality	GoNoodle Games	Just Dance	NFL Play 60	Sworkit Kids	Workouts Exercises at home	Habitz	My app
Content diversity	◕	●	◕	◕	◑	◕	◕
Motion sensing	●	○	○	○	○	○	●
Kid friendly UI/UX	●	◑	●	◑	◑	●	●
Progress Indicator	○	●	◑	●	◑	◕	●
Notifications	○	○	○	◕	◕	○	●
Rewards for kids	◕	◑	◕	◑	◑	●	●
Develop healthy habits	◑	◑	◑	◕	◑	●	●
Integration with Health apps	○	○	○	●	○	○	●
Parent application	○	○	○	○	○	●	●

For comparison I indicated parameters which are important and are based on my research and results of the survey conducted.

The findings show that applications which were designed purely for children have kid friendly graphics and user experience. Still there should be functionality enhancements such as reminders, better content to help children develop healthy habits and move more.

From the graph we can notice several features which are either absent or present in a few applications. Among the important features which would bring additional value to our application there are:

- parent app for both parents;
- reminders on physical activities;
- enhanced rewards and achievements technique;
- movement tracking with video analysis.

4.3 Managerial Conclusions

Market is not saturated with players who can efficiently solve the problem of children's physical activity and develop healthy habits. Most of the existing applications do not track actual motion because they rather provide some recommended content for exercises. Also, there is a lot to improve with children engagement as current solutions anticipate users to remember about activities they need to do by themselves or have manual reminders setup which is not kid friendly.

It is crucial to monitor the market constantly on new players and evolution of existing ones to have up-to-date information about how they solve client problems, learn from their success stories and failures.

CHAPTER 5. ASSUMPTIONS VALIDATION

5.1 Hypothesis

Our goal is to create a solution which helps children get more time doing physical activities, decrease the amount of sedentary time and develop healthy habits. Having seen a trend in increasing the number of mobile devices in families as well as having one's own smartphone or tablet in kids under 10 years old we decided to use these devices as a basis for our solution. Implementing a cross-platform mobile application without any additional hardware lets us reach children spending time where they spend it now and make sure that this screen time is used wisely.

Many existing applications in similar domains provide the ability to watch video or animation with exercises and repeat them. It works with adults because they pursue a goal to lose weight or to be in a good shape or some other reason related to physical well-being. They are conscious about the need for training. Although it won't work with kids, they want to be entertained and not really care about what needs to be done rather than what they want to do.

Having researched existing technologies we found out that there is an ability to track child movement automatically with the help of a camera. Together with gamification techniques it looked as a proper solution to get kids moving at the same time providing parents with some reports which include kid "movement score" and dynamics over the period of time.

We want our application to help children develop healthy habits. For some activity to become a habit, repeatable actions during a long period of time is needed. For this purpose, we see it beneficial to have a child daily schedule in an application with corresponding notifications or reminders. For school age children it might be useful to have their schedule imported from School Management Learning Systems which they use on a daily basis.

One of the initial ideas was to create a solution in the form of a physical toy which would make a kid leave the screen and dance, sing or do exercises with this toy.

Many existing solutions have applications just for a child. In our opinion it would be useful for a parent to see a child progress in their own application as well as see a set goal and choose rewards for hitting those goals.

Another feature that should bring additional value is personalization. Each child has its own needs and one type of content and the same exercises for everyone might bring less value rather than the one based on child progress and preferences.

5.2 Validation

In order to validate my hypothesis, I decided to carry out a survey on parents' perception of children's physical activity, screen time and gather feedback on functionality they consider useful.

148 parents of children between the ages of 3 and 10 filled out the form with questions (Appendix 3).

Among respondents 77 parents have kids between the ages of 3 and 5 and 78 parents – of 6 and 10. 88 parents from 148 indicated that their kid has its own mobile device which is 59.4% of children under 10 years old. Majority (67.6%) own a tablet and the rest 32.4% - smartphone (Fig. 5.1).

Tablet   Smartphone

32%

68%
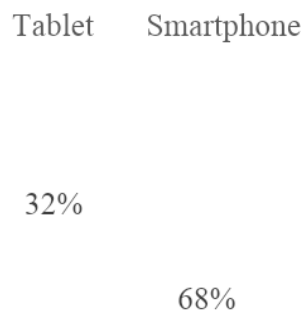
Figure 5.1. Mobile device ownership in children under 10 years old

What was odd a couple of years ago is becoming a norm now. Ten years ago, not every pupil has access to mobile devices and currently children start using them sometimes before they even can talk. Our findings show that among all children under 10 who own a tablet or smartphone 6% get it when they are under 3, 29.5% - between 3 and 5 and 63.3% - between 6 and 10.

Parents were asked about the average amount of screen time a child spends with a mobile device during a typical day. No estimated time is likely to be exact but when dealing with children under 10 years old results obtained from parents are more likely to be reliable than those obtained from a child. Our research showed that most spend less than 3 hours a day. Daily screen time of 64 persons is up to 1 hour per day, other 62 persons spend between 1 and 3 hours and 23 persons spend more than 3 hours (Fig. 5.2).
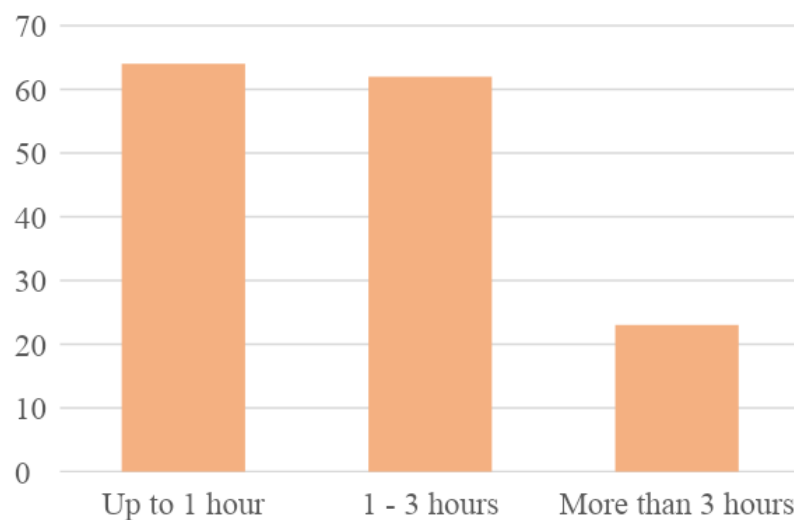
Figure 5.2. Average screen time 3- to 10-year olds spend daily

It was interesting to see that most parents evaluated a child's physical activity during the day as moderate. Only 11.7% consider a physical activity level as sedentary (Fig. 5.3)

Sedentary   Light intensity   Moderate intesity   High

10% 12%

27%

51%

Figure 5.3. Parents' evaluation of physical activity level among children 3 to 10

Despite the fact that most parents are satisfied with the level of physical activity of their children, 41% of them would prefer using mobile applications to encourage a kid to move more (Fig. 5.4, Appendix 2).

thy habits

s about recommended time for physical activities

S

he help of camera

eferences

0%   20%   40%   60%   80%   100%   120%

■ Strongly agree ■ Somewhat agree ■ Somewhat disagree ■ Strongly disagree
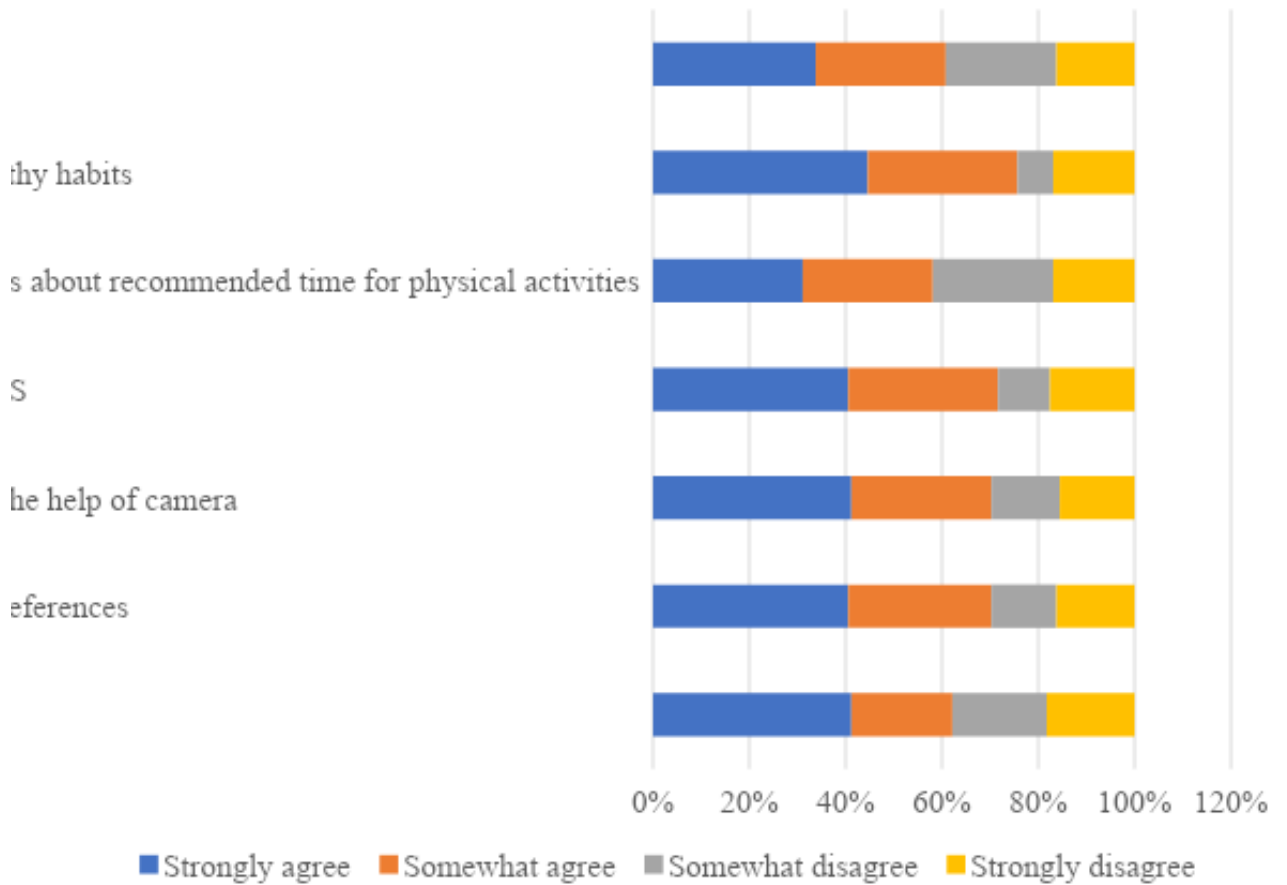
Figure 5.4. Distribution of responses to survey on solution to get children moving

The results in the chart show that parents are interested in passing healthy habits on to their children and would want an application to help them in such a process. They also see it useful to have a child schedule with more smart notifications about exercises.

A few parents like the idea of auto tracking for movements with the help of cameras but still the majority see functionality useful.

Personalized training got the most votes. 45% of parents want activities to be based on their child's progress, preferences and needs.

Finally, most parents find it useful to have their own application where they can see the child's "movement score", statistics on physical and other activities for a chosen period of time, set goals and come up with rewards.

There was an idea to integrate a mobile application with a physical toy which should have become a "buddy" for a child who can encourage dancing, singing and play some funny games to get children moving. Therefore, it was decided to add a question about preference for the solution to include such toys. As a result, 64.9% of parents responded that application is enough and 35.1% mentioned that they would like a mobile application to be integrated with a physical device in the form of a toy (Fig. 5.5).

Physical smart device   Mobile application

35%

65%
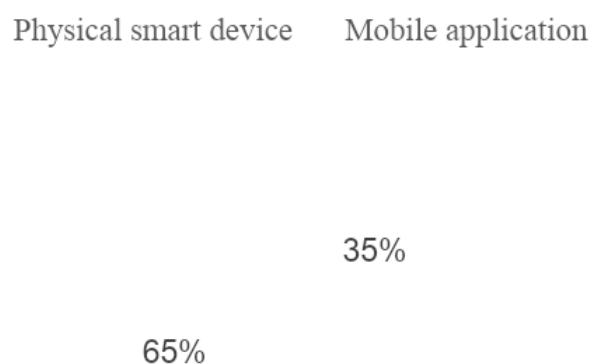
Figure 5.5. Physical smart device VS Mobile application

5.3 Managerial conclusions

When launching a new product or service it is crucial to hear what those people who are your target audience think about a problem you are trying to solve and proposed solution. One might think that one's own idea is brilliant as a person itself encounters such an issue which one wants to solve. Although each person lives in the bubble which is formed by his or her own beliefs, people that surround them, years of experience and so on. If the idea was not crash-tested with people who should become a real user there is a big chance new business will fail. Moreover, communication with users should continue after product launch to test each new hypothesis.

In my case I thought about the number of parents who noticed the lack of physical activity because of screen time being higher. Despite this fact parents still want kids to move more. It might be due to a reason that a child who spends a lot of time with a mobile device can be physically active the rest of the time. One more factor such as sedentary behavior should have been included in the survey as we found research which shows correlation between screen time and sedentary behavior which might have a negative impact on child development.

Another reason which seems reasonable is that parents understand that screen time will only increase from year to year and they want a kid to develop healthy habits including being physically active.

One more interesting finding is connected to the necessity of a physical toy which was initially present in our solution. The survey results as well as market and competitor research showed that having a toy would be nice but it is not really needed to solve the issue we focus on. If one does not talk to the target audience and just follow initial ideas a huge budget can be spent on functionality which will not bring value for end users.

My last hypothesis was that people will definitely want to spend at least \$3 per month for such an application as it brings so much value to their kids. The survey

shows that the majority are reluctant to spend money on the application on a monthly basis and want to use it for free. It might show that either a problem is not so serious or some other type of monetization should be applied, such as ads in the free version. A freemium business model is planned for the solution – an initial free version with further ability to buy a monthly subscription for valuable functionality such as content personalization or more detailed statistics on child progress with some recommendations etc.

CHAPTER 6. PRODUCT DESCRIPTION

6.1 Value Proposition Canvas

Everything starts with a problem. If there is no need or "job to be done" then there will be no successful product. Dr Alexander Osterwalder created the Value Proposition Canvas to ensure the product is positioned around what the customer values and needs [16]. It consists of two parts: Value Proposition and Customer Profile.
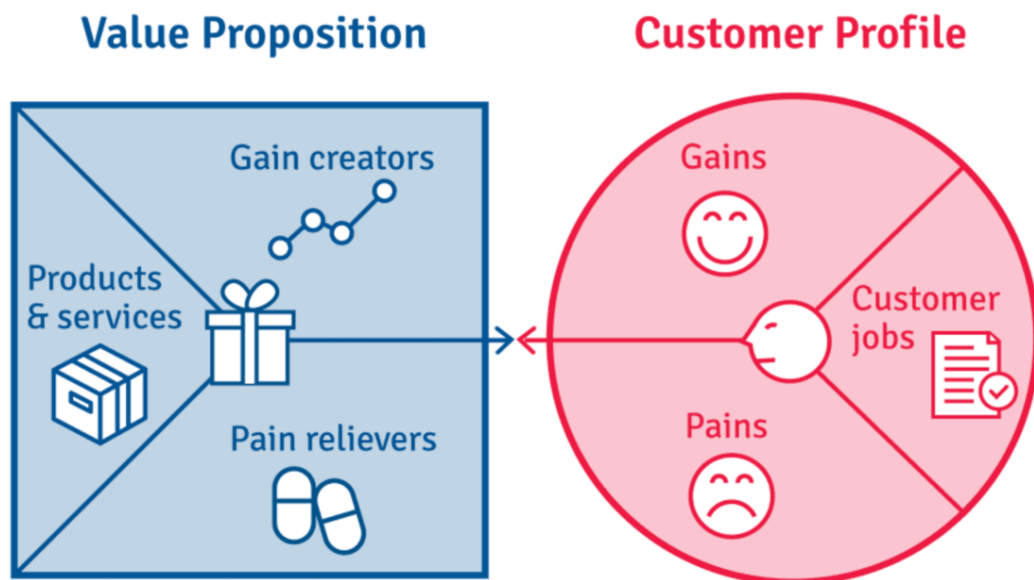
Figure 6.1. Value Proposition Canvas Template

Source:

https://www.b2binternational.com/research/methods/faq/what-is-the-value-proposition-canvas/

Customer Profile describes the problems the customer is trying to solve, benefits which the customer expects which brings delight and negative emotions that the customer experiences when doing the job.

Value Proposition explains how the product creates added value, provides a description of how the product relieves pains and describes the product itself.

In our case our customer can be divided into two different user personas: parent and child. We will focus on the parent here as he or she will conduct the role of buying persona as well.

Customer Jobs:

- need a child to be more active and move at least 60 minutes a day;
- need a child to follow daily routine;
- need a child to follow school schedule and do assignments on time;
- need "break" time to do housework or just have some rest.

Pains:

1. Lack of physical activities which might lead to health issues and too much sedentary time because of screen-based device use.
2. A child doesn't follow daily routines.
3. A child forgets to do school assignments and other activities on time. That's why a parent needs to constantly remind them.
4. Keep in mind a schedule for more than one kid.
5. A parent feels guilty for time a child spends with a screen-based device because he or she understands it might have a negative impact.

Gains:

1. A parent knows a child's progress with physical activities in real-time.
2. A kid is motivated to do training by him-/herself.
3. A parent is sure that a child develops healthy habits and sees proof.

One of components of the Value Proposition is product description. The solution is a cross-platform mobile application accessible on iOS and Android smartphones and tablets for a parent role and a child role. The application works offline and synchronizes data across devices.

Pain relievers:

1. Interactive games or activities which encourage a child to participate and move. Adapt activities to be useful for children with the help of machine learning.
2. Ability to create schedules.
3. Ability to set reminders (auto or manually) and see statuses in a parent app to control.
4. Ability to add more than one child in a parent app.
5. Make screen time smart including "breaks" for physical activities.

Gain creators:

1. See statistics about a child's progress in a parent app.
2. Add valuable rewards, gamification into application. VR activities
3. Physical activities are tracked with the help of a camera. A child sends photos when submitting activity as done.

Each "pain" and "gain" from Customer Profile got a "pain reliever" and a "gain creator" in Value Map.

6.2 Levitt Model

After the main functionality was identified with the help of the Value Proposition Canvas it needs to be divided into categories to frame our approach to compete effectively in the market.

Levitt's model suggests that all elements of product fall into four categories [17]:

- Generic;
- Expected;
- Augmented;
- Potential.
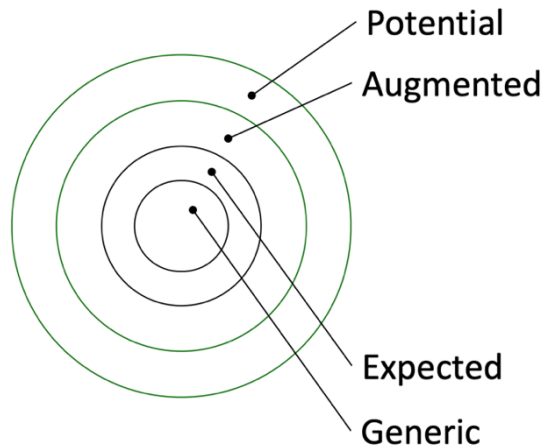
Figure 6.2. Ted Levitt's Total Product Model

Source: Scott Sehlhorst presentation from Product Management course

A product which satisfies only expected and generic characteristics is the one nobody complains about. But a product that has all four types of values is the one that excites people [18].

Table 6.1

Product Functionality Grouped by Ted Levitt Model

Type of characteristic	Feature
Generic	1. Plenty of interactive content (games or training). 2. Synchronization between devices. 3. Proper work in offline mode.
Expected	1. Video analysis and movement tracking in real-time. 2. Ability to create a manual schedule with reminders. 3. Rewards as real presents. 4. Ability for a parent to create their own rewards. 5. Send photos as proof for completion. 6. Ability to track more than 1 child. 7. Access to a parent app for more than 1 parent. 8. Integration with native health apps to see progress in one place

Augmented	1. Statistics with child "movement score" (e.g. kcal, min) in real-time
	2. Smart reminders on when to practice based on child schedule, screen time analysis.
	3. Integration of schedule from SMLS.
	4. VR physical activities encouraged for children.
Potential	1. Activities personalized based on progress, needs.
	2. Personalized graphics, characters (not chosen from predefined).

All functionality of the product falls into this table. Generic features are the ones a customer expects by default. Without these features our application won't be considered as a possible solution. Among the expectations - there is everything which is good enough for a client and one wants to see. Augmented features exceed customer expectations because of much better user experience or technology solutions. Finally, potential ones are about a "wow" effect and everything a client can only imagine.

CHAPTER 7. ARCHITECTURE AND TECHNICAL DESCRIPTION

7.1 General Architecture

A solution is a mobile application available on iOS and Android operating system for smartphone and tablet devices. Since we need to support different mobile devices and have centralized storage, typical Client-Server Architecture (Appendix 4, 5) was chosen for our solution. In this model server hosts, distributes, controls the majority of the resources and services which will be used by a client. Such structure is made up of one or more client systems connected to main servers through network. All systems associated with it share computing resources. Client-server architecture is also called network-computing structure because each request and associated services are distributed over the network.

The client app will be based on Xamarin. This platform allows the building of modern cross-platform mobile applications for iOS and Android devices. Xamarin allows engineers to have shared business logic for both platforms which decreases time for development itself.

Our solution will be based on Xamarin. Native which allows to have native UI, high performance and access to built-in device features. This approach is also beneficial when connecting to many platform-specific APIs. In our case we plan to integrate with native health iOS and Android applications and School Management Learning Systems such as Google Classroom, Microsoft Education and others.

The server side will be based on ASP.NET Core WebAPI – a cross-platform, an open-source framework for the development of internet-connected, cloud-based web applications. One of the core benefits is high performance. Another advantage is cost efficiency as the latest technology demands less coding. Developers easily optimize code structure by writing much fewer statements. As a result, it is easier to maintain an application and effectively manage it.

7.2 Image and Video Processing (algorithms)

Video analysis and image recognition is at the core of the solution therefore I analyzed available technologies. Having been acknowledged with Microsoft stack I started investigation of existing Azure Cognitive Services, also TensorFlow models. The main purpose was to find a suitable technology that will be used to analyze video streams from mobile device's camera and recognize activities and kid gestures during an activity session.

Finally, I have found the TensorFlow based model PoseNet which looked exactly what was needed in the context of product MVP. It is a vision model that makes it possible to estimate the pose of a person in an image or video by checking where key body joints are.

TensorFlow has a lot of benefits. It is an open-source platform for machine learning which has a comprehensive ecosystem of tools and libraries. Developers can easily build and train models using intuitive high-level APIs, deploy ML powered applications. Simple and flexible architecture helps to bring ideas to life faster.

Having the ecosystem of tools might be a great benefit in future when additional features such as progressive and personalized training or smart reminders which adapt to a child schedule and other characteristics.

7.3 Database

Since we are building Software as a Service solution (SaaS) highly scalable and reliable data storage that supports the large datasets is required. I have selected Azure Cosmos DB – globally distributed, multi-model database service. Throughput and storage can be easily scaled from thousands to hundreds of millions of requests per second worldwide.

CosmosDB makes it possible to build highly available and responsive applications around the globe as it replicates the data wherever users are. With the extensive integration with Azure infrastructure CosmosDB gives 99,999 %

availability, guarantees less than 10-ms latencies for reads and writes at 99th persentile.

Security is one of the biggest concerns when talking about children, especially with the use of camera and video tracking. In this regard CosmosDB adheres to strict security standards, having a wide array of compliance standards. In addition, all data is encrypted at rest and in motion.

In particular we are going to use the MongoDB API which has support from CosmosDB. Consequently, we could easily move to a separate MongoDB cluster to reduce costs in the mature application and high load. MongoDB has many advantages, among which is great documentation, ease of scale. It is easy to set up, conveniently flexible because of being schema-less and can accommodate huge loads of data.

7.4 Deployment

For deployment purposes I have decided to set up the project management and CI/CD process based on Azure Devops. Azure Devops is the whole ecosystem of tools for convenient and efficient development of different applications. It includes many useful systems among which: Azure Boards for task management, Azure Pipelines to build, test and deploy with CI/CD that works with any platform, language and cloud, allowing integration with GitHub or any other Git provider.

Continuous integration and continuous delivery are very useful processes to establish for delivering code changes reliably and frequently. Thanks to deployment automation a development team can focus on code quality, business requirements and security.

The server-side solution will be completely deployed to the Microsoft Azure environment. Mentioned CosmosDB with MongoDB API will be used as the main application database. Azure Mobile App which is actually an extension to ASP.NET Core Web API, has already provided such functionality as push notifications, offline mode, social integrations with Facebook, Twitter, Google.

Mobile Apps feature of Azure App Service allows applications to remain useful when network issues occur, which means users can create and update information when they are offline. Caching server data locally on the device improves app responsiveness. Mobile Apps allow native sync experience across iOS and Android applications which is useful in our case.

When relying on notifications as a part of core functionality we need to assure that an engine is capable of scale. Azure Notifications Hub capacity includes sending millions of push notifications to iOS, Android devices (and other platforms if we would need them in future) within seconds.

The mobile clients will be distributed to users initially through Visual Studio App Center which facilitates release process helping with running tests and shipping enhancements as fast as those are built. At the end the application will be available in Apple Store and Google Play where any person worldwide could download it to build healthy habits and increase physical activity.

CHAPTER 9. PROJECT BUSINESS MODEL

9.1 Business Model Canvas

Every business begins with an idea although one idea itself is worth nothing. The process of launching a new product or service should unite all components besides an idea such as problems to solve, target audience, budget and resources, distribution channels and so on.

Eric Ries in his book Lean Startup said that a startup becomes a business when it finds a repeatable and scalable business model. It consists of a set of steps that one should track again and again which gives a revenue [19].

One of widely used tools to visualize strategy and define goals is the Business Model Canvas which was initially offered by Aleksander Osterwalder in 2005 [20]. It provides a clear structure which helps develop and document a business model.

With clear delineation down the middle left part of canvas relates to Product and right part – to Market. The key elements of Business Model Canvas are the following (Appendix 6):

- Value Proposition
- Customer Segments
- Customer Relationships
- Channels
- Key Partners
- Key Activities
- Key Resources
- Cost Structure
- Revenue Streams

Unique Value Proposition

This section describes offering to the customers that will differentiate the product from other solutions which address the same or similar problem.

Our value proposition components:

- Motion-sensing personalized physical activities

- Smart reminders based on daily schedule

- Child progress and recommendations

- Goal settings to develop healthy habits

- Rewards for hitting goals

- Cross-platform access for both child and parent

Customer Segments

Our solution has two types of personas. A buying persona is a parent and a user person is a child. For the purpose of a business model, I focus on a buying persona.

- Parents of 3-10 year old kids who spend more than two hours a day with mobile device

- Parents of 3-10 years old kids willing their children develop healthy habits in early and middle childhood

- Parents of 6-10 year old kids with more than 1 child who want to manage a child's time and a daily schedule without lots of effort.

Customer Relationships

Quality of the solution itself is crucial, as after facing bugs and issues users often lose interest in further use of the product and switch to competitors. Although the correct communications are at the same level of importance. Among components to build long-lasting and trustworthy relationships with our customers we highlight the following ones:

- Excellent support service

- Updates with bug fixes and improvements

- Building and managing community of active parents who care about children health

Channels

As the solution is a mobile application, two main channels of distribution for mobile applications are Apple Store and Google Play. Others include:

- Websites,
- Social Media platforms such as Facebook, Twitter, Instagram
- Conferences, trade shows partnerships
- Paid ads

Key Partners

- Technology provider (TensorFlow, Azure Cognitive Services)

- Marketing agency

- Conferences & Trade Shows

- Apple Store and Google Play as distribution partners

Key Activities

- Research and development

- Marketing and sales

- Engagement with users via online channels

For a software solution the main activity is the development with the prior technology and functionality feasibility research. Currently thousands of applications are being released to Apple Store and Google Play each day. Without efficient

marketing and sales activities applications can just be lost and not seen by the target audience.

Another activity is reaching customers for the purpose of testing new hypotheses, collecting feedback, and building a community of like-minded people with a healthy lifestyle.

Key Resources

- Human capital (product, design and development team)

- Infrastructure (servers, licenses)

- Marketing and sales

Cost Structure

- Team salaries

- Infrastructure cost

- Support service cost

- Administration expenses

- Marketing and advertising

Revenue Streams

- Monthly subscription (main channel)

- Shop partnership fees (will be implemented later on, excluded from first version)

9.2 Minimum Viable Product Cost

The first version of a product which will be tested with real users will include a parent and a child iOS application. It will have healthy habits management and schedule management. Among physical activities there will be two types initially: three gamified activities and three dances to repeat. For each activity we do motion analysis and provide a parent with analytics. A child schedule can be created either manually or imported from Google Classroom. This SMLS was chosen as the first to integrate because of its popularity in the USA. Google stated that Google Classroom usage doubled active users to more than 100 million since March 2020.

Reward management is included in the first version and a child's motivation to use an application is at the core of developing habits.

Based on the duration estimation in Table 9.1 it will take approximately 4 months for a team of a designer, a product manager, two mobile developers, one full-stack web developer and a tester to complete MVP. Setting a 50% additional estimate for management and testing we get a total budget of $56640 for the first version of a product with $20 per hour of work.

Table 9.1

MVP Estimation

Epic	Feature	Estimate, man/days
Design	Designs and graphics creation	30
General	Parent/child authorization management	8
	Integration with Google Classroom	5
Child	Healthy habits (List, check as done, physical activity can not be just checked as done, it is calculated automatically based on progress in app)	12
	Daily schedule (view and update)	10

	Physical activities in the form of games to collect smth, sit down or jump, other movements. 3 games for MVP.	30
	Physical activities in the form of dance lessons (see and repeat). We do not track accuracy, just analyze movement intensity. 3 dances for MVP.	30
	Reward management (coins, badges, rewards set by parents, ability to create wishlist)	12
	Reminders on schedule, time for physical activity	8
Parent	Dashboard with statistics on child progress with healthy habits by day.	8
	Manage child schedule	8
	Manage healthy habits (choose applicable from default ones, add own goals)	15
	Rewards management (add custom rewards, approve/decline)	10
	Subscription management	8
	User settings	11
Admin panel	User management	10
	Healthy habits management	12
	Rewards management	8
Total design and development, days		**236**

9.3 Financial analysis

The subscription business model is chosen for the current application. I built a financial model for an IOS application which shows a number of paid users, revenue and costs with a 5-year forecast.

In order to calculate revenue, I started with a number of users. Our goal is to reach 3% of market coverage in 5 years. With the total market of 2.5 million users it is 75500 customers.

Table 9.2

Customer forecast calculation from Year 1 to Year 5

	Year 1	Year 2	Year 3	Year 4	Year 5
New customers	10000	20000	30000	30000	30000
All customers	10000	25200	45624	61481	75496

Churn rate, yearly	*48%*	*38%*	*31%*	*26%*	*23%*
Churn rate saving, yearly		*-10%*	*-7%*	*-5%*	*-3%*
Leaving users	-4800	-9576	-14143	-15985	-17364
Total All Customers	5200	15624	31481	45496	58132

The average churn rate for a SaaS (software as a service) application is approximately 4% per month. I took 48% as a churn rate for the first year as the first version of the application might not meet customer expectations perfectly and functionality will be adjusted or changed based on feedback. During the following years, we will work on the churn rate reduction by improving customer experience, working on right push notifications and personalization.

Subscription price is one of the most important components of a business model as our revenue is directly proportional to this number. Based on the competitor analysis, the market research we set $7 per month as a reasonable price for a monthly subscription. When the first version of the application is ready a subscription price will be tested on real customers and the final number will be defined. We might reveal that parents are not ready to pay $7 per month but $5 is reasonable for them. Or it might occur that there is no big difference for parents if the price is 7$ or $10 and we would be able to increase revenue. All the calculations in the table are done with $7 as a monthly subscription price.

Table 9.3

EBITDA forecast for 5 years with subscription price $7 per month

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue					
Subscriptions	$ 436,800	$ 1,312,416	$ 2,644,367	$ 3,821,632	$ 4,883,056

Cost					
MVP cost	$ 56,640				
Salaries	$ 115,200	$ 144,000	$ 180,000	$ 225,000	$ 281,250
Apple Store fee	$ 131,040	$ 196,862	$ 396,655	$ 573,245	$ 732,458
Infrastructure cost	$ 1,248	$ 3,750	$ 7,555	$ 10,919	$ 13,952
Gross profit	**$ 132,672**	**$ 967,804**	**$ 2,060,157**	**$ 3,012,468**	**$ 3,855,396**
Gross profit margin	*30%*	*74%*	*78%*	*79%*	*79%*
Marketing & sales	$ 530,000	$ 960,000	$1,290,000	$ 1,140,000	$ 1,140,000
Cost of customer	*$ 53*	*$ 48*	*$ 43*	*$ 38*	*$ 38*
Cost of customer saving, yearly		*$ (5)*	*$ (5)*	*$ (5)*	
Contribution margin	**$ (397,328)**	**$ 7,804**	**$ 770,157**	**$ 1,872,468**	**$ 2,715,396**
Fixed admin costs	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000
EBITDA	**$ (421,328)**	**$ (16,196)**	**$ 746,157**	**$ 1,848,468**	**$ 2,691,396**

Variable costs include team salaries, Apple Store fees and infrastructure costs. Salary cost for the first year was set for $9600 a month with a team composition of one FTE product manager, 1 FTE mobile developer, 1 FTE tester, a part time designer and a backend developer. The rate of every team member is $20 per hour, 160 working hours a month. Each year a 25% increase in a team is planned to fulfill all development needs.

Apple Store charges a fee for in-app purchases. In the first year Apple takes 30% of revenue. Since 2016 they have reduced fees for subscriptions after 12 months of

service. Starting from the second year revenue share increases to 85%, so Apple takes 15% of revenue. These numbers are displayed in the table.

Infrastructure cost was set to $0.02 per user per month and the amount depends on a number of users correspondingly.

Fixed admin costs include legal, bookkeeping and other services. Office rent is not the part of expenses as remote work is planned.

The biggest expense is marketing and sales services. Nowadays there are thousands of new applications in the Apple Store and a few users will find an app organically. The most common approach to acquire new users nowadays is to pay for ads and literally buy new installations. Not each user that installs an application will buy a subscription.

	APAC	EMEA	Latin America	North America
Install	1.11	1.46	0.55	3.87
Register	2.79	2.85	0.98	7.03
In-app purchase	85.95	58.16	27.13	112.22
Purchase	67.68	56.15	29.73	93.38
Subscribe	53.01	35.42	30.6	53.01

Figure 9.1. Average mobile app user acquisition costs in 2019

Source:

https://www.statista.com/statistics/941273/mobile-app-average-user-acquisition-cost-worldwide/

Our target market is North America therefore I set $53 as the initial cost of a customer. During the following years, the goal is to reduce CAC by $5 each year.

With the subscription price $7 the project becomes profitable by the end of third year. Initial investment is $437,524. When lowering the price to $5 investment increases to $843,614. The company becomes profitable in the third year and investment is returned close to the end of the fourth year. If the subscription price

goes up to $10 per month this is an optimistic scenario. Investment of $290,000 is being returned the next year (Appendix 7, 8).

9.4 Managerial conclusions

The business model canvas is a great instrument to see the whole picture. It allows you to fill the missing gaps with little effort because its structure is clear and simple. Having reviewed all components of the canvas, you can easily understand which part is covered well and where you need more research to do.

There is a famous proverb that businesspeople love numbers. No decision can be made until revenue streams, cost structure and financial forecast are figured out.

Business model relies heavily on understanding the market. Although nothing can be planned 100%, what means it is crucial to be able to make relevant assumptions.

After the first version of the product is launched there is an assumptions validation stage. It might have many iterations until market fit is found. Based on collected feedback we adjust the business model to correlate with new factors.

Financial model helps to understand the impact of different factors on financial results.

CHAPTER 10. IMPLEMENTATION STRATEGY

As for now a proof of concept was developed. The main purpose was to test technology and check its feasibility for the solution. The proof of concept includes an activity where a child tries to catch balls. With the help of a mobile device camera motion is analyzed in real time and we calculate a score which indicates intensity of movements.

10.1 Phase #0. MVP development

Timeline: July 2020 – October 2020

The main goal of this stage is to develop core features to be able to launch iOS applications on the market and start testing with real users. Another important objective is to find initial investment.

10.2 Phase #1. Getting product out

Timeline: November 2020 – April 2021

After the application is released to the Apple Store, we do test it on our target audience. After feedback is collected, we adjust the application to customer needs. The goal of this stage is to define a working business model and get market fit with our solution.

10.3 Phase #2 Scalability and long-term growth

Timeline: May 2021 and beyond.

At this stage we do a big push to sell as the solution satisfies the needs of the target audience and is ready to conquer the market. During this period the team will be increased to support extensive development and maintenance.

Regarding exit strategy there is no one defined yet. I want to develop this product and support its growth. The most possible scenario is to be acquired by some fitness or healthy lifestyle solution which would like to cover children.

CHAPTER 11. CONCLUSIONS

9.1 Project summary and managerial conclusions

Before writing this thesis, I had a problem in mind I thought was good to be solved and a preliminary vision of how the product may look like and which functionality it should include.

Based on the idea of validation, the market research and possible technologies product proof of concept was created. It allowed us to confirm feasibility from a technical perspective and start implementing interesting and convenient for a child user experience.

I have reviewed literature and statistics reports on children mobile devices usage, screen time, its impact on health and potential diseases. This information showed that a problem with sedentary behavior of children under 10 years old is present and requires some actions.

Market evaluation

Potential market was evaluated by retrieving data about parents in the US with kids between the ages of 3 and 10. Our solution fits into the market segment of active parents who meet physical activity guidelines and support their kids. This trend of healthy lifestyle will continue to grow. Consequently, our market will be expanding as well.

Competitor analysis

However, the market is not saturated with players who aim to increase children's physical activity without any additional hardware. Main competitors were identified. Based on parameter analysis their strengths and weaknesses were analyzed for better understanding what can be improved. Most of the existing solutions do not solve the issue of whether a child actually moves or not. That brings in our solution one of main competitive advantages.

Hypothesis validation

After a hypothesis was formulated, I conducted the survey to validate market needs. The main conclusion was that parents will more likely want their children to do more physical activities and will encourage using such mobile applications. Also, parents helped me define which functionality is important for them to make their children use the application.

Business model

Based on the research it was figured out that the subscription business model seems the most promising for the type of application I aim to develop. Having built the business model canvas, main revenue streams and cost structure were identified which became the basis for financial analysis. Considering the calculation, a company becomes profitable by the third year and investments are returned by the fourth.

Go or no go decision for starting the business

The opportunity looks promising. There is a big chance to build a profitable company. The more important aspect is that this business will make a positive impact on children's lives, their future success and well-being. I will move forward with this project. The next step would be to build an MVP version. Afterwards, we will start testing and validating our business model on real users. As soon as it is defined, we launch a big marketing campaign to acquire users and make them happy customers.

9.2 Key takeaways from study

The Technology Management program in Lviv Business School contributed a lot to my entrepreneurial thinking and the way I want to move forward with business.

Management Decision Making Toolbox was the very first module which gave me a deep understanding of management basis and methodologies that help evaluate companies on the market and the market itself.

After the module Strategic Marketing with Joe Pons I understood that product development from a technical perspective is just the beginning of the journey and

without proper marketing and sales strategy it won't take off. Sometimes marketing can be even more important than a product you do.

The huge impact on my perception of the product development process made Scott Sehlhorst. He walked us through the whole process of product creation from the initial step of problem statement and defining personas till modeling future plans in comparison to competitors. His methodology helps me a lot during working on my thesis.

Financial decision making and Corporate finances modules brought me the understanding of how to evaluate business ideas with the help of numbers and therefore be able to make correct decisions on investments, pricing models and potential of new products.

Technology entrepreneurship was the module I needed to boost thinking on my ideas. Denys Dovgopolyy shared many handy tips on how to launch a startup. Among the interesting ones were the main documents the new company should have. For me his approach to competitor analysis by parameters was clear and efficient that's why I used it in my diploma.

I highly appreciate the help of professors and mentors during the whole program as well as during the diploma thesis preparation. The experience I got exceeded all my expectations which I had at the beginning.

APPENDICES

Appendix 1. Competitor parameter analysis

Parameter	GoNoodle Games	Just Dance	NFL 60	Sworkit (Sworkit Kids)	Workout & Exercises at home	Habitz
Age	3+	4+	6-12	7+	4+	4+
Rating (iOS)	3.97	4.54	3.66	4.54	4.72	4.46
Total ratings (iOS)	146	35015	32	34939	1588	529
Latest release (iOS)	Apr, 2020	May, 2020	Dec, 2019	May, 2020	May, 2020	May, 2020
First release (iOS)	Mar, 2020	Apr, 2014	Jan, 2014	Apr, 2014	Jun, 2014	Aug, 2017
Price	Free	Free	Free	Free	Free	Free
In-app purchases	No	Yes	No	Yes	Yes	Yes
Kid friendly design	Yes	Colorful, but not kid friendly	Yes	Nice design for adults	Kid graphics, UX not kid friendly	Yes
Types of activities	Games	Dances	Workouts, games	Workouts	Workouts	Workouts
Amount of content	4 games	More than 500 songs	Plenty	Plenty	Plenty	1 workout
Notifications	No	No	No	Reminders are present	Manually create	No
Rewards	Coins	Coins, levels	Levels, achievements	No	Levels, achievements	Yes, Habitz store, levels.
Physical activity progress indicator	No	Calories burned	No	Calories burned; minutes done	Calories burned	No
Integration with health apps	No	No	Yes	Yes	No	No
Movement tracker	Yes	Yes	No	No	No	No
Parent app	No	No	No	No	No	Yes

Appendix 2. Distribution of parent responses to survey for solution to get kids moving

Features	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Prefer using mobile app to get kids moving	61	31	29	27
Prefer using mobile app to help kid develop healthy habits	60	44	20	24
Ability to add child schedule to send notifications about recommended time for physical activities	61	43	21	23
Import school schedule automatically from SMLS	60	46	16	26
Auto identify movements during activities with the help of camera	46	40	37	25
Personalize activities based on child progress, preferences	66	46	11	25
Own parent app to track progress, set goals	50	40	34	24

Appendix 3. Survey Questions

Question	Options
1. How old is your child?	▪ 3 – 5 years old ▪ 6 – 10 years old
2. If your child has own mobile device, please indicate the type.	▪ Tablet ▪ Smartphone
3. At what age does your child get own mobile device?	▪ Up till 3 years old ▪ 3 – 5 years old ▪ 6 – 10 years old
4. How many hours per day does your child spend with mobile device?	▪ Up to 1 hour ▪ 1 – 3 hours ▪ More than 3 hours
5. How do you evaluate child physical activity during a day?	▪ Sedentary ▪ Ligh intensity ▪ Moderate intensity ▪ High
6. Would you prefer a child to use a mobile app which gets him/her moving (e.g. dances, training)?	▪ Strongly agree ▪ Somewhat agree ▪ Somewhat disagree ▪ Strongly disagree
7. Would you like to be able to add a kid's daily routine schedule (e.g. time to wake up, time to brush teeth) into an app for kids to develop healthy habits?	▪ Strongly agree ▪ Somewhat agree ▪ Somewhat disagree ▪ Strongly disagree
8. Would you like the app to include a kid school schedule so that it enables notifications about recommended time for physical activities?	▪ Strongly agree ▪ Somewhat agree ▪ Somewhat disagree ▪ Strongly disagree
9. Would you like the school schedule to be automatically imported into the app from the School Management Learning System?	▪ Strongly agree ▪ Somewhat agree ▪ Somewhat disagree ▪ Strongly disagree
10. Would you like the app to analyze child motion intensity automatically with the help of a camera?	▪ Strongly agree ▪ Somewhat agree ▪ Somewhat disagree ▪ Strongly disagree
11. Would you prefer physical activities in an app to be personalized for your child (kid progress, age, parent objectives)?	▪ Strongly agree ▪ Somewhat agree ▪ Somewhat disagree ▪ Strongly disagree
12. Would you like to have a parent app to track child progress, set goals?	▪ Strongly agree ▪ Somewhat agree ▪ Somewhat disagree ▪ Strongly disagree
13. Would you like the mobile/tablet app to be integrated with a physical device in the form of a toy so that it acts as a kid's "buddy" whom one can touch and who reminds the kid about daily routines, school schedule, assignments, training time?	▪ Strongly agree ▪ Somewhat agree ▪ Somewhat disagree ▪ Strongly disagree

Appendix 4. General Solution Architecture
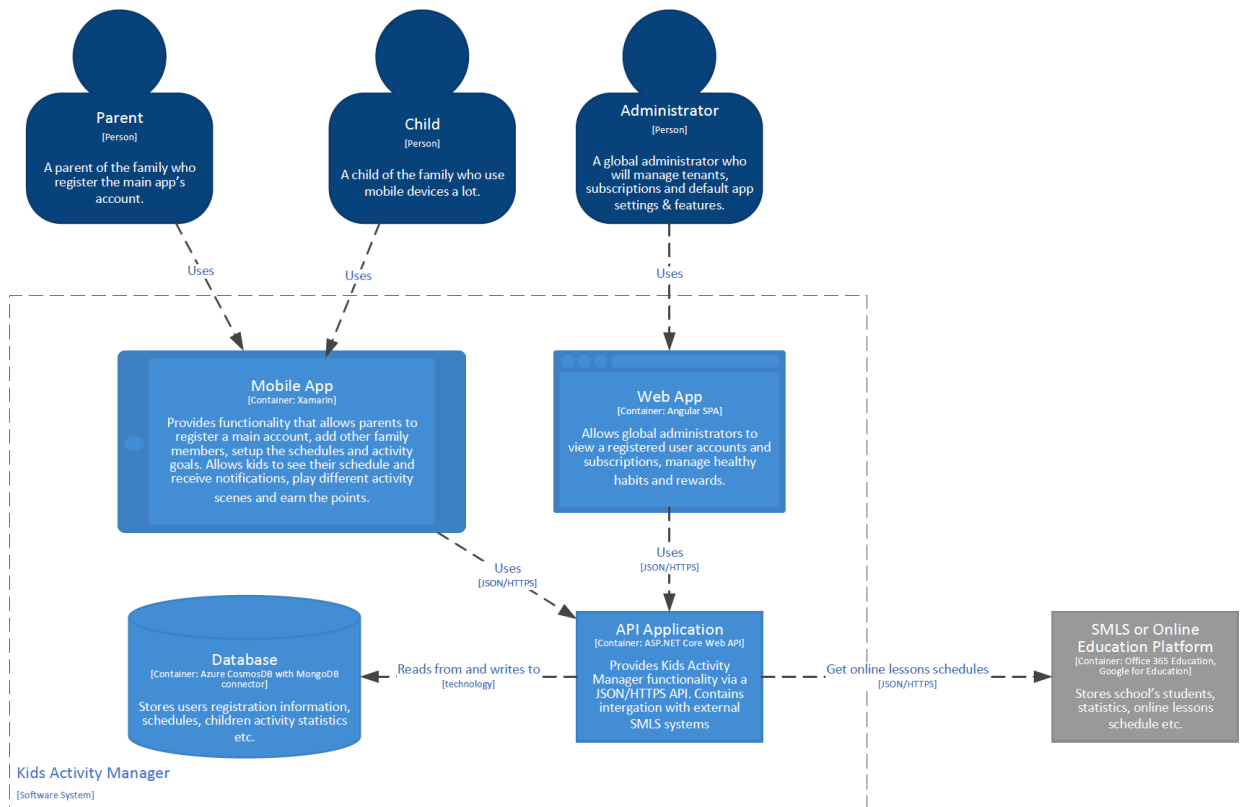
Appendix 5. Container diagram of mobile application
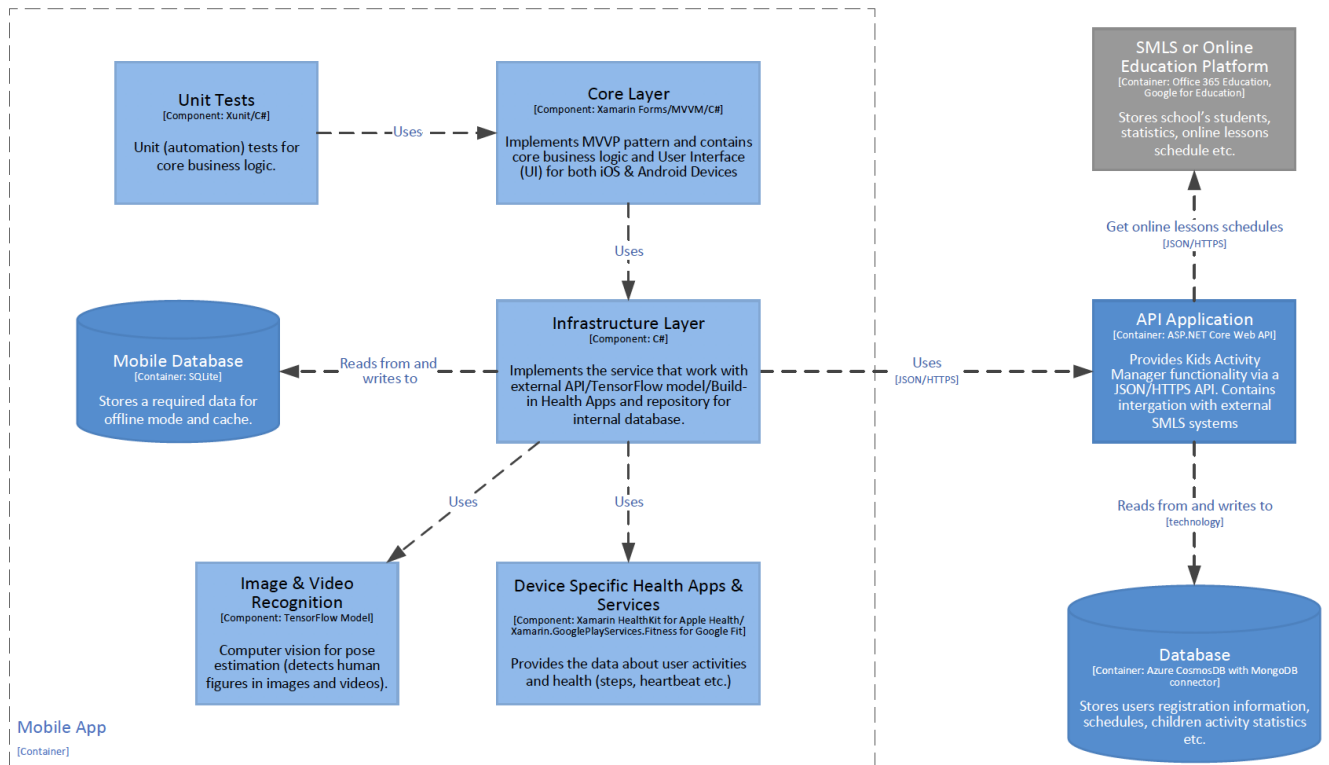
Appendix 6. Business Model Canvas

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONSHIPS	CUSTOMER SEGMENTS
▪ Technology provider (TensorFlow, Azure Cognitive Services) ▪ Marketing agency ▪ Conferences & trade shows ▪ Apple Store and Google Play as distribution partners	▪ Research and development ▪ Marketing and sales ▪ Engagement with users via online channels **KEY RESOURCES** ▪ Human capital (product, design and development team) ▪ Infrastructure (servers, licenses) ▪ Marketing and sales	▪ Motion-sensing personalized physical activities ▪ Smart reminders based on daily schedule ▪ Child progress and recommendations ▪ Goal settings to develop healthy habits ▪ Rewards for hitting goals ▪ Cross-platform access for both child and parent	▪ Excellent support service ▪ Updates with bug fixes and improvements ▪ Build and manage community of active parents who care about children health **CHANNELS** ▪ Apple Store & Google Play ▪ Website ▪ Social Media (Facebook, Twitter, other) ▪ Conferences, trade shows partnerships ▪ Paid ads	▪ Parent of 3-10 years old that spend more than two hours a day with mobile device ▪ Parents of 3-10 years old willing their children develop healthy habits ▪ Parents of 6-10 years old with more than 1 child who want to manage child time and daily schedule without lots of efforts

COST STRUCTURE	REVENUE STREAMS
▪ Team salaries ▪ Infrastructure cost ▪ Support service cost ▪ Administration expenses ▪ Marketing and advertising	▪ Monthly subscription ▪ Shop partnership fees

Appendix 7. EBITDA forecast with subscription price $5 per month

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue					
Subscriptions	$ 312,000	$ 937,440	$1,888,834	$ 2,729,737	$ 3,487,897
Cost					
MVP cost	$ 56,640				
Salaries	$ 115,200	$ 144,000	$ 180,000	$ 225,000	$ 281,250
Apple Store fee	$ 93,600	$ 140,616	$ 283,325	$ 409,461	$ 523,185
Infrastructure cost	$ 1,248	$ 3,750	$ 7,555	$ 10,919	$ 13,952
Gross profit	**$ 45,312**	**$ 649,074**	**$ 1,417,953**	**$ 2,084,357**	**$ 2,669,511**
Gross profit margin	*15%*	*69%*	*75%*	*76%*	*77%*
Marketing & sales	$ 530,000	$ 960,000	$1,290,000	$ 1,140,000	$ 1,140,000
Cost of customer	*$ 53*	*$ 48*	*$ 43*	*$ 38*	*$ 38*
Cost of customer saving, yearly		*$ (5)*	*$ (5)*	*$ (5)*	
Contribution margin	**$ (484,688)**	**$ (310,926)**	**$ 127,953**	**$ 944,357**	**$ 1,529,511**
Fixed admin costs	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000
EBITDA	**$ (508,688)**	**$ (334,926)**	**$ 103,953**	**$ 920,357**	**$ 1,505,511**

Appendix 8. EBITDA forecast with subscription price $10 per month

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue					
Subscriptions	$ 624,000	$ 1,874,880	$ 3,777,667	$ 5,459,474	$ 6,975,795
Cost					
MVP cost	$ 56,640				
Salaries	$ 115,200	$ 144,000	$ 180,000	$ 225,000	$ 281,250
Apple Store fee	$ 187,200	$ 281,232	$ 566,650	$ 818,921	$ 1,046,369
Infrastructure cost	$ 1,248	$ 3,750	$ 7,555	$ 10,919	$ 13,952
Gross profit	**$ 263,712**	**$ 1,445,898**	**$ 3,023,462**	**$ 4,404,634**	**$ 5,634,224**
Gross profit margin	*42%*	*77%*	*80%*	*81%*	*81%*
Marketing & sales	$ 530,000	$ 960,000	$ 1,290,000	$ 1,140,000	$ 1,140,000
Cost of customer	*$ 53*	*$ 48*	*$ 43*	*$ 38*	*$ 38*
Cost of customer saving, yearly		*$ (5)*	*$ (5)*	*$ (5)*	
Contribution margin	**$ (266,288)**	**$ 485,898**	**$ 1,733,462**	**$ 3,264,634**	**$ 4,494,224**
Fixed admin costs	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000
EBITDA	**$ (290,288)**	**$ 461,898**	**$ 1,709,462**	**$ 3,240,634**	**$ 4,470,224**

LITERATURE

1. Rideout V. The common sense census: Media use by kids age zero to eight / V. Rideout. // Common Sense Media. – 2017.

2. N Hinkley T. Mothers' and father's perceptions of the risks and benefits of screen time and physical activity during early childhood: a qualitative study / T. Hinkley, J. McCann. // BMC Public Health. – 2018.

3. Kathleen E L. Screen time and physical activity behaviors are associated with health-related quality of life in Australian adolescents. Quality of Life Research / Lacy Kathleen E. // 2012.

4. Mustafaoğlu R. The Negative Effects of Digital Technology Usage on Children's Development and Health / Rüstem Mustafaoğlu. // ADDICTA. – 2018.

5. Sudan V. Trends in cell phone use among children in the Danish national birth cohort at ages 7 and 11 years / V. Sudan. // Journal of Exposure Science and Environmental Epidemiology. – 2016.

6. Fakhouri T. Physical activity and screen-time viewing among elementary school-aged children in the United States from 2009 to 2010 [Електронний ресурс] / T. Fakhouri, J. Hughes, D. Brody // Jama Pediatrics. – 2013.

7. Donnelly J. Physical activity, fitness, cognitive function, and academic achievement in children: a systematic review [Електронний ресурс] / J. Donnelly // Med Sci Sports Exerc.. – 2016.

8. Hamilton K. A Psychosocial Analysis of Parents' Decisions for Limiting Their Young Child's Screen Time: An Examination of Attitudes, Social Norms and Roles, and Control Perceptions / Kyra Hamilton. // The British Psychological Society. – 2016.

9. Associations Between Parenting, Media Use, Cumulative Risk, and Children's Executive Functioning / D.Linebarger, R. Barr, M. Lapierre, J. Piotrowski. // J Dev Behav Pediatr. – 2014.

10. Michelle P. Screen time and young children: Promoting health and development in a digital world / Ponti Michelle. // Pediatrics & Child Health. – 2017.

11. LeBlanc A. Active video games and health indicators in children and youth: A systematic review / A. LeBlanc, J. Chaput, A. McFarlane. // PLoS ONE. – 2013.

12. National Health Interview Survey // National Center for Health Statistics. – https://www.cdc.gov/nchs/nhis/releases/released201905.htm#7a

13. State of Mobile // AppAnnie. – 2020. – https://www.appannie.com/en/go/state-of-mobile-2020/

14. SensorTower – 2018. – https://sensortower.com/blog/revenue-per-iphone-2018

15. Subscriber share held by smartphone operating systems in the United States from 2012 to 2019 – 2019. – https://www.statista.com/statistics/266572/market-share-held-by-smartphone-platforms-in-the-united-states/

16. What is the value proposition canvas? – https://www.b2binternational.com/research/methods/faq/what-is-the-value-proposition-canvas/

17. Levitt T. Marketing Success Through Differentiation — of Anything / Theodore Levitt. // HBR. – 1980. – https://hbr.org/1980/01/marketing-success-through-differentiation-of-anything

18. Whole Product Game // 2013 – http://tynerblain.com/blog/2013/08/01/whole-product-game/.

19. Ries E. Lean Startup / Eric Ries., 2011. – 336 p. – (Crown Publishing Group).

20. Business Model Canvas –https://en.wikipedia.org/wiki/Business_Model_Canvas

21. Worldwide mobile app retention rate during the first 90 days of ownership as of March 2016, by mobile platform – https://www.statista.com/statistics/243728/worldwide-mobile-app-user-retention-by-mobile-plaform/