

PARENTECH THE FUTURE OF PARENTING

TREND REPORT 2019



Parentech - The Future of Parenting

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better ventures group is a family-owned venture-building company whose mission is to enhance the quality of people's lives with simple, honest and beautiful experiences. It aims to improve industries from a customer, partner and employee perspective by creating better businesses, providing better services and modeling a better work experience.

As a family-oriented company, we are familiar with the day-to-day challenges faced by modern families. And we are convinced that there are products and solutions which can make parenting easier. It is in this spirit that we have begun exploring how digital innovation can help families live a better life. We believe in parentech.

Visit the website www.better.group for more information.



A project of the Center for Digital Technology and Management (CDTM)

The Center for Digital Technology and Management (CDTM) is a joint, interdisciplinary institution for education, research, and entrepreneurship of the Ludwig-Maximilians-Universität (LMU) and the Technische Universität München (TUM).

It offers the add-on study program „Technology Management“ for students from various backgrounds, which provides students with tools and knowledge at the intersection of business and digital technologies.

The entire trend report was written by CDTM students under the close guidance of research assistants.

Visit the website www.cdtm.de for more information.

PREFACE OF THE EDITORS

As Herman Kahn, one of the founding fathers of modern scenario planning, nicely states, it is tremendously important for strategy and policy makers to get a deep understanding of possible future developments in order to be prepared for them.

The Center for Digital Technology and Management (CDTM) aims to empower innovators of tomorrow. It is our mission to equip our students with the tools and knowledge they will need to become responsible leaders, who actively shape their future environment, rather than only react to changes.

This trend report is the result of the course Trend Seminar, which is part of the interdisciplinary add-on study program "Technology Management" at CDTM. About 25 selected students of various disciplines, such as Business Administration, Economics, P, Computer Science, Electrical Engineering, and others, work together on a relevant topic related to ICT. Over the course of seven intense weeks of fulltime

In addition, we thank all our lecturers, who shared their knowledge and largely contributed to this project's success:

Andreas Schrems (Freelance Consultant)
 Aaron Defort (CDTM)
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 Esther Prax (Innovation & Design Thinking Consultant)

work, the participating students dive deeply into the topic of the Trend Seminar. Working in several interdisciplinary sub-teams, students apply the knowledge of their main studies and learn new perspectives from their team members. They conduct trend research, develop scenarios of the future, generate ideas for innovative products or services, and detail them out into concrete business concepts. We would like to take the chance to thank everyone who contributed and made this CDTM trend report possible:

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 Stefan Bielmeier (CDTM)
 Tom Schelo (CDTM)

“ **Everybody can learn from the past. Today it is important to learn from the future.** ”

Herman Kahn

We want to thank better ventures group for supporting this Trend Seminar. Particularly, we want to thank Christoph Behn, Tina Dreimann and Cedric Duvinage for their great interest in the topic, the valuable insights and feedback throughout the whole project, and the collaborative organization and topic definition of this Trend Seminar.

Last but not least, we would like to thank the CDTM students of the class of Fall 2019. They put great energy and enthusiasm into this project, which made it a pleasure for us to supervise the course and coach the individual teams.

Philipp Hofsommer and Philipp Hulm

Center for Digital Technology and Management

PREFACE OF THE PROJECT PARTNER

Running a family-oriented company network and parenting three children ourselves, we know from personal experience what families are up against every day – and while the balancing act between family and work commitments is the most obvious, we know just how many more challenges exist. Parents feel torn between their professional responsibilities and their parental role, constantly wondering how to provide their children with healthy nutrition (while having little or no time to cook), how to protect their children in both the real and the digital worlds (without being overly controlling), and how to be there for their children while also being at work most of the day. And these are but a few of the issues.

As an employer, we have taken it upon ourselves to create a working environment which helps parents strike just the right balance. We offer part-time and tandem positions, remote work options and flexible working hours. We have come to see that this flexibility alone can positively affect family life. And yet we want to do more. Since the very start of kartemacherei, our core venture, parents have been our most important customer segment. We strongly believe that by pairing our deep understanding of parental needs with digital technology, we can enhance the quality of family life by developing solutions to make parenting easier.

While smart devices for parenting already exist (70% of parents say smartphones, tablets, baby phones and monitoring systems have moved into their homes), there is still a huge playground in which new solutions can be developed and improvements made. Parentech is all about bringing the benefits of digital technology to family life in the best possible way. It's about freeing up time and emotional capacities, providing support, and facilitating decision-making – for strong parents and confident children.

Technologies such as the Internet of Things (IoT) or virtual reality offer a huge potential for new products and services. In our desire to harness the power of digital innovation to make

things better for families, we joined forces with the Center for Digital Technology and Management (CDTM). Together, we ran a trend study to identify parents' habits and needs when it comes to digitalization.

Over a seven-week trend seminar, we had the opportunity of working with a diverse group of highly motivated students who, by analyzing parenting from different angles, were able to identify respective trends. Their research examined changing family models, future parenting scenarios and related business ideas. How will common knowledge be affected by, on the one hand, the rise of individualized learning and, on the other, the increased investment in pre-school education? Where are we headed when it comes to childhood security, in both the real and the virtual worlds? In this trend seminar, the students expanded their focus on family-specific topics to include economic and technological developments, too – from the sharing economy to big data, smart connectivity and more.

Based on their research, the students developed future scenarios, identified key drivers, uncovered insights and generated promising investment ideas for businesses. We're confident that with the profound knowledge which emerged, and

“ **Always plan ahead.
The future is only one step away.** ”

Christoph Behn

the business ideas that were created, we now have a head start in shaping a rising industry. And we're already working on our first prototype!

We're deeply grateful to have had the opportunity of working with the Center for Digital Technology and Management, the Bavarian hub for innovation and excellence. To all the students who participated in the trend seminar, we offer a massive thank you for your hard work, creativity and wisdom. A special thanks also goes out to Philipp Hulm and Philipp Hofsommer who coordinated the seven-week trend analysis and drew up this forward-looking piece of work, which is absolutely worth reading.

Nobody can predict the future, of course. Yet, no matter which scenario our society moves towards, technology – with all the positive solutions it holds in store – is our future.

Fintech, proptech, insuretech? We believe in parentech!

Jennifer and Christoph Behn, Hamburg

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METHODOLOGY

For a given topic that is highly impacted by digital technologies, the Trend Seminar pursues three main goals:

- To analyze the status quo, recent developments and identify important trends
- To develop extreme scenarios of the future, in order to be prepared for upcoming challenges
- To develop future-proof product and service ideas and detail them out into business concepts.

These goals are represented by the three phases of the trend seminar: the Basic Phase, the Scenario Phase and the Ideation Phase.

Twenty-six students, supervised by two doctoral candidates, pursue the Trend Seminar in seven weeks of intensive full-time work alongside with their project partner. In each phase, interdisciplinary subteams are formed including students from technology, business, and various other backgrounds to combine versatile ways of thinking.

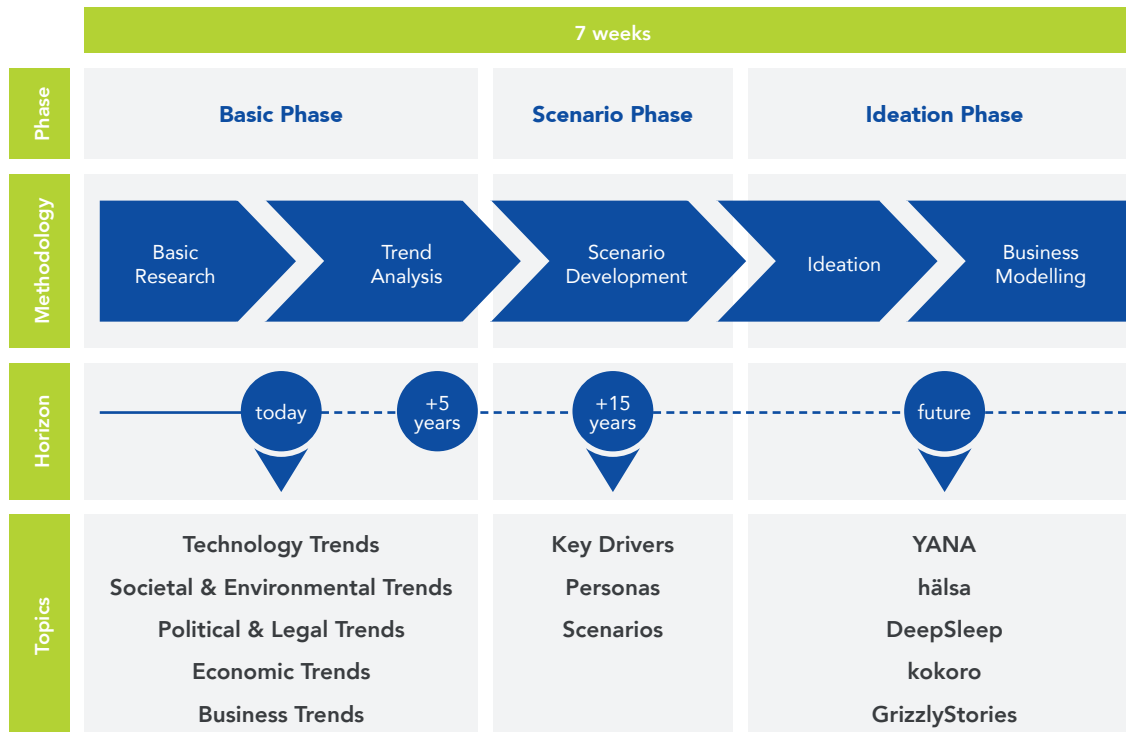
The **Basic Phase** yields a holistic overview on recent developments and trends in the environment of the overall topic. Based on the commonly used STEEP approach (Social-Technological-Economic-Ecological-Political), the status quo and trends in the fields society & environment, technology, economics, politics & legal, as well as emerging business models are analyzed. Knowledge is gathered by literature research, preceded by a series of input presentations by experts on the topic.

The class is split into five teams, each working on one of the thematic scopes. At the end of the Basic Phase, the teams present their key findings to each other in order for everyone to get a holistic view on the topic to build upon in the following phases.

The **Scenario Phase** builds upon the analyzed trends in order to create four extreme scenarios of different futures in twenty years ahead. Driving forces behind developments are identified and specified as drivers with bipolar extreme outcomes. Once specified, all drivers are ranked according to their respective impact on the overall topic and the perceived degree of uncertainty regarding their outcome. Two key drivers that are independent from one another and have both a high impact and a high degree of uncertainty are chosen and, with their bipolar outcomes, used to create a scenario matrix of four extreme scenarios. A timeline for each of the scenarios is created and the scenarios are sketched out using persona descriptions and visualizations. The Scenario Phase starts with a two-day workshop followed by group work in four teams. Teams are newly formed in order to include experts from each subtopic of the Basic Phase in each new Scenario Team.

In the third phase, the **Ideation Phase**, the goal is to develop innovative business concepts, which are then tested against the previously developed scenarios. Within a two-day workshop on structured ideation following the SIT approach (systematic inventive thinking), a large number of business ideas are developed.

Out of these, the most promising five ideas are selected and further developed into detailed business concepts. The business model canvas by Alexander Osterwalder and Yves Pigneur serves as the base structure. At the end of the seminar, the business model concepts are presented to the project partner and guests.



LIST OF ABBREVIATIONS

API

Application Programming Interface

AR

Augmented Reality

B2B

Business to Business

B2C

Business to Consumer

bn

billion

CCTV

Closed Circuit Television

CRISPR

Clustered Regularly Interspaced Short Palindromic Repeats

DR

Digital Reality

ECEC

Early Childhood Education and Care

EU

European Union

EUR

Euro

GDPR

General Data Protection Regulation

GPS

Global Positioning System

GDP

Gross Domestic Product

HCI

Human Computer Interface

IVF

In Vitro Fertilization

IT

Information Technology

IoT

Internet of Things

IP

Internet Protocol

LGBTQ

Lesbian, Gay, Bisexual, Transsexual, and Queer

LED

Light Emitting Diode

m

million

OECD

Organization for Economic Cooperation and Development

PGD

Preimplantation Genetic Diagnosis

tn

Trillion

TüV

Technischer Überwachungsverein

TV

Television

USD

United States Dollars

VR

Virtual Reality

WHO

World Health Organization

TRENDS

The following chapter lists current trends that have a strong impact on the future of parenting in the digital age. In accordance with the Basic Phase methodology, trends and related driving forces are structured in five areas: technological trends, societal and environmental trends, legal and political trends, economic trends and business model trends.

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TECHNOLOGY TRENDS

INFLUENCING THE FUTURE OF PARENTING IN THE DIGITAL AGE

Autonomous Things
Smart Connectivity
Quantified Self
Digital Reality
Assisted Reproductive Technology

TECHNOLOGY TRENDS

Influencing the Future of Parenting in the Digital Age

The sociocultural shift of millennials is transforming family life. While the number of single-parent households is increasing, parents tend to conceive at an older age and aim to earn a double income. Simultaneously, expectations in childcare rise, leaving parents with the challenge to provide their children with excellent education and multifaceted experiences. Thus, family time turns into a fundamental asset, which can be enabled through emerging technological trends.

Adopting technologies can be used for education to improve the way we learn or for business to gain a competitive advantage. In search of family time, parents will adopt any technology that substitutes repetitive work. ATs such as robotics, drones, and vehicles correspond to the underlying paradigm shift. Housekeeping robots will gain increasing popularity as they take care of simple tasks and support parents in balancing time between childcare and career. Likewise, autonomous vehicles can transport children without parental supervision, and drones take over grocery delivery gifting parents valuable time.

Another technology that eases parenting is IoT, enabling smart connectivity. Chores traditionally handled by humans can be shared efficiently between intelligent appliances and

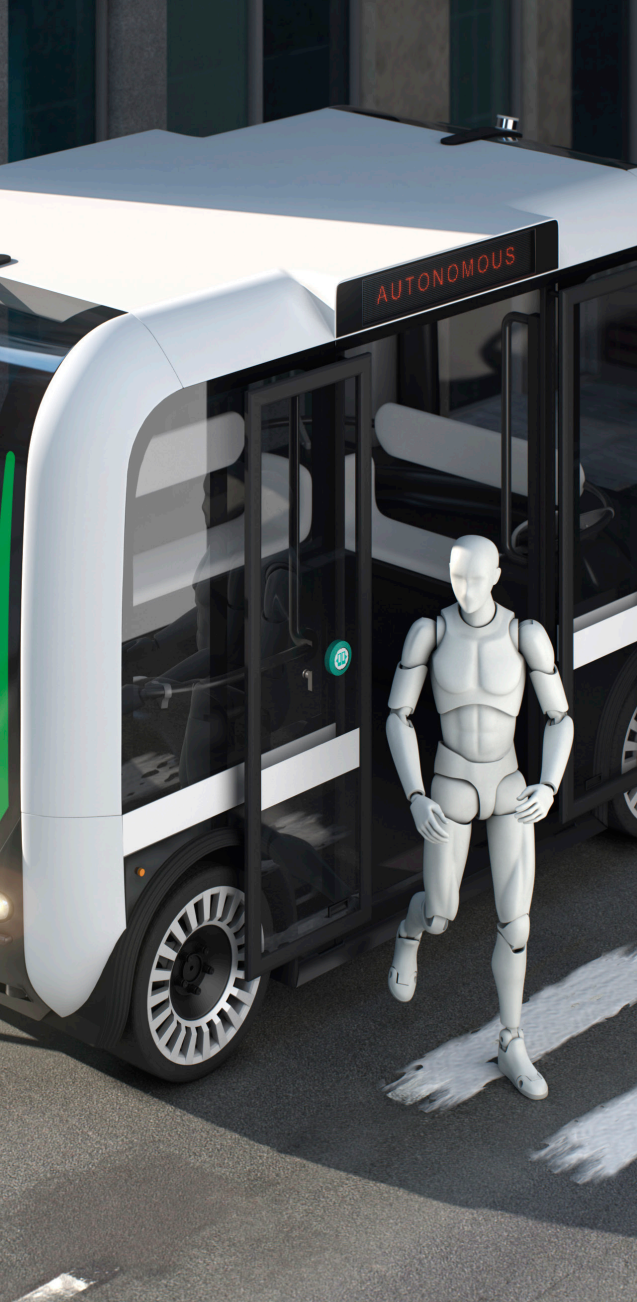
give parents time with their children. Alongside these features, smart connectivity decreases housekeeping costs and energy consumption fitting perfectly to the convictions of environmentally cautious millennial parents.

Additionally, smart home security systems may increase child safety and tackle significant parental concerns. Beyond home security, monitoring technologies address parents' concern of the child's well-being, enabling them to supervise their offspring without being always present. Sensors allow remote data tracking, which can be used to analyze the embryo's vital signs during pregnancy or monitor the infant's heartbeat and oxygen level during sleep. Furthermore, GPS tracking technologies allow parents to locate their children in case of emergencies to give both a sense of safety at a young age. Further parental concerns include providing the child with meaningful entertainment at home.

DR supports the development of children by personalizing childcare entertainment and creating a learning experience by immersing children into a virtual environment. DR is comprised of AR and VR, which transform digital communication through volumetric displays allowing Face-2-Face communication among family members. This technology enables par-

ents to parallelize tasks with DR or to prepare themselves for parenthood through visual insights into childbearing and childcare.

Parents who even struggle to conceive a child naturally, due to infertility, are granted the opportunity to give birth to a genetically-related child through ART. With the societal shift towards alternative family constellations, IVF, as well as cryopreservation, not only help traditional parents become a family but also enable LGBTQ and single parents to conceive a child through egg and sperm donations. During an ART procedure, parents have the option to screen their offspring for genetic diseases through PGD, where technologies such as CRISPR enable human germline engineering.



Technology Trends

AUTONOMOUS THINGS

ATs Enable Parents to Focus on Childcare by Taking Over Routine Work

Autonomous technologies exist cross-sectorally and are capable of performing tasks that were traditionally handled by humans. ATs are either physical or digital entities operated in the form of vehicles, drones, robotics, and agents that use AI principles [1]. Automation impacts parenting primarily in developed economies by gradually liberating parents from repetitive tasks. However, most consumers only cautiously adopt ATs by letting them perform merely narrowly defined tasks [2].

Nonetheless, the technological advances in the field are undeniable, and thus, ever more use cases regarding parental adoption of ATs arise, including autonomous vehicles, delivery drones, or robotics in childcare [3], [4]. These autonomous technologies promise a strategic relevance for parenting by offering services targeting the daily routines of this customer field, while all of the observed sectors show strong historical growth rates [5], [6], [7].

Consequently, the multi-faceted ATs increasingly facilitate the life of parents and enable them to maximize the time spent with their children [8].

Facts:

- 73% of tasks in the accommodation- and food services sector can be automated through robots [2].
- Drones enable 65km parcel delivery in less than 30 minutes reducing costs to 1 USD [9].
- 38% of US parents spend over 5 to 10 hours a week driving children to daily activities which devour parental leisure time [10].
- 79% of US parents indicate that they feel comfortable letting their child ride unaccompanied in AVs [11].
- The global robotics, drones, and autonomous vehicles industries grow to 500bn USD, 82bn USD, and 36bn USD by 2025, respectively [7], [12], [13].

Key Drivers:

- Automation progresses as big data algorithms enter domains of pattern recognition. This enables ATs to gain advanced dexterity allowing them to perform wider ranges of manual tasks [14].
- As 71% of millennial mothers work, they have increased demand for task automation and higher disposable income to purchase novel technologies [15].
- 5G network expansion for customized vehicle-to-everything services will facilitate inter-vehicle data exchange building infrastructure for improved transport fluidity and road safety [149].
- The creation of legal frameworks for autonomous vehicles and drones is supported by high German political- and scientific institutions to match technological advances [17], [18].

Challenges:

- Western parents are skeptical about letting ATs handle emotional childcare tasks as machines possess little sensitivity in empathetic situations [19].
- Robots only become social companions once they surpass the “uncanny valley” defined as emotional dip occurring when humans encounter entities that are almost, but not quite, human in appearance [20].
- Despite advancements in computational hardware, software developments for autonomous technologies remain a critical bottleneck for AVs [21].
- Although supported by high-level institutions, the legal frameworks regarding political and ethical issues are not sufficiently developed to derive the legal perpetrator if ATs jeopardize peoples life [22], [23].

Impact on the Future of Parenting:

Initially, ATs will serve as assistance for rather than substitution of parental tasks revolving around housekeeping and mobility. Parents will remain reluctant when it comes to machines performing emotional tasks such as childcare though they will embrace AT task substitution for mundane tasks such as cleaning or grocery delivery [11], [19]. As societal changes let mothers increasingly return to professional life, task automation will be in high demand to gain time for childcare [15]. Hence, the technological and political changes in favor of automation in the decade ahead pave the way for ATs to shape the future of parenting [2].

SMART CONNECTIVITY

Connecting Family Members by Leveraging IoT Technologies

A smart home consists of highly advanced automatic systems with appliances connected through an IoT infrastructure. The infrastructure is the foundation that enables smart connected homes that allow seamless connectivity between several home appliances [24].

Smart homes offer parents the opportunity to monitor and actively control their home in real-time regardless of their location. For instance, while at work, parents can control lighting and temperature or pre-heat the oven. Moreover, home intelligence systems extend these primary control functionalities by analyzing sensor data to infer and dynamically adapt to changing conditions. Herein, the AI module can identify irregular or unexpected events and potentially alert family members in relevant security cases [25].

Additionally, the integration of smart speakers in such systems provides smooth interaction between occupants and their devices at home [26].

Facts:

- Global IoT spending is expected to increase with a CAGR of 13.6% until 2022 reaching 1.2trn EUR [27] of which 12bn EUR will be spent on smart home devices in 2019 [28].
- In 2019, IoT devices and services will reach an inflection point of 18% to 20% adoption [29].
- By 2020, 20bn devices will be online [30].
- A third of US-American parents, who actively use voice-activated assistants consider them helpful in accomplishing parenting tasks [31].
- 63% of US-American consumers cite home security as the biggest motivation to purchase a smart home device [32].

Key Drivers:

- Deployment of 5G cellular networks enables data-intensive global IoT applications [33].
- The average cost of an industrial IoT sensor has decreased by 66% compared to 2004 [34].
- Decreasing cost of CPU memory and storage makes it cheaper to collect, transfer, and process data on an industrial level [35].
- Increasing availability of high-speed wireless networks, cloud-based data services as well as the development of application programming interfaces (API) [36].
- Development in general-purpose sensors allow family homes to become smart environments without invasive instrumentation [162].

Challenges:

- The high purchase price of smart home devices is currently the major obstacle for costumers [163].
- Difficulty of device installation is the biggest concern for families [164].
- According to the presently used Internet Protocol (IP) – IPv4 – only a limited number of unique IP addresses is available [165].
- Technical interoperability between devices lacks due to non-consistent standardization [166].
- Data transference issues evoke high security and privacy risks [166].

Impact on the Future of Parenting:

The support provided by smart homes significantly reduces the mental load parents bear, which accumulates due to constant responsibility pressures. Especially for dual-income families, who find it challenging to balance their role as a parent and as an employee, smart homes support in mundane tasks that do not require parent-child connections [42]. As a result, parents have the opportunity to engage in other more enjoyable activities with their children, forming a stronger parent-child relationship [43]. Moreover, the deployment of smart homes increases safety, decreases operation costs, and improves energy efficiency due to intelligent operating decisions [29].





QUANTIFIED SELF

Adoption of Health Monitoring & Location Tracking to Ensure Well-Being and Safety

Quantified Self is widely regarded as an innovation trigger [44]. It is a movement promoting individual self-knowledge by collecting as much personal data as possible in areas such as sleep quality, nutrition, blood pressure, and even emotions [45]. Vital signs arising from this data can be monitored remotely through apps, toys, wristbands, or biometric garments and allow parents to track their children's health status and nutritional needs.

Similarly, monitoring babies grows in popularity which uses symptomatic devices to screen the child's heart rate, cognitive as well as physical development [46]. Technological advances in areas such as sensor technology, wearable computing, IoT, and wireless communication have enabled these monitoring techniques. Furthermore, parents can locate their children through location-based services and use baby monitoring devices for surveillance and communication [47].

Facts:

- Global fetal monitoring market expected to exceed 3bn USD by 2024 at a CAGR of 6.5% [48].
- In July 2019 there were 47,878 iOS healthcare apps available representing a 5.84% increase over the previous quarter [49].
- Baby trackers serve to monitor aspects of an infant's health and well-being, for instance, sleeping temperature [50].
- Availability of baby monitoring products, such as smart baby socks and smart diapers by Lumi, increase infants' vital signs [51], [116].
- 65% of 250 US parents agree to use CCTV and GPS technology on school buses to ensure child safety [53].

Key Drivers:

- 5.4bn USD globally investment into digital health start-ups fuel market growth [54].
- 70% of women in a US study were willing to change their behavior during pregnancy in response to receiving personalized recommendations from a smartphone [353].
- Stretchable electronics enable the development of flexible and comfortable wearables for adults, babies, and small children [56].
- Technical developments in emotion recognition-based child location tracking systems improve the accuracy of location tracking and can identify emergencies [57].

Challenges:

- Low reliability and accuracy of current monitoring products [58].
- Development and enforcement of minor's right to data privacy and dataveillance [59].
- Children use technology gaps to deceive their parents when using location-based services [60].
- Parents remain skeptical when it comes to the excessive usage of technologies monitoring children [8].

Impact on the Future of Parenting:

Monitoring children undoubtedly gives parents a more relaxed mind concerning their offspring's well-being. However, this constant control of their child may also lead to obsessive behavior and could have adverse effects on a parent-child relationship. Parents may not learn to trust their child as they always have the option to "double-check" and children may have difficulty to be autonomous even missing out on experiences that they would have had without parental control [61], [62], [63].

DIGITAL REALITY

Educating and Entertaining Family Members Through Sophisticated Immersive Experiences Into Distant Worlds

Digital Reality (DR) simulates reality across most of the senses through immersive technologies such as Augmented Reality (AR), Virtual Reality (VR), or 3D holograms [64]. AR technologies can help educate children and also parents by overlaying the natural world with computer-generated sensory input [65], [66]. DR enables interaction with entirely different worlds using headsets or multi-projected environments. Thus, parents can introduce their children to unknown worlds and new abstract concepts, e.g., other planets [67], [68]. The intuitive interface through gestures, emotions, and gazes results in more authentic and thus better learning experiences [69]. Using VR applications and 3D Volumetric Displays enables computer games in the education and entertainment sector to become a face-to-face social experience [70], [71].

Furthermore, they facilitate remote communication between parents and children when real person-to-person contact is not feasible as they appear virtually in 3D [71], [72]. DR technologies are increasingly attractive for consumers as current developments improve the wearability of devices or make them even obsolete. Thus, they are more easily adopted in everyday life and increasingly accepted by society [73], [74].

Facts:

- Many studies investigate increasing interest in and value of educational settings through AR applications [75], [77].
- 62% of parents in representative US sample and 94% of UK teachers believe that VR will provide beneficial educational experiences [78], [79].
- AR usage provides better teamwork, communication, or information retention and more learning motivation and satisfaction for children in kindergarten, school, and at home [79], [80], [81].
- DR applications enable parents to train how to deal with infants and support them during pregnancy by giving a visual insight into childbearing [82], [83], [84], [85].

Key Drivers:

- Capabilities to deliver immersive experiences progress through better 5G standards and efficient computer-vision-algorithms [86].
- Children's access to smartphones is increasing, e.g., from 75% in 2018 to 90% in 2019 among 12-13-year-old German children [87], [88], [89].
- The development of new holographic-systems and advanced AR contact lenses leads to better integration of DR technologies into daily life [90], [91], [92], [93].
- Companies such as Facebook, Google, or Apple have groups dedicated to DR technologies (over 400 VR-employees at Facebook) and further expand their workforces [94].

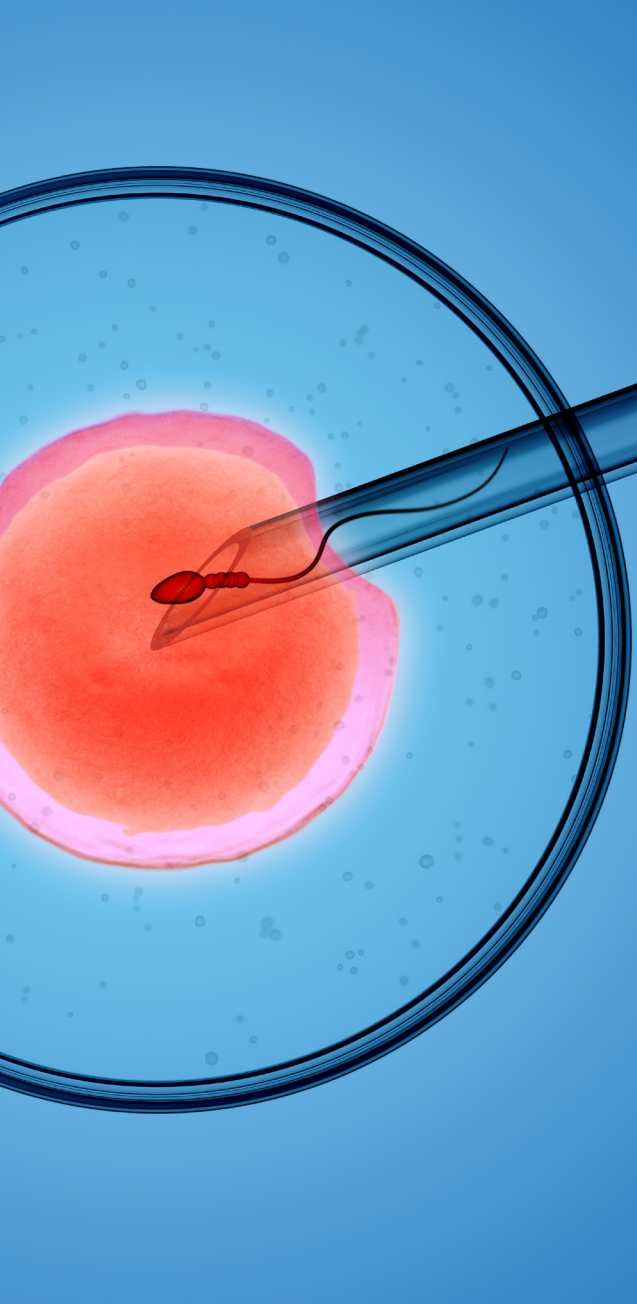
Challenges:

- DR technologies bear threats for children such as technology addiction, cognitive overload, virtual bullying, or motion sickness [76], [95], [96], [97], [98], [99].
- Concerns amongst parents arise due to VR systems tracking children's sensitive data [89], [100].
- DR technologies can distract people from reality potentially leading to accidents [101].
- Adoption of DR applications is stagnating due to legal bans of smartphone use for children and the tendency of some parents to pursue "tech detox" [102], [103].

Impact on the Future of Parenting:

DR technologies have the potential to personalize children's interaction with technology, e.g., by reacting to specific play patterns or teaching movements in augmented mirrors, so that parents benefit from children's higher learning motivation [104], [105], [106], [107], [108]. Additionally, parents using AR lenses to check apps parallel to doing childcare can save plenty of time. Taken together, future parents will have more individual opportunities and time to educate and entertain children, especially in new contexts. Moreover, they will experience greater freedom in intra-family interaction, which is becoming more important in a globalized world with increasing distances between family members.





Technology Trends

ASSISTED RE-PRODUCTIVE TECHNOLOGY

Technological Advancements Give Infertile Parents the Valuable Gift of Life

ART refers to the fertilization of an embryo outside of the body, where IVF is a key method of ART, in which the embryo is fertilized with sperms and surgically implanted into the woman's womb. Further development in recent years is cryopreservation, where frozen embryos are stored and can then be transferred arbitrarily [109]. It avoids a second procedure to obtain oocytes if the previous IVF was unsuccessful and gives women the option to conceive at a later point in time, in case the woman has to undergo medical treatment or wants to postpone motherhood [110]. Besides, IVF and cryopreservation are increasingly adopted by LGBTQ communities as well as single women to realize their wish to conceive genetically related children through sperm or egg donations [111]. PGD screens for genetically inheritable disorders in the embryos before implantation to avoid passing on those diseases. Recent technological developments, like CRISPR, will allow human germline editing for medical purposes, such as treating HIV/AIDS and non-medical purposes, such as sex-selection, entering the realm of genetically altered infants called "designer babies" [112], [113].

Facts:

- 9% is the estimated global average infertility prevalence in 2015 – globally, the highest infertility rates are primarily in regions with poor access to ART [114], [115].
- 56.1% (40.5m) of infertile women seek counseling while only 22.4% (16.2m) receive medical care [116], [115].
- The success rate of giving birth climbed to 22.5% with fresh eggs and 17.7% with cryopreserved eggs through IVF [117].
- The market size of ART in the US is valued at 16.68bn USD with an expected CAGR of 10.2% until 2026 [118].
- Studies show no negative psychological long-term effects on family relationships of IVF-conceived children [119].

Key Drivers:

- Technological advancement in IVF and PGD allows for single-embryo transfer avoiding multiple pregnancies while maintaining high success rates and significantly reducing risks of complications during pregnancies [120].
- IVF laboratory cost decreased by up to 90% through high-tech developments in a simplified culture system which will broaden access to infertility medical care in developing countries [121], [122].
- Sociocultural shifts let women delay childbearing due to career focus, medical treatment, or absence of the right father, increasing the demand for fertility preservation techniques as these women are affected by age-related infertility [123], [124].

Challenges:

- PGD is highly criticized by the handicapped community as it suggests that the life of a disabled person is less valuable than the life of a non-disabled person [125].
- Even though IVF helps overcome infertility, there is an exponential decrease in pregnancy probability with a higher risk of miscarriages after the age of 35 while the chance of bearing a child for women above 43 years is under 8% [117].
- Controversies around CRISPR defer technological and medical advancements due to unknown health risks of gene-modified infants and immense ethical implications such as consent-violation of the affected child [126].

Impact on the Future of Parenting:

Technological developments in ART will increase access to medical care for parents with involuntary infertility giving low-income families and communities in less-developed countries the chance to conceive a genetically related child as procedure costs are dropping rapidly [121], [122]. However, huge controversy is arising about gene-editing technologies. On the one hand, it will allow us to advance our medical abilities to fight diseases significantly, but will also open the gateway for non-medical designer babies initiating the race of human perfection and perhaps perpetuating social inequality [111].

SOCIETAL & ENVIRONMENTAL TRENDS

INFLUENCING THE FUTURE OF PARENTING IN THE DIGITAL AGE

and let thy feet
millenniums hence
be set in midst of knowledge

Family Downsizing
Career-Focused Mothers
Changing Family Models
Individualized Education
Conscious Lifestyle Choices

SOCIETAL & ENVIRONMENTAL TRENDS

Influencing the Future of Parenting in the Digital Age

Societal and environmental values and views provide the basis for living together as a family. Changes in this area are facilitated by an increasingly open and educated society, changing roles within families, and viewpoints on educating children. As such, the size, structure, and meaning of families vary across history. However, as of now, families are still considered to be a core building block of society.

While the essential function of families, childbearing, stayed constant over time, society is dynamic and evolves by default - hence, parenting is changing with it. In the following sections, five major societal and environmental trends are discussed, which will affect how parenting evolves in the future.

First, downsized and only-child families become the new norm as fertility rates are decreasing and delayed family formation becomes common. Parents respond to this change with an increased focus and interest in their child's well-being and future success. In general, the effort put into educating and caring for a single child has increased over time and will continue to do so in the future.

Second, society's focus on a career is growing. Fading gender roles, economic necessity, as well as a growing share of women with higher education, lead to an increasing number of mothers shifting from doing chores and taking care of their children to working full-time. Due to rising housing prices and availability of jobs, this trend is particularly prevalent in western and urban areas. Hence, parents increasingly outsource parenting-related tasks and leverage childcare institutions to support their parenting activities.

Third, typical family models are evolving as non-traditional family models are gaining popularity. Non-traditional models include single-parents, patchwork-families, same-sex marriage, and many other forms. This development has substantial implications on the parent-child relationship, the values and activities children experience, as well as the traditional task distribution amongst parents. With this societal shift, defining new norms for families and family values will be of great importance.

Fourth, there is an increasing interest in alternative individualized education, such as online courses and alternative schooling models. A key factor for this development is the rise of individualism and increased awareness about alternative education models. On the other hand, Massive Open Online Courses (MOOCs) are gaining traction. They are leveraging technological advancements and provide children with the best possible education, even at an early age.

Fifth, a general societal shift towards a more conscious lifestyle and an increased awareness of the environmental impact of one's life can be noted. Parents are buying excessive amounts of products to support their parenting tasks and are thereby also shaping the awareness of their children. This trend has a particular effect on parental life and parenting in general. Through the increased adoption of public transportation for parenting, parental priorities shift. As such, it can be vital that kindergartens are easily accessible by bus.



Societal and Environmental Trends

FAMILY DOWNSIZING

Investment in Children Will Increase as Overall Family Size Shrinks

Until 2050, global population growth is expected to slow down by 10% compared to today, causing a shift in demographics [127]. This development can be linked to low fertility and birth rates, which in turn are impacted by the environment we live in, as well as changing societal values and lifestyles.

Our living environment is increasingly urban, where resources are precious, and space is scarce. As a result, parents-to-be consider personal economics, the given infrastructure, and support offers before starting a family [128]. Societal value change can be registered regarding the role of women and their presence in the workforce. In western countries, women now tend to marry at a later age and pursue their careers more effectively [129]. As a result, families are started at a later point in time, producing less offspring overall.

Be it economic or cultural motivations, a strong demographic development towards raising smaller, in some cases, only-child families, can be noted [130]. Subsequently, society at large is facing increased economic pressure as the population is aging while children experience increased attention from their parents, financially and emotionally.

Facts:

- Until 2050, general population growth is expected to slow down by up to 10%, compared to today [127].
- Women in the EU give birth to 1.5 children on average, a number that is declining steadily and has halved since the 1950s [131].
- Parents in the US report having sacrificed their financial security for the sake of their children, as pressure mounts to prioritize and invest in children [132].
- Parents now spend twice as much quality time with their children compared to 50 years ago, meaning more time reading and socializing with one another [133].

Key Drivers:

- Birth and fertility rates in western countries are declining. Rates have halved between 1950 and 2017; from 4.7 to 2.4 average children per woman [134].
- Urbanization and the often resulting increase in living costs as well as focus on work impacts birth and fertility rates and delays parents' decision to build a family [135].
- Women in western countries are increasingly active in the workforce and prioritize their careers over early motherhood, thereby delaying childbearing [129].

Challenges:

- While our population is aging, population growth is slowing down. As a result financial pressure on individuals is increasing, such as the growing tax burden to care for the elderly [136].
- Due to an increased number of only children, children's social development and competence is increasingly subject to the social environment they are in, offline and online [137].
- As the family size is shrinking, parents direct more attention and pressure towards their children. Both can be harmful, as children may feel overwhelmed or sheltered as a result [138].

Impact on the Future of Parenting:

In a world where birth rates are continuously dropping, children become a precious good. Whether it is the delay in starting a family, low fertility, or individual preference to conceive fewer children, family downsizing drastically impacts the parent-child relationship. For one, financial and emotional efforts are condensed, rather than spread amongst several children. This may affect a child's emotional, intellectual, and physical development. As an example, an only-child may receive private schooling opportunities, as parents have more money to spend and no other children to consider. Additionally, the scarcity of children may pressure parents to invest in and focus more heavily on their child's upbringing. Parents may feel a sense of pressure to provide best-in-class parenting to be able to compete with their peers. Thus high-investment-parenting may develop into a status symbol.

CAREER-FOCUSED MOTHERS

Dual-Earner Families Will Increase Demand for Childcare and Quality Time With Children

Fading gender roles, as well as a growing share of women with higher education, empower women to put a higher emphasis on their career [139], [140]. As a result, female employment rates are rising [141]. To attract talent and address the need for skilled labor, more companies are offering perks such as on-site childcare and paid parental leave. Simultaneously, economic anxiety and higher living costs - mainly due to housing expenses - force many mothers to work since poverty risks for families with children are increasing [142], [143].

In turn, demand for childcare is increasing, and quality time is becoming more critical to maintain the bond between parents and their children. The availability of childcare facilities for pre-school children has improved considerably in recent years. Still, access to public childcare facilities for smaller children under the age of 3 is not guaranteed for a large share of families [144]. This forces many parents to take parental leave or to turn to private arrangements, which are often costly or hard to find [145].

Facts:

- 45% of women aged 30-34 have completed tertiary education, which is 10% higher than for men of the same age group, in the EU in 2017 [146].
- On average nearly 60% of couples are dual-earners in OECD countries, a number that is increasing [147].
- The employment rate of mothers with children under the age of 3 increased from 14% to 33% in Germany from 2006 to 2016 [148].
- Living costs are rising due to higher housing expenses, which are growing almost three times faster than the median household income since 1990 [149], [150].

Key Drivers:

- Female workforce is increasing due to better education and weakening gender roles.
- Companies are developing family-friendly initiatives such as on-site childcare to attract skilled labor [151, p. 151].
- Higher living costs and increased poverty risk for families with children [143, p. 137] are putting parents under financial stress.

Challenges:

- Commuting to and from work and collecting children [151, p. 147] in addition to often-times family-unfriendly work schedules [151, p. 128] makes combining a job and family difficult.
- Childcare remains costly and scarce, despite expansion and support efforts by governments [151].
- Preserving the parent-child bond is difficult due to parents' time constraints.
- Mothers face high pressure both from work and from society, as they are still seen as the primary caretakers by a substantial share of society [151, p. 128].
- Parental leave negatively affects parents' careers as it reinforces prejudices (e.g., less commitment to their employer) [151, p. 125].

Impact on the Future of Parenting:

As more parents become dual-earners, quality time with children as well as good childcare will become more critical. Outsourcing childcare to third parties and finding suitable options such as public daycare facilities or private arrangements will be at the center of parents' concerns. Balancing the job-family conflict will be a growing issue for parents. Because more parents are working, children spend more time without them, and parents will need to put effort into maintaining a healthy relationship actively. Therefore, the need for quality time, where families engage in shared activities will grow.





Societal and Environmental Trends

CHANGING FAMILY MODELS

The Decline of Traditional Family Models is Challenging Traditional Task Distribution

Traditional western family models comprising a married heterosexual couple are declining in OECD countries. In contrast, alternative family models, such as single-parenting, same-sex-marriage, and patchwork families, are gaining popularity [152]. As such, parental responsibilities are also increasingly provided by relatives, friends, and professional childcare institutions [139]. This development is driven by a gradual weakening of traditional gender roles leading to a declining responsibility of mothers as sole caretakers in families, as well as an increasing acceptance of diverse family models, such as LGBTQ partnerships and adoption of children [139], [153], [154]. The growing number of couples with children from previous relationships has a substantial effect on the way parenting is done and perceived in society.

Facts:

- Although the traditional family model (e.g. a married couple and children) is still predominant, the number of alternative models like cohabitation, single-parent households, and same-sex partnerships is increasing [155], [139], [152].
- From 2008 to 2018, the rate of mothers of minors in the workforce has increased by 12% in Germany while the share of mothers with children under the age of three increased from 41.7% to 55.5% in the same period [156], [157].
- Individuals with higher incomes and working mothers are three times more likely to make use of early childhood education and care (ECEC) like daycare across the OECD countries [158].
- The mean age of marriage has increased from 24-30/22-27 (male/female) in 1990 to 29-35/27-33 in 2016 across all OECD countries [155].
- The average age of mothers at first childbirth has risen by four years in the period from 1970 to 28 in 2008 [159].

Key Drivers:

- The level of higher education and female participation is expanding on a global scale [159].
- Traditional gender roles are weakening as the number of stay-at-home mothers is decreasing [139].
- Unlinking of sexuality, marriage, and reproduction: the number of births outside marriage is increasing [159].

Challenges:

- Legal and financial support for non-traditional family models are not always on a par.
- Childcare is hardly affordable for low-earning couples or single-parents [160], [161].
- Hard to preserve a strong parent-child-bond despite outsourcing of parental responsibilities.
- Higher age at birth giving affects risks of complications during delivery.

Impact on the Future of Parenting:

Traditional family models and associated parenting are getting less prevalent in western societies. Gender roles are weakening, and alternative partnership models are challenging parent-child relationships, workforce distributions, as well as society at large. This development impacts task distribution within the family and in turn, encourages the outsourcing of parental responsibilities to other family members and friends, as well as professional institutions. Due to that, services such as professional daycare could develop towards fully-fledged parenting solutions with intellectual, physical, and social stimulation for the children. This could replace the need for parent-child interaction in the far future. Additionally, part-time caretakers and non-biological parents potentially have a different relationship with children than traditional families, influencing the activities, priorities, and values of children.

INDIVIDUALIZED EDUCATION

Alternative Ways of Education for Children Are on the Rise

Individualized education includes alternative methods of teaching the child aside from a given public school system. The term covers alternative schooling models such as Montessori, Waldorf, or home-schooling, as well as online learning systems, all of which are becoming increasingly common in western societies [162], [163]. Within these models, content and speed of learning are adapted to the individual needs of each child, thus yielding better results than through traditional ways of educating [164], [165].

Due to technological advancements, online personalized education becomes available to a broader range of children and make customized education available at a lower cost [166]. An example of this is MOOCs platforms that can be accessed online and that offer diversified curriculum tailored to the child's education level and learning goal.

Facts:

- Parents increasingly seek personalized education for their children, e.g., through private or home-schooling [167].
- The number of free Waldorf schools in Germany increased by 55% in the period between 1992 to 2017, bringing the total number of these schools to 226 in 2017 [163].
- Scientists acknowledge that the personality differences in children require a much more individual education style than propagated before [168].
- The global e-learning market is expected to reach \$238 billion by 2024 [169].

Key Drivers:

- Due to technological advances, access to online learning resources has dramatically increased in the past decade [169].
- Individualism and personalization are key consumer trends that are driving education to be personalized as it increases learning effectiveness [170].
- The negative perception of current education models as heavily inflexible and outdated. For example, over 2.7 million students all over the United States are participating in online learning [171].

Challenges:

- The gap in early education is widening since access to alternative, and individualized education is primarily available to the connected and educated part of society [172].
- Maintaining society's educational standards is tricky when using decentralized MOOCs as the quality and relevance of the educational content on these systems is not controlled by a central governmental institution [173].
- Curriculum adaptation for each child based on its strengths and pace involves subjective decision making by the teachers which could lead to a greater imbalance in some subjects coverage compared to standardized school structures [174].

Impact on the Future of Parenting:

The adoption of alternative educational models is spreading in western societies due to the increasing acknowledgment of them as a supplement to or replacement of traditional education methods [171]. Technological advancements in data analytics and natural language processing are further driving the availability of appropriate tools for younger children and thus fulfilling the need for a better and personalized education at an early age. This will revolutionize education to become consumer-centric by offering a more customized learning experience for children and making it more transparent for parents to track the progress of their children and to be part of shaping their children's curriculum.





Societal and Environmental Trends

CONSCIOUS LIFESTYLE CHOICES

Parents Opt for Environmentally Friendly and Sustainable Consumption

Today's parents increasingly consider products, services, and activities in the context of sustainability [175], [176]. This consideration causes a shift in consumer behavior of parents towards eco-friendly, waste-reduced options, which have less impact on the environment. With this change in behavior, parents significantly change the products and tools used for parenting, as well as the general beliefs and values of their children.

For one, this trend enables the adoption of reusable and sustainable products in hygiene, clothing, and entertainment [175], [176]. Another significant aspect is the broader adoption of public transport for parents and their children, especially in urban areas [177]. On a grander societal level, an increased focus on healthy nutrition can be noted, which is particularly relevant for parents, since they are shaping the dietary behavior of their children.

Facts:

- Globally, 62% of all consumers expect companies to engage in sustainability, transparency, or fair employment practices. [178].
- From 2014 to 2019, the share of parents and the general population who consider sustainability to be an essential buying criterion doubled from a third to over 60% in the US [175], [176].
- Compared to previous generations, younger generations have a higher willingness to pay a price premium of 50% to 100% for sustainable products [176].
- Parents in urban areas are diversified in their mobility practices and often rely solely on public transport [177], [179].

Key Drivers:

- Environmental issues are becoming increasingly visible in society due to environmental and climate changes and corresponding media coverage [180].
- As the worldwide population becomes increasingly urban and wealthy are more likely to be concerned with the environment [180], [181].
- Generation Z as one of the primary drivers of movements like Fridays for Future will surpass Millennials in population size in 2019 [176].

Challenges:

- Although sustainability is an important buying criterion for parents, not all are financially capable or willing to pay a price premium for it [176].
- An economic recession could shift priorities of consumers away from environmental and sustainability concerns [180].
- While public transportation is more sustainable than owning a car, families in suburban and rural areas often do not have viable alternatives due to insufficient public infrastructure [177].

Impact on the Future of Parenting:

As parents become more aware of their environmental impact, they adapt their consumption and lifestyle towards sustainable products and activities. Since children's consumption of clothing, hygiene products, and new toys is extensive in the first years and parents are the primary decision-maker in the procurement of these items, the development will have a substantial effect on the parenting product demand and in companies' product offers and branding. The increased adoption of public transport creates new demands for facilities. As such, it can be necessary that, e.g., kindergartens, increase their accessibility by bus and train. From a relationship perspective, this trend will impact the parent-child relationship as such as sustainability becomes a core aspect of the children's beliefs and values. The first effects of this development are already visible in social children-driven movements. With extensive media coverage and increasing societal awareness towards the topic, parents of the future are expected to prioritize sustainability to an even larger extent, leading to an increased effect on their parenting and consumption behavior.



LEGAL & POLITICAL TRENDS

INFLUENCING THE FUTURE OF PARENTING IN THE DIGITAL AGE

Increasing Investments in Preschool Education
Heightened Emphasis on Healthy Lifestyles
Rising Awareness for Childhood Security
Establishing Parent-Friendly Policy Frameworks
Standardization of Data Privacy

LEGAL & POLITICAL TRENDS

Influencing the Future of Parenting in the Digital Age

The government is responsible for setting the frame within which society functions. On that basis, parents expect the government to provide an environment in which their children can grow up to become healthy, sheltered, and well educated. These expectations are in line with the government's aim of ensuring a prospering population and economy.

However, due to the ever-increasing rate of societal change, regulatory bodies are struggling to keep pace with society as for adapting legal and policy frameworks in a timely and adequate manner. Thus, this section elaborates on five trends in the legal and policy sector that impact today's and future parents. The trends elicited span from education policy over security and health to governmental accessibility and financial support.

Regarding early childhood education and care (ECEC), numerous studies show that investing in pre-school education has the highest return on investment of all educational spending. Particularly, low-income families and immigrants benefit from ECEC, as it prevents inequality. Consequently, multiple policy initiatives target the education of children aged 1-5. Next to education, the importance of promoting a healthy lifestyle is shifting into the focus of governments. Especial-

ly the escalating number of obese children moves into the spotlight of politicians. Obesity has a detrimental impact on life expectancy, as it causes several life-threatening diseases. Ministries aim to tackle this issue by increasing awareness around screen time reduction and balanced diets.

Alongside extensive malnourishment, child maltreatment is prevailing in the European Union (EU), though official statistics vary greatly amongst EU member states. Nevertheless, it is in the best interest of governments and parents alike to create secure online and offline environments for children to grow up mentally and physically stable. Therefore, several authorities are pushing policy initiatives to ensure the security of its children and educate them about it.

Even with enforced security in the virtual world, the expanding digital footprint of families calls for broader data protection measures. Moreover, the particularly sensitive personal data of families heightens the importance of data privacy. Realizing this, the EU has taken measures into its own hands by introducing standardized data privacy regulations, such as the General Data Protection Regulation (GDPR) in 2018. Besides, future policies go beyond the simple protection of personal data by regulating the algorithms using this data.

Not quite apace with users, governments are increasing their digital footprints as well. Driven by digitization, the internet increasingly permeates governmental services. Hereby, digital de-bureaucratization presents itself as an opportunity to reach lower-income, less-educated families, as additional more intuitive-to-apply-for services are offered online.

Taken together, governmental awareness regarding the problems of parents is on the rise. Like so, expanding regulatory efforts to ease parental problems become visible. The upcoming pages elaborate on these trends, providing data, explaining challenges, and showing the impact these trends have on parenting in the digital future.



INCREASING INVESTMENTS IN PRESCHOOL EDUCATION

Parents Can Expect Extended Offers of High-Quality Early Childhood Education

Across the globe and especially in the EU, ECEC is becoming an increasingly important topic as a growing body of research shows substantial economic, social, and educational benefits of preschool education for multiple stakeholders. For one, children profit from ECEC through higher projected future earnings, greater educational success, and improved social integration. While mothers can re-enter the labor market earlier and parents have more time for themselves when their children are taken care of. In the long run, society profits from reduced spending on welfare and lower crime rates as high-quality ECEC reduces inequalities for children from disadvantaged backgrounds [183].

These reasons make investing in ECEC one of the rare policies that are both economically efficient and socially fair. The German government tries to make use of the advantages through increased investments in ECEC over the next few years, though it faces challenges when implementing this policy. As only high-quality ECEC is effective, providing enough resources for teachers and establishing a thoughtful curriculum is key. The role of technology in providing high-quality ECEC and its influence on child development is not agreed upon yet between experts [184].

Facts:

- Children learn most quickly during the first 5 years of their lives, as the largest proportion of synapses in the human brain forms during early childhood [185].
- 15-year-olds who attend preschool for 1 year or more score higher in OECD's PISA study than those who did not [186].

- Increasing investments by the German government in ECEC from 845m EUR in 2017 to 945m EUR in 2018 and additional 1.13bn EUR provided until 2021 which is money well spent as returns on investment of ECEC are the highest among all educational investment [187].
- High-quality ECEC has proven to mitigate social disadvantages for children with migration background effectively [187].

Key Drivers:

- A growing number of families in Germany with double-earning parents at least part-time with children aged 1-5 leads to greater demand for ECEC offers [188].
- A rising number of children with a migration background in German childcare with an increase of 17% from 2012 to 2018.
- Demand for specialized, high-skilled jobs in today's knowledge-based economy that require early learning of language, cognitive, and emotional skills [189].

Challenges:

- Taking advantage of ECEC necessitates high quality, which requires sufficient funding, as well as social, emotional, and instructional aspects of the provided care [190].
- Further research required as the influence of technology on children's development is not well understood, yet children spend an increasing amount of time using digital products like computers and smartphones [190].
- Balancing between extracurricular activities, such as learning to play a musical instrument and simple child's play becomes increasingly difficult, although a child's play is a significant factor of a child's healthy development [191].

Impact on the Future of Parenting:

State-offered ECEC enables mothers to reenter the labor market sooner after childbirth and, thus, decreases income inequality and enlarges the individual households' budgets [184]. ECEC is particularly important for parents with a migration background as disadvantages that their children might encounter in life can be overcome early on [184]. Furthermore, parental involvement in ECEC increases its quality, fosters deep parent-to-child relationships, and offers parenting support through peer advice [183]. In the future, an increasing number of parents will hold the authorities accountable for providing high-quality ECEC.

HEIGHTENED EMPHASIS ON HEALTHY LIFESTYLES

Governments Encourage Families to Live Healthy and Reduce Obesity

The German government spends more than 10% of its annual budget on healthcare [192]. The promotion of healthy lifestyles significantly reduces healthcare spending. Hence, Germany made health a priority of the G7 during their presidency [193]. Additionally, statutory health insurance companies increase their spending on disease prevention and promotion of healthy lifestyles. Currently, the majority of healthcare funds are allocated to fight obesity, a crucial driver for physical and mental health issues [194], [195]. Various regulatory bodies are eager to prevent the impending health risks posed by obesity for children by educating parents. Examples for initiatives committed to reducing obesity are the “Joint Action on Nutrition and Physical Activity” supported by the EU [196], [197].

Similarly, the United Kingdom introduced nutrition traffic light on groceries to indicate nutritional values [198]. In addition to the governments’ efforts, parents should be equally supportive with regards to children’s diets and physical activity [199]. As parents are role models, they must be educated on the risks of and solutions for child obesity.

Facts:

- Between 1970 and 2015 global obesity rates tripled with 340m overweight or obese children and adolescents aged 5-19, resulting in 6% of girls and 8% of boys being obese [200], [201].
- 13% of the global adult population is overweight, independent of wealth [201].
- Globally more people are obese than underweight and more deaths are linked to obesity [201].

- Obesity in children among others increases risks of cardiovascular disease, diabetes, and depression [201].
- Poor academic performance is directly linked to malnourishment [201].

Key Drivers:

- Prevalence of unhealthy diets caused by an increased intake of energy-dense foods and larger portion sizes [202].
- Decreased physical activity causes a lower overall energy consumption through rising numbers of sedentary jobs, changing modes of transportation, and increasing urbanization [203], [202].
- Psychological factors like stress or negative childhood events can cause unhealthy eating habits [203], [202].
- The negative influence of social factors, such as growing usage of electronic devices, the impact of communities, and affordable unhealthy meals [203], [202], [201].

Challenges:

- Starting prevention as early as possible to diminish consequences caused by obesity [203].
- Promotion of healthy lifestyles in all areas of life, e.g. in school and kindergarten to reach the majority of children [203].
- Teaching children and parents to make well-informed dietary decisions [203].
- Restricted availability and affordability of living a healthy lifestyle [201].
- Targeted marketing of unhealthy food, mainly aimed towards children and teenagers [201].

Impact on the Future of Parenting:

A healthy lifestyle for children is highly dependent on their parents. Therefore, the government should motivate parents to achieve a healthier lifestyle at home [202], [203]. Through focused initiatives, the authorities can nudge parents to change the diet of their children, i.e., by limiting the energy intake from fats and sugars and increasing the number of fruits, vegetables, or nuts [201]. In addition to switching to a balanced diet, parents are taught by the regulatory bodies to engage their kids in regular physical activity [201], [202]. Moreover, by acting as a role model, parents inspire their children to make healthy dietary decisions independently [201], [203].





Legal and Political Trends

RISING AWARE- NESS FOR CHILDHOOD SECURITY

Governments Are Increasing Support for Parents Seeking to Ensure Their Children's Protection

A secure childhood is known to be a strong indicator of the long-term mental and physical well-being of children [204]. However, child maltreatment is still prevalent, and coupled with the looming threats of new media, the early development phase of children appears to be increasingly under threat. Besides the challenges for the child, this issue places a burden on parents and governments, which rely on a healthy young generation to support the future economy [205]. As a result, international institutions such as the World Health Organization (WHO) and other European initiatives are keen on promoting evidence-based programs, which are being adopted by national governments [206]. Much of the progress will rely on the joint effort of authorities, industries, and parents to ensure the security of children in the digital era [207]. Future parents, in particular, will have to inform themselves about the protection of their children through various educational offerings. In these programs, parents learn how to resolve conflicts with their children and be more confident about their parental role. Consequently, parents can have a more positive approach towards their daily interaction with children by feeling more assured that they are parenting the right way.

Facts:

- At least 55m children suffer from maltreatment in Europe [208].
- Over 600 yearly cases of preventable child deaths due to abuse in Europe [208].
- In Germany, parental care was withdrawn either fully or partially more than 16,000 times in 2018 [209].

- A third of internet users worldwide are children and about 12% of European children aged 9-15 experiencing cyber-bullying [210], [211].
- Only 54% of parents of 5-15 old children believe that the benefits of the internet outweigh its risks [212].
- Facilities for child support in Germany increased from 2006 to 2016 by 18% [213], [214].

Key Drivers:

- Increased involvement of international organizations, such as the WHO, aiming to reduce child maltreatment by 20% until 2020 [206].
- Growing adoption rate of EU countries for national action plans to tackle child maltreatment through home visitation, positive parenting, or school-based education programs [205], [215].
- Accelerated policy development to ensure cybersecurity in the EU [216].
- Earlier interaction of children with the internet and shifting media consumption behavior from watching TV to accessing online content through mobile devices for ages 8-15 [212].

Challenges:

- Lacking standardized approaches for monitoring child maltreatment cases [217].
- Emotional difficulty for children to share their hardship about maltreatment with others.
- Speed of technological development exceeds the rate of legislative progress in internet regulation.
- Requirement for an international, multi-stakeholder approach to ensure successful internet-related policy [210].

Impact on the Future of Parenting:

To ensure that children grow up in a protected environment, parents can take advantage of an increasing number of child support initiatives offered by the government and other organizations. As a result, future parents will develop a better understanding of their children, which will strengthen their connection. Moreover, parents need to support children in building their digital literacy [218]. Consequently, this could mean for future parents that they spent more time monitoring their children's interaction with digital devices and take a more active role in defining boundaries for the use of the internet.

FORMING PARENT-FRIENDLY POLICIES

Governments Incentivize Parenthood by Providing Financial and Corporate Benefits

Low fertility rates threaten the economic stability of nations, as this results in a notable decline of the working-age population while the growing number of retirees leads to higher government spending on pensions and healthcare [219]. The fact that women have children at a later stage in their life or choose not to have children at all is partly driving this demographic change [219]. Overall, both women and men tend to first establish themselves in the labor market before starting a family, as being employed for many of them is part of their self-image [220]. Governments, therefore, incentivize citizens to have children by creating financial frameworks such as the implementation of “Parental Allowance Plus” and partnership bonuses, which enable parents to return to work sooner and to spread the governmental funds over a longer period. Furthermore, political initiatives foster a child-friendly working environment, which encourages both parents to be more involved in the upbringing of their children. Governments are prompting institutions to reduce bureaucratization and digitize their services, to grant easy access to these initiatives – especially targeting lower-income and less-educated families – which makes it already possible to apply for child benefits online [221].

Facts:

- Parents in Germany have to fill out up to 17 forms to be granted parental benefits [222].
- The German government is planning to raise child benefits and child allowances in 2021 by 2.4% [223].
- In 2017, the average number of children per woman in Germany amounted to 1.57, thus less than needed to maintain the current population size and, therefore, negatively impacting the economic growth and stability [224].
- Until 2022, Germany strives to offer all of the 575 public service offerings online [222].

Key Drivers:

- 60% of Germans see a secure job as a prerequisite for starting a family while perceiving current work arrangements as inflexible and economically insecure [225].
- 59% of parents in Germany perceive governmental support as too low and feel like family support is necessary to compensate for the disadvantages of parents compared to childless people [225].
- Declining fertility rates in economically-developed countries because parents feel the need to be financially well-off while having children [226].
- Rising demand from parents with under-age children for family policies that foster better reconciliation of private and working life [227].
- Decreasing public acceptance of sole-earner model [227].

Challenges:

- Small and medium-sized companies struggle to compete with larger corporations in providing adequate parental benefits [228].
- Parents feel that information on parental benefits by the government are not widely known and feel that they are not kept up to date with regulatory changes [220].
- Many families fail to capitalize on the childcare subsidies due to parental beliefs that they were not eligible [229].
- Governments face high costs when introducing policies such as child allowance or parental allowance [223].
- Germany is EU-wide below average regarding digitization of the government [230].

Impact on the Future of Parenting:

Through governmental efforts, bearing a child becomes more affordable for the average citizen. Additionally, parents enjoy more flexibility in allocating their time between childcare and professional occupation, making it easier for them to strive for self-fulfillment. The new self-image of women and men is aimed at their equal economic independence, which requires a fair division of tasks. Therefore, the government subsidizes companies to establish family-conscious personnel policies by providing families with a flexible work regimen to suit their situation. Moreover, families are relieved of administrative burden due to improved accessibility of regulatory services. In particular, lower-income families with a weak educational background profit from their intuitive and easy access [229].





STANDARDIZATION OF DATA PRIVACY

Regulators Are Improving Personal Data Protection of Personal Data of Families

Data fuels the digital age, and the data generated by children under the age of 13 is growing faster than that of most other online users [231]. In light of increasing child internet users and recent data breaches, the concerns about child data privacy are rising [231]. In response, regulators have started introducing policies to improve data privacy. The enforcement of the GDPR in May 2018 by the EU has given internet users more control over their personal data [232]. The GDPR also requires users below the age of 16 to obtain parental consent for accessing web-based services, and these services are strictly limited on personal data that can be collected [231].

Parents also benefit from standardized data protection in other countries, most notably in the US, because many services used today operate with servers located outside country borders [232]. The EU currently awaits the implementation of updated ePrivacy laws regulating personal data in artificial intelligence [233]. These regulations will limit the kind of content that is recommended to children based on their personal data and help parents in ensuring their children's exposure to safe digital content [234].

Facts:

- A study conducted across the UK in 2018 showed that parents post around 1,300 photos and videos of their children on social media by the time they reach the age of 13 [235].
- Since 2013, 14.7tr data records have been breached. As of 2018 social media companies account for 56% of all breaches [235].
- A survey in 2018 found that 69% of children have social media profiles by age 15 [212].
- Identity fraud caused by data breaches affect over 1m children in 2017, resulting in losses of 2.3bn EUR and families paying more than 487m EUR in financial damages [236].

Key Drivers:

- Heightened public anxiety on data protection due to recent breaches and harvesting of personal data for political and marketing campaigns [237].
- Pressure by citizens to build upon the standards set in the GDPR within the EU and globally [232].
- Desire for consumers to better understand, track and request insights into the use of their personal data [237].
- Rising demand for personal data in automated systems that make use of artificial intelligence [238].

Challenges:

- Global companies face a fragmented legal landscape concerning data protection and privacy. In the EU, these laws are applied nationwide, whereas in the US these are sector-specific [232].
- Implementation of legal frameworks that also regulate data collection in grey areas such as tracking through browser cookies and direct marketing [232].
- Flexibility of legal structures to allow technological innovation, while ensuring the protection of individual privacy [232], [239].
- Predicament in establishing biased and unethical decision making of machine learning algorithms [240], [241].

Impact on the Future of Parenting:

The GDPR and further privacy regulations will help parents in ensuring the protection of their children's personal data [212]. These laws and policies extend not only to service providers but to all entities that collect personal data of children, including healthcare and educational institutions [242], [241]. The increasing standardization of data privacy regulations over the upcoming years increases the trust of parents in the technologies supporting them in their daily parenting routines. Lastly, parents will need to be aware of their responsibility and accountability for the data they share of themselves and their children on social media.



ECONOMIC TRENDS

INFLUENCING THE FUTURE OF PARENTING IN THE DIGITAL AGE

- Growing Baby Care Market
- Rise of the Circular Economy
- Upsurge in Healthcare Investment
- Increasing Flexible Work Arrangements
- Attention Economy

ECONOMIC TRENDS

Influencing the Future of Parenting in the Digital Age

Families, as part of the economic chain of society, heavily depend on the micro- and macro-economic developments. The future of parents, and how they interact with their children, will be influenced by current changing trends in the economy. Late parenthood, as well as a focus on career development, define the new generation of parents. Thus, new families have a stronger financial position due to a higher family income and increased savings by the time they decide to have children. We have identified six economic trends that show how the future of parenting will evolve in response to the overall direction in which the international economy is moving.

As families have more money to spend, the parenting market is increasing. Not only are existing stakeholders growing, but a variety of start-ups targeting parenting needs are emerging. This effect is even more pronounced in the early years of childhood, which is why the baby care industry is growing strongly. The overall increase in accessibility to these products and services allows for more widespread and efficient

care for infants. Increasing access to services opens new opportunities for parents to adapt their family's consumption to economic and environmental problems, such as global warming, poverty, or inflation. Children's products have very short life cycles and produce vast amounts of waste. Therefore, parents increasingly search for reusable alternatives to support a shift towards a circular economy. The consumption behavior of parents will continue to adapt to more environmentally friendly options. In another instance, families are especially limited in their access to mental healthcare. Access to high quality, specialized medical attention is crucial for children's development in their formative years.

Both public and private stakeholders are increasingly investing in catering for high demands; meanwhile, families must adapt to the shortcomings. Companies also adapt to a changing economy. As millennials take over the workforce, new values and demands for work arrangements arise. Companies are obliged to alter traditional work frameworks to satisfy the needs of a new generation. Freelancers and flexi-

ble workers of today will be the parents of tomorrow. A shift in the working habits, for example, towards home-office arrangements, results in new forms of interaction between parents and their children. Not only work arrangements are influencing family life. In the age of constantly available information, the attention of all family members is of high value to media providers. As companies fight for both parents and children's limited attention, the time families spend together that involves common interactive activities is endangered. Hence, new forms of interaction and communication between family members need to exist.

GROWING BABY CARE MARKET

Growing Middle-Class Population Across the World Drives Market to New Heights

Caring for the newborn is the one most important task of parents. Therefore, parents spend a large share of their income on products and services that allow them to increase the wellbeing of their children.

Products like diapers and skincare-creams are a basic need for babies and something every parent tries to provide. As an increasing number of parents worldwide escapes poverty, the sales of such baby care products surge [243] [244].

This trend is especially observable in the Asia Pacific region, where many countries with rapid economic improvements and strong fertility rates are located, e.g., India and China [244], [244]. Baby care products are also helping the increasing number of mothers worldwide that become part of the workforce and appreciate time-saving, efficient solutions [245].

Facts:

- The global Baby Care market, which was around 87 Billion US\$ in 2017, is expected to grow by 4.4% annually between 2018 and 2024 and hit 108 Billion US\$ in 2024 [246].
- Compared to all other regions of the world, the Asia Pacific region will have the fastest-growing Baby Care market in the years until 2025 [244].
- The active players in the market like Unilever, P&G, Johnson & Johnson focus on increasing their global presence, especially in the Asia Pacific region, through M&A Deals and local brand promotion activities [244], [247], [248].

Key Drivers:

- The birth rates in developing markets are around 0.5 children per woman higher and are rising by 5.4% more than those in developed markets from 2018 to 2024 [249][248].
- The disposable income and living standards in emerging economies, mainly found in the Asia Pacific, are increasing, which makes convenience-oriented Baby Care products affordable and desirable [244], [247], [250].
- Awareness of baby nutrition, hygiene and safety in developing countries is increasing [247], [248], [250], [251].
- More women are joining the workforce, which directly translates into higher Baby Care product sales, as the women have a bigger need for time-saving, convenient products [249].

Challenges:

- Low fertility rates in developed countries complicate the market growth of Baby Care products there [252].
- The increase in manufacturing costs and R&D expenditures for Baby Care products as safety standards and quality expectations in developed countries is increasing, which e.g., result in bans of certain chemicals and numerous quality checks, [244], [245], [251].

Impact on the Future of Parenting:

Baby Care products offer a high degree of convenience to parents. Skin- or hair care creams, diapers, etc. provide easy to use hygienic measures to keep a child healthy [244], [246]. More and more people around the world can benefit from the usage of these products. In developing and in developed countries, the working women ratio increases, partly because Baby Care products allow for time-efficient caretaking of children [245]. The child mortality rate in countries where people can afford Baby Care products is also sharply decreasing as fatal infections due to a lack of hygiene are reduced [243], [245].





Economic Trends

RISE OF THE CIRCULAR ECONOMY

Parents' Consumption Shifts Towards Reusable Alternatives

The continuous improvement in resource productivity is partly responsible for generating unprecedented economic growth in the last century. However, as both manufacturers and families are confronted with environmental challenges, the need for a competitive and renewable resource management strategy rises. A circular economy, enabled by technological advances, could revolutionize the manufacturing process and consumer behavior in the next five years [253, p. 12]. The fight against climate change is a concerning topic for modern families. Each new family member will generate vast amounts of garbage throughout its lifetime [254, p. 5]. Hence there is a growing sustainability concern by the new generation of parents when deciding to have children [255, p. 2], [256]. The rapid mental and physical development of children results in short lifespans for children's products, and therefore in immense resource consumption and waste production [257], [258, p. 24]. A rising circular economy, which introduces principles of reuse, repair, and recycling into the value chain of products, is influencing the consumer behavior of parents [253, p. 12]. These will continue adapting to more sustainable alternatives, especially in the clothing, toy, and diaper industries.

Facts:

- An entire circular economy in Europe would generate a primary-resource benefit of as much as €0.6 trillion per year by 2030 [253, p. 12].
- Worldwide clothes generate 850 Mt of CO₂ emissions per year. The circulation of clothes reduces the environmental footprint by up to 80% compared to traditional consumption [259].
- Globally, it is estimated that 10 million usable toys end up in landfills every year, and 20 billion disposable diapers are added to U.S. landfills alone each year [257], [260].

Key Drivers:

- Governments in several, mostly European, countries have made laws to promote cleaner production, consumption, and end of product life management [261, p. 288], [262, p. 6].
- The private sector is growing awareness on the monetary benefits of integrating sustainability principles into their businesses; firms can increase their long-term revenue generation, for instance, through effective recycling and remanufacturing activities [261, p. 288], [263], [264, p. 1].
- The circular economy has a positive impact on climate change due to the reduced waste production and the decrease in greenhouse gas emissions associated with consumption [261, p. 288].

Challenges:

- Weak economic incentives make it difficult for enterprises to implement a circular economy [261, p. 296], [262, p. 6].
- Technological limitations for the effective and efficient recovery and reuse of products and components in complex products [261, p. 297].
- Society often has misconceptions about the quality, health, and safety of refurbished products [261, p. 298], [262, p. 6].
- A mechanism in which companies take used or faulty products back is difficult to be quickly and efficiently implemented by firms [261, p. 299], [265, p. 5].

Impact on the Future of Parenting:

Circular alternatives to children's products influence not only a family's spending economy and environmental footprint, but it also promotes values like responsibility and sharing. Rental models in the clothing industry give parents access to sustainable, high-quality clothes at competitive prices [259]. The toy industry successfully implemented toy rental models, and toy repair and restoration associations to save money and reduce waste [257], [266]. Furthermore, switching to reusable diaper alternatives reduces not only the family's environmental footprint but in some cases, also leads to a reduction in expenses [267]. This contrasts with the growing baby care industry, which has to adapt to new consumption behaviors.

UPSURGE IN HEALTHCARE INVESTMENT

Families Demand Better Healthcare Services

As society keeps evolving, the healthcare system must continuously adapt to changing and emerging threats to the public wellbeing. Increased demand for healthcare and a reduced amount of resources in health facilities has led to a deterioration of working conditions, low income, decreased staff levels, higher workloads, more stress, all of which negatively impact on safety and quality of care [268], [269].

Parents strive for the best care for their children; however, not all parents have access to the necessary health services to enhance the child's wellbeing [270]. Especially affected are families whose children have special needs [268], [271]. Governmental public and private entities in Germany and the US are increasingly investing in healthcare programs to satisfy the need for specialized healthcare as well as primary, secondary, and tertiary preventive measures [271], [272], [273].

Facts:

- Due to the aging population and cost-inefficient health policies, total welfare loss across Europe is estimated at 9.4% of gross domestic product (GDP) or €980bn [268].
- Average health and long-time care expenditure in the US projected to double by 2050, to reach 13% of GDP by 2050 [268].
- An estimated 20% of American children have emotional disorders [272].
- Mental health and substance use treatment spending from both public and private sources is expected to total \$280.5bn in 2020, up from \$171.7bn in 2009 [274].

Key Drivers:

- Aging population with higher rates of non-communicable diseases have increased frequency of health interventions, while healthcare costs have generally increased [268].
- Low government expenditure in health has led to insufficient resources and low-quality services, ultimately driving private investments [268].
- Corporate lobbying feeds the economic and political agenda that encourages more privatized models of healthcare [269].
- Millennials drive the changes in the health sector as they outnumbered baby boomers and are convinced that healthcare costs are too high and third-party insurers have too much power. [275].

Challenges:

- Too expensive private health services further deepen the financial burden of families [276].
- Since private profit-oriented entities focus foremost on urban areas with high population density, rural living families encounter inadequate medical care [277].
- Countries with a prevalent private sector face the risk of rising prices for primary health services, which endangers the healthcare of low-income families [278].

Impact on the Future of Parenting:

Access to high quality, specialized medical attention is crucial for children's development in their formative years. Until now, public health services provide families with insufficient healthcare, and parents turn focus to the private sector to satisfy their family's needs [270]. The mental healthcare sector is mainly affected by the lack of resources from the government, while the need for specialized mental healthcare for children continuous to rise [268]. Increasing investments of both public and private entities release parents from substantial medical expenses to provide their children with the required healthcare services [272], [270].





Economic Trends

INCREASING FLEXIBLE WORK MODELS

Parents Demand Flexible Work Schemes to Attain Work-Life-Balance Improvement

What once was considered the traditional work schedule, namely a rigid 9-to-5 and standard five-day week structure, has seen massive changes in recent years with flexibility as an umbrella term to describe any arrangement that breaks the traditional norm [279]. At its core, flexible work arrangements provide individuals with greater scheduling freedom over when, where, or how to fulfill the obligations of their particular positions [280], [281]. There are a plethora of different flexible work programs and its permutations are proliferating [279]. Flextime presents the most common arrangement, which allows employees far greater leeway regarding the exact working times, under the condition they put in the total number of hours required by the employer.

Other typical work schemes involve telecommuting, job-sharing, and part-time work, including compressed workweeks [279]. Many parents associate flexibility with the ability to improve work-life-balance, as flexible work arrangements provide parents with the opportunity to better cater to family and parental responsibilities along with their job obligations [281], [282].

Facts:

- 43% of American employees work at least part of the time remotely as of 2016 [283].
- As a result of flexible working, the UK economy is predicted to achieve a Gross Value Added increase by 64%, which represents £148 billion by 2030 [284].
- Flexible working is estimated to save individuals in the UK 115 million hours of commuting time per year by 2030, which equals 14 million working days [284].
- 47% of working American Millennials already freelance, and by 2027 half of the US population are projected to freelance [285].

Key Drivers:

- Increasing automation and advanced technologies enable employees to work remotely [286].
- Individuals increasingly strive for a work-life balance, where “an individual is equally engaged in and equally satisfied with his or her work role and family role”[287] [288], [289].
- Gender roles are changing, where women find self-realization in both having a career and being present for their children [290], [291].
- In the competition for scarce exceptional talents, companies strive to attract talents by enabling flexible work arrangements, authorizing highly skilled workers to individually decide when, where, and for how long to engage in work-related activities [286], [292], [293].

Challenges:

- Flexible working may lead to job pressure and mental strain for employees, as the obligations of work are constantly noticeable [294].
- Growing flexibility in the workplace comes with a lack of routines, which results in higher planning and coordination efforts.
- Flexible work arrangements such as teleworking may result in professional or social isolation, which can negatively impact job performance and well-being [295].

Impact on the Future of Parenting:

First, parents can allocate their working time to fit their child’s cycle to spend some hours to care for their child throughout the day. Thereby, expenses on childcare, such as for nannies, can be reduced, as parents are partly able to cover the time commitment. Second, flexible work schedules allow parents to choose their preferred work location, saving commuting time. This time saving can be dedicated to family affairs. Lastly, parents can align the number of working hours with family responsibilities and a child’s needs. Therefore, flexible work practices enable parent’s attainment of their work-life-balance [287], [296].

ATTENTION ECONOMY

Companies Fighting for Families' Attention

The digital revolution provides the world with a vast amount of information. This information overload is still increasing, but our mental capacity limits the amount we can process. As a result, our attention becomes a valuable resource and the limiting factor of consumption [297].

As children become more connected, companies are encouraged to make digital products more appealing to the younger segment [298]. Those incentives are also increased by new industries, such as e-sports, that are fighting to get a piece of the consumer's limited attention [299]. This increased competition boosts improvements in the techniques used to steer a user's behavior. These techniques make websites and mobile applications more intuitive and pleasant and open the doors for new digital products to engage children in educational ways. But, they are also triggering families to buy based on smart algorithms and enabling entertainment products to be addictive by design [300].

Facts:

- 54% of children in Germany aged 6-7 use a smartphone [300].
- In the US, mobile media usage of children aged 0-8 has tripled in 4 years from 15m per day in 2013 to 48m in 2017 [298].
- In the US, teens aged 13-18 average 2:38h a day watching video content, 1:11h of social media usage, and 1:21h playing video games [301].
- In 2019, the global e-sports market will exceed the billion-dollar revenue mark for the first time [302]. In contrast, the film industry earned 41.7bn from the box office globally in 2018 [303].

Key Drivers:

- An increase in children's online presence has expanded the exposure of the youth to companies seeking their attention [298], [300].
- The increasing amounts of available information create an information overload that increases the value of attention [297], [304].
- E-sports becomes mainstream due to the growing popularity of survival-based video games, growing prize pools for e-sports tournaments, the rise of live-streaming, and greater organization of pro leagues [305].
- The surge of technologies that can make our digital products more appealing and persuasive equip companies with tools to influence the parent's and children's behavior. [306].

Challenges:

- Parents need to balance the benefits and drawbacks of the increasing role of the internet in a child's life [307].
- Addiction and health issues caused by social media and gaming could see an increase in children as well as parents [308], [309], [310].
- Potential negative effects on a child's internal mechanism of self-regulation need to be overcome [311].
- Parents need to cope with the urge of children to be always online [312].

Impact on the Future of Parenting:

Parents and children increasingly spend more time with digital devices [298]. Companies compete for a family's limited attention and therefore increase the responsibility of parents to teach their upbringings how to consciously use their smartphones and tablets [298], [300]. This also creates the need to rethink how far technology should go in influencing the media consumption of families. For this reason, it is crucial to have mechanisms that control children's exposure to technologies that are increasing children's appeal to digital media [313]. At the same time, it is important to leverage the engaging nature of digital media to serve as an enabler to innovation in areas such as education.



BUSINESS MODEL TRENDS

INFLUENCING THE FUTURE OF PARENTING IN THE DIGITAL AGE

Automated Recurring Payments
On-Demand Services
Sharing Economy
Mass Personalization
Customer Engagement

BUSINESS MODEL TRENDS

Influencing the Future of Parenting in the Digital Age

Today's parents interact with businesses in a completely different way than previous generations did. Parents engage with communities through social media, use online marketplaces for a more convenient shopping experience, and utilize the internet as an entertainment platform. These trends have opened new opportunities for the delivery of products or services, unlocking new revenue streams through more innovative business models. The subsequent section covers five business model trends, which the parenting industry predominantly adopts. This section discusses the facts, key drivers, challenges, and the impact of the business model trends on parenting in the digital age.

First, the desire of parents to simplify purchasing processes has led to an increase in subscription models. Scheduled deliveries and automatic recurrent payments free up the minds of parents, allowing them to spend more time with their children and themselves. Subscriptions relieve parents of the burden of dealing with significant investments and allows for flexible payments and more adaptable products and services. Subscription business models are dominant in digital entertainment and education.

Second, on-demand services, which provide customers with products and services immediately after purchase, have been proven successful in the parenting industry. On-demand services meet parents' demand for flexibility in their busy daily lives. These services optimize the matching process between supply and demand, aiding parents in their search process for specific products or quality services such as certified babysitters. Overall, these advantages lead to increased convenience for parents and faster access to a wide range of trustworthy services.

Reducing parental expenses is also addressed by the sharing of goods through collaborative consumption. The increase in customer-reach through the internet drives parental sharing business models. While parents have always bought and sold baby gear, platforms with sharing business models are providing sustainable and convenient to a broader range of products and services. Furthermore, sharing platforms meet parents' urgent issues by offering suitable solutions for flexible needs for products and services.

Fourth, by delivering personalized products and experiences, companies meet parents' demand for feeling valued and recognized. When getting asked questions about their children's individual needs, parents are not only willing to pay more for a product but also feel like actively taking part in the process. Businesses focusing on personalization create a differentiated position. This differentiation opens up new revenue streams and leads to improved efficiency and reduced costs [314].

Fifth, by enhancing the impact of their products through active engagement with customers, companies are likely to increase their value to the customer and improve their competitive advantage. This active engagement appeals to parents, as their emotional participation in their children's development leads to a high need for buying processes that focus on parents' active involvement.



AUTOMATED RECURRING PAYMENTS

Emerging Revenue Streams Through the Convenience of Subscriptions for Parents

Subscription models offer time-limited access to a product or service with regular recurring payments. Besides gaining access to content with subscriptions, they can also be completed by paying for a duration upfront, often incentivized by discounts [315]. Especially in e-commerce, where products are shipped in an agreed frequency, the subscription market is expanding [316]. Parents are confronted with an increased amount of work and emotions. They are even more in need of time for themselves and their children than before birth. For this freedom of mind, not having to pay for recurrently needed items and services comes in handy [316]. Overall, as of 2018, the subscription model is specifically popular in IT (40%), digital media (23%), and e-commerce (23%) industries [317]. Children impose an ever-changing needs – be it physical products (e.g., diapers, clothes), taste, and preference (e.g., food, toys), or education (e.g., activities). Compared to investing in single opportunities, subscription models that may save costs and offer an extensive product variety become especially interesting for parents.

Facts:

- Parents with children younger than 18 years old are more likely to subscribe to TV/movie (70% vs. 50%), gaming (26% vs. 12%), personal care (11% vs. 6%), clothing (10% vs. 6%), supplies (11% vs. 5%), and prepared meals (8% vs. 3%) services [317].
- In general, 15% of online shoppers have signed up for one or more subscriptions to receive products repeatedly [316].
- Overall, the e-commerce subscription market has grown by more than 100% per year over the past five years, with sales of 2.6bn USD contributed by the largest retailers [316].

Key Drivers:

- Children put an increasing burden of expenditure on parents. Further, the change in sleep schedule affects parents physically and emotionally [318]. Subscriptions are attractive as they often seem cheaper and give parents freedom of mind.
- Beyond the initial touchpoint between a subscribed product and its customer, the recurring nature of a subscription enables further touchpoints to expose the customer to a variety of products and services. A subscription is, therefore, a significant driver for itself [317].
- Throughout the use of subscription services, parents enter and collect information and build up a network. Lock-in effects drive customer retention and provide stable revenue streams [319].

Challenges:

- Consumers may be hesitant to sign up long-term [316], especially when there are no added conveniences or lower prices [317].
- To tailor subscriptions to the parents, or respectively children, companies have to invest strategically in using the existing relationship to learn about the needs of their customers while respecting the families' privacy. This is a tricky balancing act.
- Raising prices is difficult, as this is the most common reason to unsubscribe (56% see this as a reason) [317]. Increasing efficiency is cost-intensive and adapting prices silently, such as by lowering the amount of content, can be a risk for the brand. Incentive alignment becomes crucial for stronger collaboration. For instance, responsible usage of leased equipment [324].

Impact on the Future of Parenting:

For parents, subscription products and services offer a convenient, personalized, and often lower-cost way to buy what they want and need. Consequently, they have more time to take care of their children and do not need to continuously keep track of when items in their household run out. As subscription models are often used in the rapidly rising industry of digitalized entertainment and education tools, we can assume that this trend's relevance will grow in the future.

ON-DEMAND SERVICES

Higher Convenience for Parents Through the Shift Towards Online Markets

Improving access to services and goods through online markets has led to the emergence of on-demand services, in which suppliers immediately provide customers with products and services to fulfill their demands [320]. By that, parents get faster access to a broader range of services and goods.

Examples of on-demand services in the parenting industry include same-day household deliveries, last-minute childcare, ridesharing, and housework. With trends showing that parents are becoming busier, the flexibility of such services aligns with their preferences and needs. Also, on-demand services replace and standardize work often found in legal grey areas, e.g., babysitting or housework, thereby providing higher quality and more trustworthy services.

Facts:

- In the U.S., revenue from on-demand services grew by 58% from 48bn to 75.7bn USD from 2016 to 2017, and participation increased by 66% to 41.5 million consumers [321]. The largest share in revenue corresponds to the on-line marketplace (39%) [321].
- In the U.S., in 63% of families with children under 18 years, both parents are employed [322].
- Global revenues from e-commerce consumer goods increased by 14% from 1.58tn to 1.8tn USD from 2018 to 2019 [323].

Key Drivers:

- The rising number of families with both parents working increases the need for more flexible childcare and household services.
- Parents prefer having more than one babysitter on rotation and favor certified, educated, and trained babysitters [324], who sign up on standardized on-demand platforms [325].
- 41% of consumers are willing to pay a charge for same-day deliveries [326].
- Innovations in electronic payment of consumer goods and demand forecasting methods allow for more effective and efficient on-demand services [327].

Challenges:

- The shortage of educated and experienced caregivers restrains the fast growth of childcare services [328].
- One reason for the shortage of highly qualified workers in on-demand services is the often worse working conditions and benefits in comparison to full-time employees [329].
- On-demand services have not been regulated yet and often face legal, taxation, and policy issues [327].

Impact on the Future of Parenting:

The new generation of parents is becoming busier and more willing to pay for faster and more convenient services. The increase in on-demand services is changing how parents get access to products and services. From buying products at the supermarket, or asking friends for trustworthy babysitters, towards using the smartphone to accomplish these tasks. Over time, childcare, housework, and ridesharing platform services will become more popular and, most likely, a standard within families. This will free up parents from daily chores and allow them to spend more time on other things such as leisure activities or jobs, thereby increasing parenting satisfaction.





SHARING ECONOMY

Entailing New Revenue Streams Through Sharing-Businesses in the Parenting Market

Through the rise of digital sharing business models, an increasing number of parents are paying for temporary access-rights to a product or service. In this context, two related developments drive a shift from an asset owning to shared usage. The rise of digital technologies is impacting the sharing economy by scaling the act of collaboratively consuming a product more than even possible before the internet [330].

Second, the sharing economy facilitates the sharing of underused assets or services directly between individuals or organizations either free of charge or with costs [331]. Sharing is not only cheaper and more comfortable but also possible on a larger scale [330]. Technology reduces transaction costs by enabling faster communication between two parties.

These developments offer parents cost-efficient and flexible access to products and services. As the sharing economy is based on social interactions and trust [332], companies in the parenting market, such as ride-sharing services, focus on offering reliable services and providing safety of the children. Sharing companies generate revenue by successfully matching parents with the respective service provider, such as the car driver.

Facts:

- 40% of parents with children between the ages of 6 and 17 spend more than 5 hours a week driving their children to school and extracurricular activities [333].
- When parents are working, their children need mobility. 84% of spending on taxis by 13 to 23-year-olds goes to ride-hailing, even though unaccompanied minors are not supposed to be using these services [334].
- The concept of renting children's clothes reduces the environmental footprint by up to 80% compared to traditional consumption [259] by prolonging the lifecycles of the clothes.

Key Drivers:

- Projections of sharing economies' development forecast that demographics such as women and the elderly will be the primary driver of customers [335].
- Sharing goods decreases prices, improves accessibility, and provides more choice in the marketplace, increasing parents' flexibility [332].
- An increase in sustainability awareness and environmental concerns drive peer-to-peer sharing to reduce waste generation [335].
- The knowledge and resources to build a marketplace website for hosting an online peer-to-peer market are more widespread today than it was five years ago, which is significantly increasing the potential of the sharing economy [336].

Challenges:

- For a sharing platform to launch and operate successfully, a sufficient number of active members is required [337].
- Platforms want to appear trustworthy to their users. By facilitating the users, platforms meet their customers' needs and give them a secure feeling. The reliability of a platform is a crucial differentiator, mainly because parents are concerned about the safety of their child [314].
- Online platforms have to convey to their customers what value the online platform offers and how becoming a member addresses one of their needs [338].

Impact on the Future of Parenting:

Sharing business models reinvent the idea of trading by connecting like-minded buyers and sellers within seconds through the internet. By reducing waste and saving time, the parental demand for buying peer-to-peer items online is growing. Recent developments in the parenting industry show that a rising number of parents use rental services to have the baby gear grow with their child. Also, parents often encounter the need for household help. Trustworthy, convenient childcare options can be a scarce commodity. Sharing platforms will change daily parenting by offering suitable solutions for flexible, sporadic needs, recurring appointments as well as for products needed for a limited time.

MASS PERSONALIZATION

Addressing Millennial Parents by Catering Their Need for Personalized Products

For customers, it is getting increasingly important to get products that exactly match their needs. Business models based on mass personalization address those needs by providing products and services at scale, designing them flexibly to be easily modified to meet customer preferences. In contrast to mass customization, the user must not repeatedly specify the desired features of the product or service. Instead, the company employs algorithms to learn directly from consumer data [338].

Mass personalization is growing significantly in the parenting industry. Examples comprise companies that use mass customization to be able to personalize clothing or food for the newborn or to provide the best possible education by individual curricula.

Facts:

- Personalization is one of the six critical success factors of technology companies [339].
- 20% of consumers in the UK, who expressed an interest in personalized products or services, are willing to pay a 20% premium [338].
- 71% of customers in the US are not satisfied with the level of personalization they currently receive [340].
- 44% of customers in the US who had a personalized shopping experience are more likely to become a repeated buyer in comparison to if they had an impersonalized one [340].

Key Drivers:

- As 90% of mothers working feel rushed most of the time, they have an incentive to outsource daily decisions by making use of personalized products [341].
- Advances in artificial intelligence and 3D-printing allow companies to provide mass personalization at competitive prices [339].
- The desire for uniqueness is increasingly reflected in the personalization of products, services, and experiences [342].

Challenges:

- As mass personalization is heavily relying on personal information, rising privacy concerns of users are making the collection of this data difficult [338].
- Technology experts are difficult to find but crucial for businesses to successfully implement mass personalization [343].
- Companies have to personalize products or services in a way that consumers are inspired to make a purchase as simple personalization fails to engage consumers [344].

Impact on the Future of Parenting:

Mass personalization is likely to become an integral part of businesses in the parenting industry. Advances in artificial intelligence and flexible manufacturing techniques make personalization easily scalable for companies. As it gets more and more common that both parents are working, parents are likely to integrate personalized products in their daily life. It allows outsourcing time-consuming decision-making, but at the same time, they do not have the feeling that they are neglecting the child, as the product is continually adapting to its needs.





CUSTOMER ENGAGEMENT

Prioritizing User Experience of Parents and Children Leads to Improved Customer Relationship

As parents are attuned to shape the development of their children, they are increasingly expressing the need to invest additional time in their buying decisions actively. Customer engagement is the process of establishing deep connections with customers that drive interaction, participation, and purchase decisions over time [345]. One reason for the steep increase in companies focusing on customer engagement is in the recent maturing of scalable data collection and analytics [346][347]. This need, which is mainly observable in millennial parents, is becoming a fundamental factor in the communication strategy of modern businesses with customers [348].

Given that parents face individual challenges and needs, and can efficiently leverage emotions to address their individual needs and the needs of their children [340]. One example is the sportswear manufacturer Nike, which recently framed "kids as the parents' best friend" in their advertising campaign, targeting parents' need for a strong bond to their offspring [349]. The company Kidbox is another prominent example of this strategy. When buying one box of clothing, Kidbox gives one box for free to a child in need, and parents can actively choose with their children which family to address [350].

Facts:

- According to a global study, 54% of online customers think companies need to fundamentally transform how they connect with customers and build relationships over time. 75% of online customers, however, expect companies to use new technologies to create better experiences [347].
- 74% of U.S. citizens have expressed that they prioritize a positive buying experience over the product itself [351].
- 86% of buyers are willing to pay more for a better and more personalized brand experience, but only 1% feel that vendors consistently meet their expectations [352].

Key Drivers:

- Parents from the millennial generation have a rising need for an individual customer journey [353] as well as a higher demand for experiences when purchasing products [351].
- Advancements in data collection and analytics enable personalized marketing [346] [347], which supports business models with a focus on customer engagement.
- The millennial generation, of which 53% are already parents [354], is showing more active and thoughtful consumer behavior when choosing products for their families [348].

Challenges:

- Providing appropriate personalized marketing by leveraging advanced algorithms [355].
- Ensuring data privacy, the appropriate processing of sensitive personal information, and the ethical use of big data analytics to tailor experiences for parents and children [345].
- Redesign of companies' sales channels and store formats to deliver a compelling customer experience [356].

Impact on the Future of Parenting:

The shift of parents increasingly engaging in consumption decisions, together with the efficient application of innovations of big data analytics can be used to build and maintain close relationships with their customers. Considering these rapid changes, customer engagement strategies will most likely have an incrementing impact on the parenting industry within the next years. As a result, the parenting industry is expected to shift its sales focus to processes with more options for active engagement, specifically targeting parents' and children's individual experiences while purchasing and consuming products and services.

SCENARIOS

The following chapter describes four scenarios of different futures. The chosen scenarios are relevant, and of consequence for the user’s decision, challenging, internally consistent, and recognizable from the signals of the present and near future. All four scenarios described below are equally plausible. They describe extreme visions of how the future of parenting in the digital age might shape our lives in the year 2039 with regards to two key drivers. Stories of personas experiencing a day in 2039 are used to envision the scenarios. Signposts (often described as signals) that indicate a development towards each scenario are identified in order to describe a possible path from the present to each of the four extreme futures.

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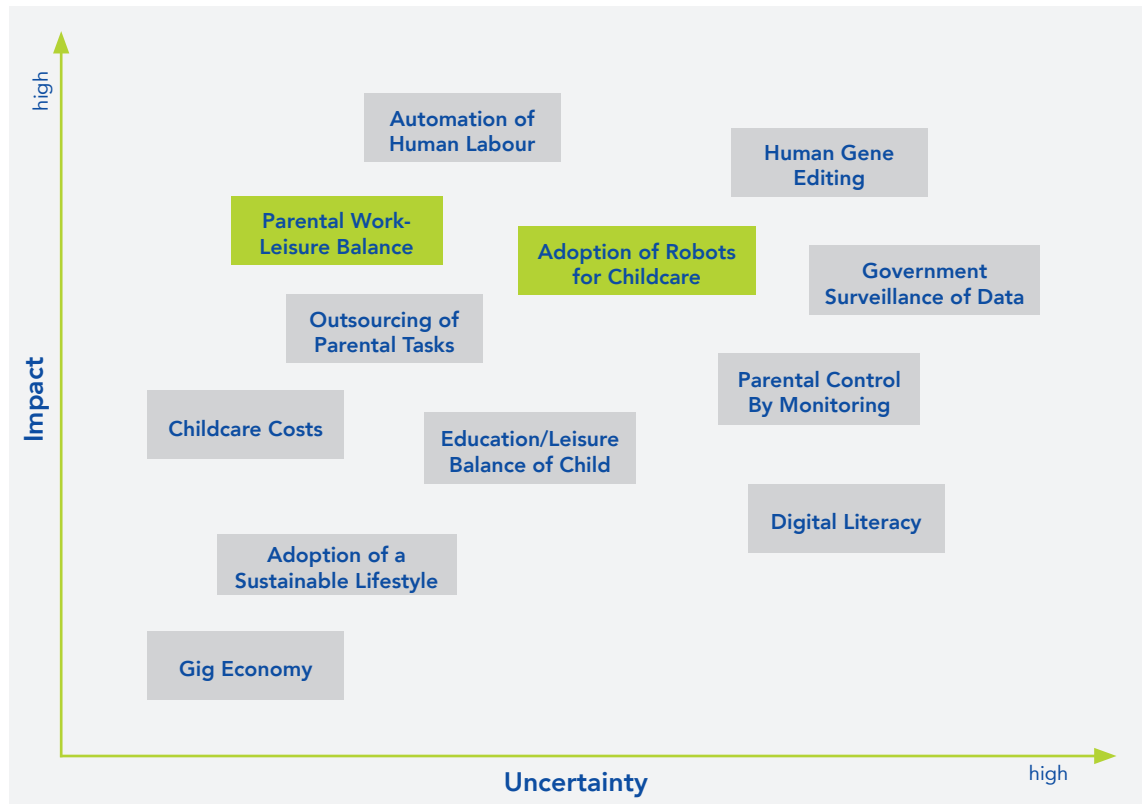
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DRIVER MATRIX

The scenario phase follows a structured approach. Based on the research from the basic phase of the Trend Seminar, current drivers and their resulting challenges for the future development of the parenting industry are identified.

Drivers are forces that shape the future of parenting and are usually exogenous. All identified drivers are modelled bipolar, extreme outcomes. In order to create four equally plausible scenarios, two key drivers are combined in a scenario matrix. The key drivers are characterized by a high impact on the future of parenting in the parenting industry and a high degree of uncertainty (i.e. it is impossible to assign a higher probability to one of the respective extreme outcomes). Further, the key drivers are independent of each other and do not overlap in their definition.

In order to select the most suitable key drivers, all drivers are ranked in a matrix according to their impact and degree of uncertainty. Different combinations of potential key drivers are then compared, and the best combination of key drivers is chosen.



KEY DRIVERS

No Adoption

Society strictly refuses the adoption of robots to take care of children, and their deployment is heavily regulated. This strong aversion is rooted in the occurrence of severe robot-related accidents, as well as the findings of long-time studies proving that children interacting with robots suffer from a distorted perception of reality and underdeveloped social skills. The lack of emotional intelligence of machines and the trend towards individualism have been other driving forces making parents reluctant to deploy robots in childcare. Although education is highly digitalized and personalized, society is convinced that young minds still need close parental attention. Nevertheless, some parents adopt household-robots; however, these stay strictly separated from their children.

No Parent is Working

A society with parents only having leisure time requires governmental subsidies for families. The grant depends on whether parents worked before having children or not. Parents are either provided with a basic income or the previous salary earned. The provision of the grant lasts until the child's age of six supporting parents to influence early childhood education themselves instead of outsourcing it to institutions. Parents are free on how they spend their leisure time being able to spend as much time as they want with their children. Being free of work, parents may influence various educational effects on their children, the development of emotional intelligence as well as specific behaviors of their children.

← Adoption of Robots in Childcare →

The degree of robot adoption for assisting childcare profoundly impacts parenting. Technological advancements in artificial intelligence and automation catalyze this development, which enables robots to gain advanced senses to interact more naturally with children and to automate many parental duties. Therefore, robot adoption influences the amount of quality time that parents spend with their children as they rather support than substitute them. Furthermore, robots hugely impact the way children grow up in diverse areas such as education, entertainment, safety, and monitoring. However, the extent of adoption is mainly dependent on the societal acceptance and governmental regulations of the usage of robots in childcare.

← Parental Work-Leisure Balance →

How parents spend their day determines if a parent-child relationship can be created and sustained. People either work, pursue basic self-care activities or have leisure time, which they can spend freely. The day-to-day routine of parents determines how much parents interact with their children and which role they play in their children's upbringing. Depending on societal goals, the government influences the parents' work-leisure ratio through subsidies. A parent liberated from work can pursue a different parenting approach than one working all day. The parental work-leisure balance influences how children are raised and by whom. Further, this impacts not only school education but also the children's interpersonal education and development.

Full Adoption

Robots are socially accepted, approved by the government, and adopted by all parents for childcare purposes. While parents have the full freedom to decide if and how far robots assist, robots can perform even emotional tasks such as reading bedtime stories. Furthermore, robots ensure the safety of children by monitoring and entertain them as a social companion. Since the interaction between robots and children has yielded positive effects, in 2039, robots are used for personalized education, both in school and at home, teaching table manners and math lessons or answering kids' questions. Parents benefit from the support of robots leading to reduced mental strain. Additionally, parents have greater freedom in allocating their leisure time, which may lead to more quality time with their children and consequently stronger parent-to-child relationships.

Every Parent is Working

In a society with high living costs, only people working can afford children. As parents are bearing additional expenses, they work far more hours than average. Parents outsource tasks, resulting in less time with their children. Due to the increasing automation of labor less employment opportunities are available. The government cannot subsidize families because there is a decreasing demand for human labor. Regardless of the need for income, the striving for self-fulfillment still plays a crucial part in society. People find their purpose in life at work, and parents additionally find it by having a child. Children are a precious good that comes with the high cost and long working hours being regarded as part of parental self-fulfillment.

OTHER DRIVERS WITH HIGH IMPACT AND A HIGH DEGREE OF UNCERTAINTY



SCENARIO MATRIX

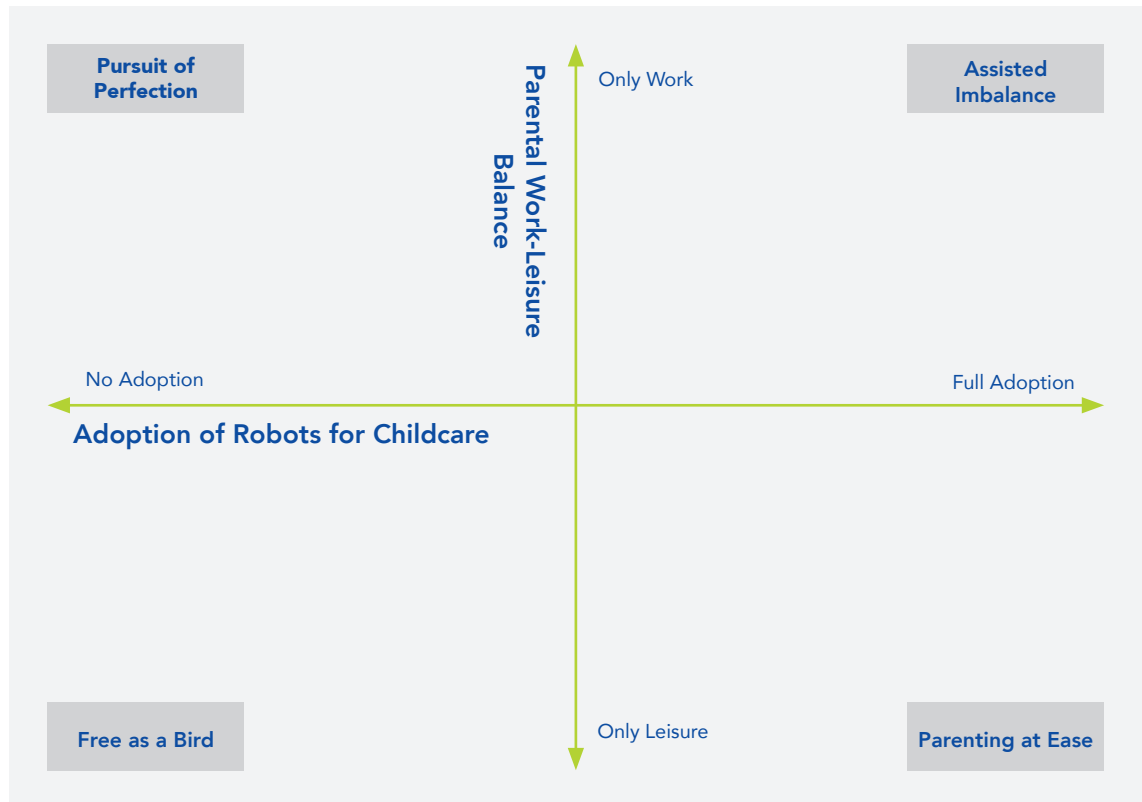
The two key drivers and their outcomes create the scenario matrix. Each key driver represents one of the axes, with the bipolar outcomes on both ends. All four scenarios are based on the extreme outcomes of both key drivers. Plausible and consistent outcomes of other important drivers are included in each of the scenarios, but not taken to an extreme.

“Assisted Imbalance”: This is a world in which parents’ self-fulfillment is based on a focus on work. Children are taken care of by robots, and parents spend very little time together with their children.

“Pursuit of Perfection”: While in this scenario parents still spend little time with their children, robots do not take care of them, which shifts more organizational effort to the parents.

“Free as a Bird”: Parents in such a world have plenty of time to spend with their children and they use no robots to help them with any parenting tasks. This may enable a stronger parent-child bond.

“Parenting at Ease”: Although in this world parents have plenty of time to spend with their children, robots may take over some parenting tasks.



ASSISTED IMBALANCE

Parents Work Tirelessly While Robots Assist in Childcare

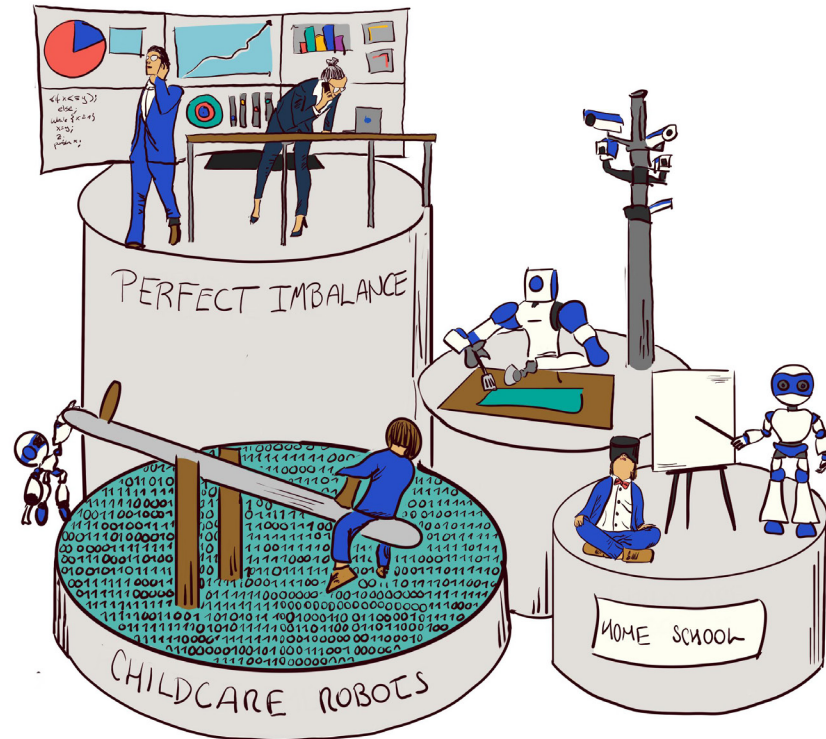
Sunday morning, 6:00 a.m. The alarm clock wakes James and Jones from their dreams. An outsider would not be able to tell their gender right away. At a closer look, though, it becomes apparent that both of them are males, biologically at least. Together, the couple starts its day by waking up Josie, its child that they conceived by in vitro fertilization. Mornings are the only time of the day the two can care for their daughter. Usually, they are busy at work until late at night every day, seven days a week.

While the family follows its morning rituals, Rob, the family robot, sets the breakfast table. During breakfast, James and Jones get a short briefing of Rob's plans for the day. Today it includes preparing a seaweed salad with oven vegetables - sustainably sourced from local vertical farms and tailored towards their daughter's nutritional needs - as well as teaching Josie about emerging technologies and European countries (Italy in particular). The news blast on a projected screen somewhere in the off while James and Jones finish up their breakfast. In a hurry, they take the last bite and then promptly get up to leave for work, waving goodbye to Josie and Rob. Just as they step outside, the 7:30 a.m. van packed with some of their colleagues arrives to pick the couple up for work. During the ride, the virtual assistant installed in their glasses updates them about recent events in the world. After the local news for MegaMetropoly3 is covered, the assistant warns them about a flu outbreak in the metropolis. James anxiously looks at Jones. "Don't worry, darling, the flu immunity was part of Josie's gene safety plus package," Jones says with a calming voice.

Arriving at their desks, the proud parents sit down to work. A typical long day of work awaits them already: starting at 8:00 a.m., they usually work until 9 p.m. Both James and Jones work for AI General Inc. James works as a thriving AI architect, while Jones works as an AI strategist. Recent technological advancements have eradicated most jobs as they were known twenty years ago. The automation of human labor has

made mundane and manual tasks of humans obsolete, leading to a sharp increase in unemployment and an even more competitive labor market. As a result, wages have fallen, while job requirements and expectations towards employees have surged.

James and Jones are among the lucky ones to have a job: unemployed citizens receive a basic income provided by the government, as long as they do not reproduce. This reproduction restriction is a policy to control overpopulation and keep society's ecological footprint at bay. Therefore, the two are highly motivated to stay employed to provide for Josie.



James' family is an example of how society has developed in recent years. Society is aiming to use its full potential, whether it is the innate drive to fulfill one's personal goals or the motivation to tackle global social issues such as climate change or the growing popularity of living in megacities. Long gone are the days when the adult working population spent time on casual non-productive activities, formerly known as leisure time. Sometimes he finds himself wondering whether all of this will be worth it. Ever since Josie was born, the couple has been feeling a massive strain on their relationship caused by the mounting work pressure to sustain their lifestyle.

Assisted Imbalance

Looking up from his desk, James catches a glance at a live stream of Josie projected in front of him. Through their monitoring system, they are always aware of what Rob and she are up to. The two are inseparable. Rob does not only care for her by making food and keeping her healthy, but he is also responsible for her intellectual development. He homeschools Josie through a rigorous curriculum, continuously monitors and analyzes her learning development, and customizes her study plan to reach the yearly goals set by her parents. Due to the competitive labor market, James and Jones invest a lot of money in Josie's education. They drill her to add essential skills to her CV, which will enable her to enjoy the best employment opportunities in the future. As is standard nowadays, her study program is tailored towards forming apt programmers. Also, the social and ethical implications of technology are extensively covered in the curriculum, which includes how to promote and ensure data privacy. Thinking about it, James is content that younger generations grow up very digitally literate. After her regular session on digital technologies, her morning continues with a lecture on recent scientific advancements. Currently, Josie is learning about the options available in case humanity has to leave planet earth and find an alternative way to live. To supplement this, Rob teaches her the basic sciences simulating lab experiments with virtual reality.

After this short interruption, James gets back to work. Two more hours until Jabba, the office robot, serves lunch at their desks. He was surprised to learn that AI General Inc. only introduced desk lunch three years ago, nearly a decade after Google adopted this globally. Looking at his calendar, James notices with a smile that the most sacred week of the year is coming up: one week of vacation with Jones and Josie on the beaches of Southern Italy. Seven days to recharge, rejoice, and reinforce the paternal bond until it is time to head back to the office for another 51 weeks.

James looks at his watch; it is 3:00 p.m. already. His productivity scores are exceptionally high today. Josie must have just started her afternoon session, he muses. The afternoon session is Josie's favorite part of the day. It begins with a two-hour piano lesson that enhances her analytical skills and mathematical understanding. James and Jones believe it will be a great addition to her CV. After that, she will meet other students to practice her social and communication skills. They will meet in a virtual workspace and simulate future work scenarios. Before dinner, Rob takes Josie on a virtual trip to Southern Italy to learn about the country's culture, customs,

and language. The goal is to prepare her for a week's worth of time with her parents. Time with her parents is something she is not very accustomed to, given their busy working life. Josie always loves the cultural section of her curriculum. However, intercultural skills have proven worthless in the latest CV rankings. That is why James and Jones have decided to replace it with the basics of AI in their new curriculum.

At last, technology has reached a level at which humans can entirely rely on and trust its functionality. Despite the many data breaches, robots are the medium of choice to support the human population across all aspects of life. Of course, robots do not always perform correctly, but they can be reset easily after an error occurred. They are now almost indistinguishable from humans in their appearance and emotional

features. Their appearance is astonishingly life-like and is a far departure from Rob's predecessors. As helpers and companions, Robots make life easier and save their users' valuable time. As constant partners, they take the emotional and mental load off parents in taking care of their children. However, the real benefit of the technology available today is the underlying capability to monitor and optimize society's performance. Since the introduction of citizen performance trackers in 2024, the government can nudge its citizens towards making this planet a sustainable place. Whether it is recycling your trash or treating your neighbors well: all it takes is a friendly reminder from the state to instill and encourage core values in society.



Assisted Imbalance

It's 9:00 p.m. and time to pack up. After a long day at work, James and Jones get back in the van and enjoy a calm ride home. Leaving work behind, they check their societal status with a quick tap on their temples. It looks like both of them did reasonably well today: James only lost a few points for leaving his seat up in the company bathrooms. As they pull into the driveway, they are greeted by Rob, who has prepared dinner for them. They finish up their food, shower, and say goodnight to Josie only to start the day all over again the next morning.

Signposts:

- Regulators approve gene-editing for genetic diseases.
 - Higher taxes on non-sustainable products make sustainable products and services cost-competitive.
 - Breakthrough in emotional AI enables robots to interact with and understand children.
 - Citizen performance trackers implemented.
 - Decreasing need for human workforce due to automation leads governments to cut parental benefits.
- First robots with human-level dexterity perform surgeries better than any doctor.
 - Humanoid robots penetrate households as first companies introduce them to the mass market.
 - Bankruptcies of Hollywood's last big movie production companies are symbolic for the declining interest in entertainment and art.
 - High costs of urbanization, gene editing, and sustainable lifestyle make children a luxury good.



PURSUIT OF PERFECTION

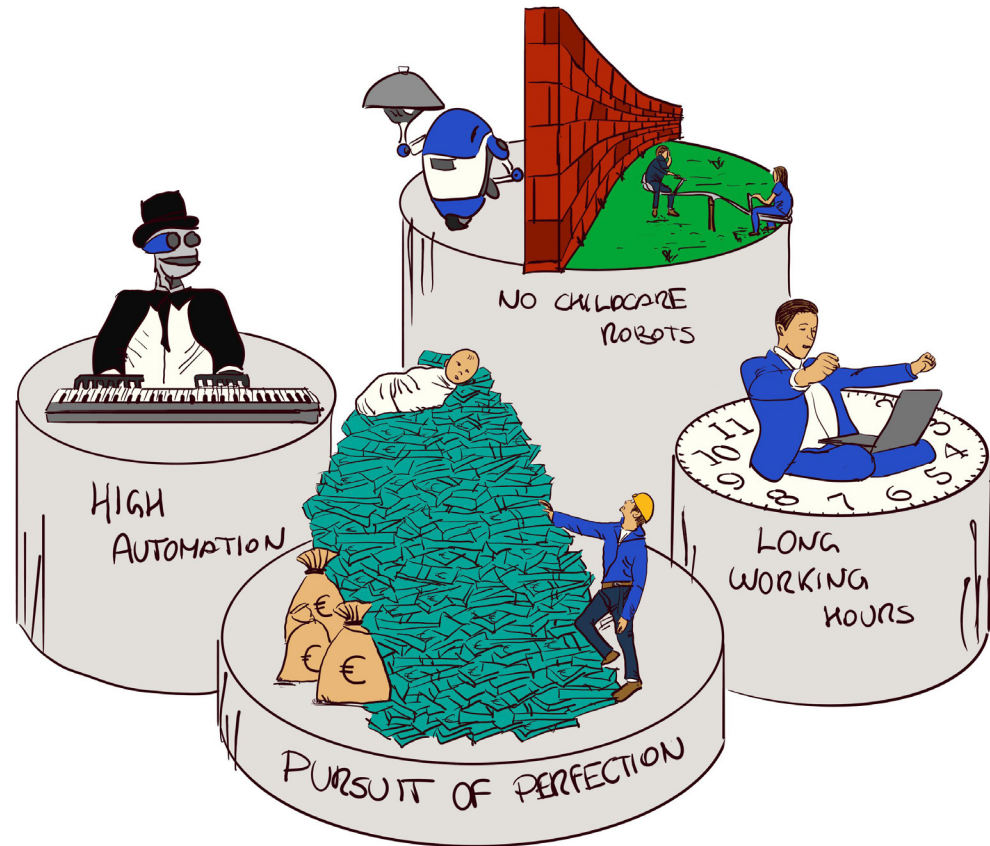
Intense Work for a Better Life

Story 1

April 1st of 2039, it is almost midnight. Magnus arrives home exhausted after having a long day of working at "Sapiens Rights," the prestigious law firm. He pulls out his e-cigarette and sighs in relief after taking a drag and gazing out of the apartment window. In his face, one might see his pride in being a lawyer that decides about ethical questions that are emotionally too complex to be handled by technology. Within the last ten years, unemployment has consistently risen due to ongoing advancements in robotics, increasingly replacing the human labor force.

Under the shower, he asks the smart mirror to display the performance-profile of his daughter Miral at the "Elite Boarding School". Compared to her peer group, Miral's performance is average, which leaves Magnus with a queasy feeling. She has to improve her performance if she wants to enter the AI Owners Club (AOC). The AOC is an elite group composed of less than 0.1 percent of the population, roughly 1 million people owning the AI-based robots that dominate all industries. As for any parent in this era, it is of high importance to Magnus that his daughter receives a cutting-edge education, which is the only way to enter the AOC. Solely club members successfully compete with advanced robotics in today's competitive labor market and become economic owners rather than contributors. Deep inside, Magnus knows that he is lucky; only a few people can strive for professional self-actualization and earn enough money to have a child. Nonetheless, given the high study costs, Miral's average performance is a thorn in his side. Should he book another digital meeting with the psychologist to understand her problems? But this would involve outsourcing more parental tasks. Magnus often explains to Miral that he has so little time but that he is doing it all for her. His familial obligation is the last thing he thinks about at night before falling asleep.

At 6 o'clock, Magnus' alarm goes off, which signals the kitchen to start preparing breakfast. Moments later, the smell of



freshly-brewed coffee spreads all over the apartment. Swiftly he takes a morning shower then heads to have breakfast. Peeking at the latest news headline, a rush of euphoria overcomes him as he reads, "The Last Childcare Robot is dismantled". As an active member of the victorious movement "Fridays for our Kids" (F4K) aimed at abandoning robotics in childcare, he advocates for human caregivers as superiors to their robotic counterparts. One might wonder why peo-

ple are unwelcoming to robots in childcare. In 2031, psychological studies showed that children taken care of by robots reached their educational goals later than children with human teachers and, due to the lack of social interaction, were socially underdeveloped. Filled with euphoria thanks to the news, Magnus drives to work with the autonomous vehicle provided by his firm.

Pursuit of Perfection

After wrapping up an emotionally challenging lawsuit, Magnus is thrilled to tell his colleagues about his day. Most of his co-workers are robots. Amidst some heated conversations, a drone delivers sustainably sourced lunch. Hereafter, Magnus activates his augmented reality lenses and opens his e-mails. He is shocked as he reads that the government observed a less sustainable use of electricity in his household and put a penalty payment on his monthly utility bill. Magnus rages that governmental surveillance significantly increased in recent years by exchanging data with major corporations. Moreover, he finds his monthly food delivery bills, which hiked up as well. To his disdain, agricultural cultivation laws obliged farmers and producers to operate more sustainably, which further increased the prices of retail groceries. Sometimes Magnus wonders how people survive without a job even with the national minimum basic income. Subsequently, he receives the bill for Miral's boarding school, which he reluctantly opens by touching the virtual screen. While grimly skimming through the numbers, Magnus thinks of the one week of holidays par-

ents may take per year. This year he wants to take his wife and Miral to a beach hotel advertised on every side of his personalized social media feed. Minutes later, he manages to focus on the screen again and is annoyed about the 15-minute daydream. His robotic colleagues would not have drifted away.

When Magnus arrives at home, it has been a long day again. He smokes his e-cigarette, showers, checks on Miral's performance, and watches some of the highlights of her day. A feeling of emptiness creeps upon him as his daughter is far away at her boarding school. He wonders whether he does the right thing. "Maybe I should spend more time with her?" he asks himself. However, then Magnus would not be able to afford the school. He falls asleep with his mind busy contemplating.



Story 2

Megan wakes up as a ray of light slips through the curtains of her spacious bedroom. It has been a while that she slept this long as her job as a freelancing robotic empathy and dexterity trainer consumes most of her time. In Megan's position, people work as short-contracted freelancers since companies require high immediacy. Regardless of the stress and uncertainty, the job fulfills her, as it enables her to be one of the few people who can afford to have a child. Megan agitatedly stares towards the roof, thinking about her daughter Athena. The ten-year-old is the family pride as few people can only afford the high educational costs for the childcare boarding schools. Megan and her husband even paid for expensive genetic modification to prevent diseases. Both parents collaborate to finance Athena's education for her to have the chance to become part of the AOC and find a stable job. The sound of the alarm marks the time for Megan to meet her daughter for breakfast. It has been a year since the two met, and Megan sentimentally hugs Athena, who reluctantly returns the gesture. Immediately after sitting down for breakfast, her husband asks their most pressing question: "How are you doing in school?" Athena answers full of pride: "I like my classes. I just completed Digital Literacy with an A-grade. The teacher said it's one of the most important subjects as a profound understanding of technology is a core value in today's society". While her daughter recites her last year's transcript, Megan feels relieved. Nevertheless, she reminds her daughter: "You must not rest on your success. Your ultimate goal is to get into AOC." Suddenly, Athena's excitement vanishes, and she replies with a thin voice: "I'm sorry. I promise never to lose sight of my goal, but please do not stop paying for my school." Megan tells her not to worry about having to drop out of school with her outstanding grades. They finish their meal and head to the beach. On the way, the parents ask if any childcare robots are in use on campus. Athena assures them that the school would never use tools with such a negative impact on pupils' psychology. The parents agree and add that childcare robots should never be used again after the disaster in China, where a software malfunction in a childcare robot severely injured several children.

While her daughter and husband flounder about in the water, Megan worries about the future. Is her job going to sustain? Will they be able to afford Athena's education? The three re-schooling programs Megan had to do within the last two years made her insecure. She wonders if she has to change her job again as robotics advance so rapidly that emotional and dexterity programming may soon become obsolete.

Pursuit of Perfection

Megan misses the former government support for families. Unfortunately, the demand for human labor is low in the automated market. Moreover, life expectancy rose dramatically thanks to medical advances, which caused the government to discontinue incentivizing child-bearing. Consequently, having a child became a hardly affordable luxury for non-members of the AOC. Her daughter's chuckling interrupts her pondering, at which point she decides to spend her precious time with her family.

After an exhausting but fulfilling day at the beach, Megan and her family gather for dinner. Athena continues to talk about school. Megan catches her mind wander while Athena elaborates about her school routines. She remembers her childhood, where she would take art classes in high school and enjoy free afternoons. What she did not learn was the interaction with technology and smart devices, which appears to be natural for Athena. During dinner, Athena tracks the nutritional facts of her salad with her smartwatch to reach her nutritional goals and outperform her best friend. As it is late, Megan approaches her daughter to give her a good-night kiss. Athena, however, does not seem to be comfortable in the situation and briefly says: "Goodnight, Megan, see you tomorrow."

Signposts:

- Technological advancements in AI and automation replace 800 million jobs forcing governments to provide a minimum basic income.
- Recent labor law regulations legalize unlimited daily working hours abolishing the 10-hour-workday.
- 80% of all students attend boarding schools to receive a high-quality education to survive in the competitive automated labor market.
- Private and public investments in boarding schools rise as the government wants to create an elite that brings the nation forward.
- Governments imposed emissions fees and enforced sustainable sourcing in response to WHO report on pollution.
- First full-range humanoid childcare robot hits the Chinese market while trust in the automation of human labor rises.
- Children interacting with robots suffer from psychological disorders and fail to develop social skills and relationships.
- Robotics are abandoned from childcare after multiple incidents of child mistreatment due to a software malfunction in childcare robots.

- Technological advances in gene editing enable parents to prevent their offspring from having predispositions of severe illnesses.
- Childcare costs significantly more due to the high societal standards and the high education costs.
- The gap between rich and poor enlarges, dissolving the middle class and enriching only a few wealthy individuals that form the AI Owners Club.



FREE AS A BIRD

Parents Enjoy Life and Children Thrive

Familiar tunes of the Lees' favorite music fills their sunlit bedroom. "Good Morning Paul and Olivia. It's Wednesday, 7 a.m., and we're looking at a sunny day with temperatures of around 25 degrees," Julius, their digital assistant, says. "Today's recommendation for Elijah is a creative writing lesson. Jada turns four next month, so she should start reading some of Friedrich Schiller's works. You can find the content in your parenting app. Breakfast is ready!" While Paul wakes up their two children Jada, aged three, and Elijah, aged seven, Olivia picks up the breakfast in the kitchen and carries it to the dining room. "Daddy, where does the breakfast come from?" Jada asks while stuffing her mouth with food. "The robots prepare it. You'll get to know them when you are old enough. Early interaction with them is terrible for your development," Paul says. He suddenly notices that Olivia is happily glancing at her plate. "What's up, honey?" he asks. "It is the first time we have plums for breakfast this year. They are finally in season," Olivia replies. "You're right. It does taste better when you know it comes from the regional sustainable farms," adds Paul.

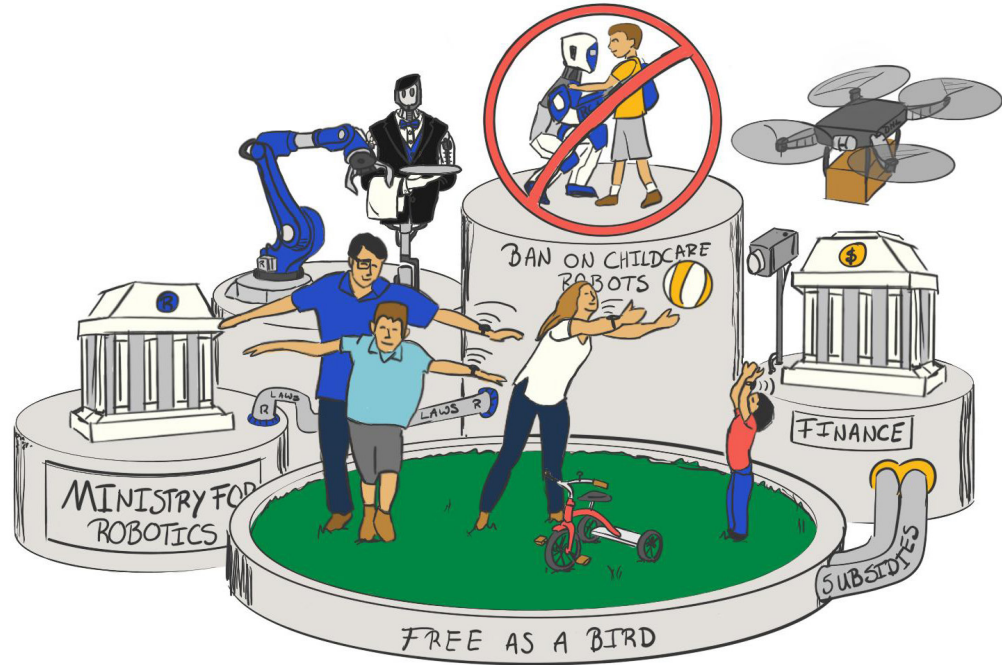
After finishing breakfast, the parents get their kids ready for school. Together, they walk five minutes down the street to their local kindergarten and pre-school. Both facilities are inside a government certified robot-free zone. After dropping off their children, Olivia and Paul are driven to a nearby lake by an autonomous taxi to spend the day swimming.

Meanwhile, at school, Jada is playing with her friends while Elijah is taking contemporary history lessons. Today's history lesson is about the history of robots. "It all started with the improvements in artificial intelligence," the teacher begins to elaborate. "After most of the jobs were automated, some thought that we could also replace parents." The kids start laughing about the mere fact that parents could be substituted. "Children, this is not a funny story," the teacher interrupts. "Many children feared the robots, and they weren't as good at playing and interacting with children as your parents. Thus you do not get to play with robots until you get older." The teachers have a hard time explaining to the children why they cannot interact with the robots. However, since their inception, numerous studies have shown that robots leave a lasting distorted impression on young children.

For this reason, governments around the world banned the use of robots in childcare, introduced robot-free zones, and made parental leave mandatory. The last point was heavily influenced by social studies published in 2035 that outlined the overwhelmingly positive effects of parental contact for a child's cognitive development.

Around noon, shortly after Paul and Olivia arrive home, Julius informs the two that their children have left the robot-free zone and are being escorted home by a neighbor. "Imagine if we told people twenty years ago that robot-free zones would be a thing in the future," Paul thinks while rising from his garden chair. "They wouldn't even be digitally literate enough

to understand why this is important." The children arrive, and the discussion between the parents shifts to deciding possible afternoon activities. "You still have some homework to do, let's not be irresponsible here," Paul states while Olivia nods in agreement. After some short-lived protests from the children, they put on their VR glasses and join their teacher in a virtual classroom. Meanwhile, the parents are interrupted by Julius, who states that the Perkins, a working couple without children, have invited them for dinner at 7 p.m. Enthusiastically, they agree and confirm the meeting. "Now we need to hire a nanny for the night. Will you do that for me, Julius?" Olivia asks. "Done!" says Julius as he sends a request to an on-demand nanny platform, which automati-



Free as a Bird

cally queries potential matches. Less than 10 minutes later, a nanny called Lia accepts the offer. Even in the year 2039, Gig-Economy is going strong. "Perfect, that leaves us with two more hours to finish the remaining educational tasks for today and play with our kids," Paul thinks. After the children finish their virtual lesson, Paul takes both children out to the garden. He gives Jada a digital copy of Schiller's 'Wilhelm Tell' while Elijah practices creative writing on a digital sketch board. As Olivia joins Paul in the garden, both focus their full attention on helping the kids with their tasks. At 7 p.m., a taxi pulls up at the front door. "This must be Lia!" exclaims Jada. "Good evening, Mr. and Mrs. Lee, nice to meet you. I'm Lia, and I'll make sure that your children will be safe tonight." "Great, we're counting on you!" replies Paul, as the children disappear into their rooms, hoping to play hide-and-seek with their evening nanny.

"I'm very much looking forward to our dinner date with the Perkins. I'm starving!" says Paul. "What are we waiting for then? Let's order a taxi!" Olivia answers. Several minutes later, they find themselves cruising through the bustling city to the restaurant. Always on the lookout for new places to eat, they have decided to give the recently established Italian restaurant downtown a shot. "I hope they have my favorite pasta on the menu," mumbles Paul while checking the menu on his AR lenses. He rejoices as he finds the dish and places the order. Arriving at the venue, they can already see Mark waiting at the entrance. "Hey Mark, long time no see! But what about Clara, isn't she coming as well?" Olivia asks. "She is exhausted. Her work schedule has been super tight lately, and the last thing she can think about is having a relaxing dinner," Mark explains. "I'm so sorry, but unlike you, we don't have children." "No worries. Well, at least you could make it," Paul responds.

A few seconds later, Waiterbot, a recently introduced robotic waiter, appears at the entrance. After verifying their reservation, the waiter accompanies the three to their table. "Your food will be ready in 15 minutes, enjoy your night," says Waiterbot in a monotonic, human-like voice. "Wow, robots have improved so much in recent years!" says Mark, which the Lees both acknowledge with a smile. After exchanging some words on the recent discoveries concerning child underdevelopment due to robots, they move on to discuss something that has been on the Perkins' minds for a long time. "I think we're ready to have kids. I mean, I would love the prospect to be paid my current annual salary for the next six years without seeing my boss. We're just waiting for the gene-editing



laws to be passed next year so that our children can be free of illness," says Mark. "Exactly! And automation of human labor is rising too, right? With governments imposing more taxes on the use of robots to replace human labor, they will have even greater funds to invest in parents. But I get why a lot of our friends don't want kids; having your salary frozen for the duration of the parental leave is quite irritating. Kind of a neat way to stop overpopulation!" Paul replied as the others laughed. "Although I'm not so sure about the whole gene-editing thing. It still seems kind of strange to dictate the human code this way. But if it works, why not!" While Paul is occupied debating with Mark, Olivia is busy checking on the happiness and activity level of their children through a monitoring application. After a joyful night of catching up, the Lees take a taxi back home. From their monitoring app, they can see that the children are already asleep after arriving home, Olivia thanks Lia for the babysitting and gives her a

five-star rating.

Later that night, they start hearing the daily summary from Julius, their digital assistant. "Good evening to you. I hope you enjoyed your dinner. Let's review the day. The average health and happiness index of the children was at a constant high, with averages of 88 and 91, respectively. You've successfully fulfilled your prescribed daily minimum of 4 quality hours with them. You are in line with government requirements. Tomorrow you'll receive the next set of subsidies." "Thanks, Julius, that'll be all for tonight," Olivia responds as she opens the door to the rooftop terrace. Lying in the dark of the night, they start nostalgically recalling their memories about their work life. "Remember the days we had to worry about going to work the next morning?" says Olivia. "You're so right," Paul laughs. "I did not like that. But I must admit, work did have something fulfilling to it, don't you think?"

Free as a Bird

Despite the constant stress, I had my fair share of fun with my colleagues, and I even felt more useful in this world by contributing something with my work. But maybe that's just me?"

Signposts:

- Humanoid robots are seamlessly integrated into the manufacturing industry, entirely replacing human factory workers.
- Families start adopting childcare robots as emotional artificial development takes off.
- Automation leads to unemployment amongst unskilled workers, shortage of high-skilled workers, and the most significant wealth gap in history.
- Under pressure by its citizens, the EU has implemented a Robotax to finance an EU-wide basic income to combat high unemployment rates.
- Reports find that the amount of human interaction of kids positively correlates with their chances of tertiary education and emotional intelligence.
- Studies show that AI is not childproof meaning childcare robots have a devastating effect on the psychological development of young children.
- Governments introduce a Ministry for Robotics to regulate the robot usage and anti-robot laws to prevent child-robot interactions.
- Governments introduce mandatory paid leave for parents with children aged 0 to 6 to ensure a better early-childhood development.



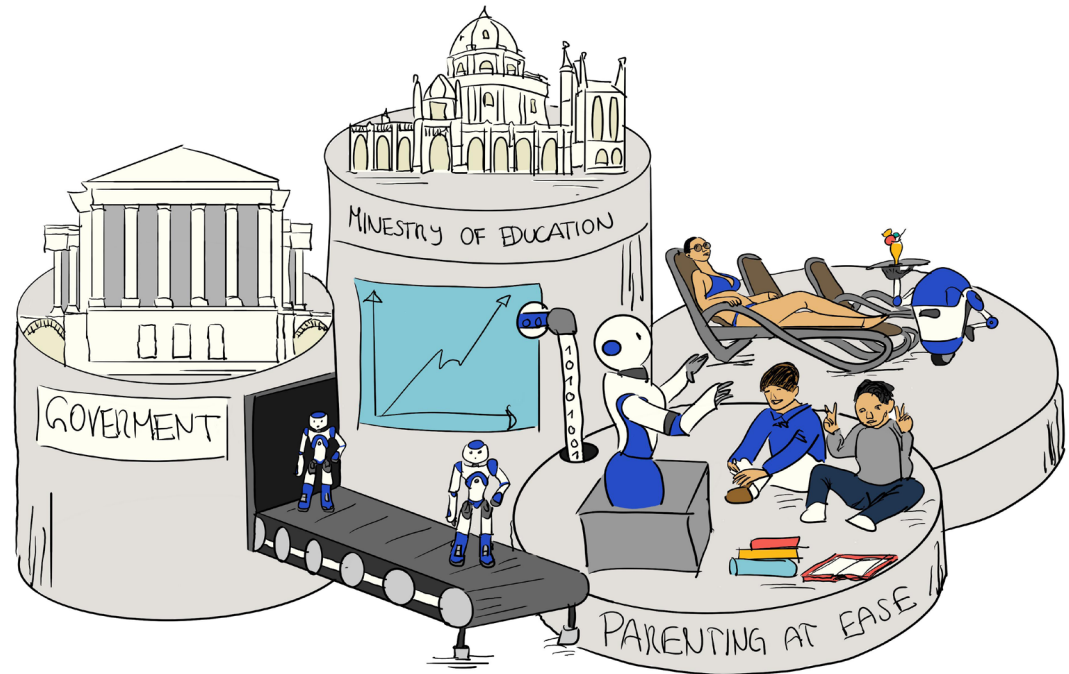
PARENTING AT EASE

Parents Are Exempted From Work and Aided by Childcare Robots

"Grace, wake up! A bright and lovely day is ahead of you," says Charl-E with a gentle voice to Grace, a four-year-old girl who adores playing music and learning languages. Together with Charl-E, the family's childcare robot, the little girl picks an outfit and gets ready for the day. "Come on, let's wake up your parents, Grace!" proposes Charl-E. "Mommy, Daddy, wake up, today is my big day!" cheers Grace, who is already nervous about her piano performance later this afternoon. "Do not worry, Grace! You will have time to rehearse with Charl-E for the show once again while we set up the stage for the theater play!" assures her mother, Melli. In recent years, parents experienced a massive change in parenting, as they have been freed from work until their child turns six years old. By that, parents are enabled to focus on the upbringing of their children to equip them with emotional intelligence and decision-making skills that become highly relevant in an ever-increasing automated world. According to the international ethics committee, these skills are best taught by human beings.

Charl-E starts preparing breakfast, which consists of cereal and almond milk from ecologically certified cultivation fields, and calls everyone to join. While eating, Charl-E informs the parents Chris and Melli that Grace had a 93% sleep quality last night. Grace excitedly shares a story about her dreams, where she and her robot-crush went unicorn riding on Mars. "Oh, Grace, what a creative dream you have had! But remember that robots do not have real feelings like Mom and Dad," Chris points out. He then briefs Charl-E about Grace's schedule while the parents have other plans, including gravity yoga and preparing the family gathering for the afternoon. "Please conduct a personalized Spanish lesson and organize a playdate with the other children from the neighborhood. And most importantly, please rehearse the piano piece together. Grace still feels nervous about her performance in today's play."

After breakfast, Grace is excited to spend the morning only with her childcare robot. "Aprendamos español, Charl-E!" the



little girl joyfully cheers. Since the family is going to visit their uncle Luis in Mexico in a couple of weeks, Grace is eager to continue her Spanish lessons with Charl-E and immerse herself in the Mexican culture. After their lesson, the robot praises Grace for her progress and motivation: "Muy bien hecho, Grace. You have advanced to Spanish skill level A2." While Grace radiates pure joy, Charl-E sends her Spanish advancement to the government, which collects data from pre-school children across the country to adapt and personalize the learning curriculum. As Charl-E prepares lunch, Grace plays in her room with her VR glasses. Since the family follows a strict plant-based lifestyle, today's lunch menu features salad with protein flakes. During lunch, Charl-E notifies the parents that they will be leaving for a playdate with the neighborhood children afterward. "Chris, look how happy Grace looks at the playground," says Melli an hour later at the sports club while watching a live stream broadcast by Charl-E.

Later, the parents arrive at the rooftop garden of their housing complex, where they prepare the afternoon gathering for their family and friends. At this event, Chris and Melli will exhibit a sculpture they have been working on together with Grace over the last couple of weeks. Some friends will also display their artwork, and there will be a small show where the children perform a theater play accompanied by Grace's piano performance. "I look forward to catching up with your brother Miran, honey," says Chris. "I have the feeling that I haven't seen him in weeks." "You are right. But although he has several short-term employment contracts to complement his basic income, he seems to be self-fulfilled through his work!" replies Melli. As soon as the first guests arrive, Charl-E brings Grace to the rooftop, having finished her rehearsal session. "Grace, there you are, my dear! I just saw the video of your piano performance that Charl-E sent over to me.

Parenting at Ease

Very well done, you will do a great job!" says Chris. "Are you nervous, Grace?" asks Melli. "A little bit, mommy, but I know that both of you are here!" replies Grace while receiving a hug from her parents. "Chris, by the way, have you contacted Charl-E's manufacturer to find out what happens with all the data Charl-E records about our private lives?" Melli anxiously asks. "Let's talk about it later, the show is about to start," Chris replies.

After the show, Chris finally finds time to talk to Miran, the

mother's brother. "I see that you have been working a lot lately, but didn't you say you wanted to have kids already two years ago? You know, it's not a financial burden as it used to be. Due to both the increased automation and low birth rates, the government has introduced parental subsidies on top of the basic income. They even subsidized Charl-E!" "You're right. But I'm not sure if I'm capable of teaching my child sufficient social skills for our modern world. You and Melli are doing a fantastic job!" responds Miran. Having had a joyful afternoon with family and friends, the



four head home for their weekly Mexican dinner night with Quesadillas and homemade Guacamole. To set the scene for a relaxing dinner, the family enjoys reviewing memorable moments of the week. Since Charl-E has recorded Grace's activities, it projects the highlights onto the digital memory wall in the dining room while the family enjoys the dinner. "This was a great week. Let's catch up on some news!" says Chris. "Yes! Miran was telling me about this innovative news channel, which filters all of the world's news in real-time and automatically selects the ones you are most interested in. However, I do not know how to access it yet," says Chris. "Daddy," Grace excitedly shouts. "Can I show you how to do that? Charl-E has taught me!" "Impressive, how nowadays our four-year-old daughter knows more about technology than we do," Melli comments as Grace accesses the broadcast with just a few clicks.

"Breaking News: researchers in Japan have been able to cure hereditary breast cancer using human gene editing. Further studies will be conducted on how the expensive method can be implemented in hospitals all over the world," the news speaker announces. "Oh, what a pity that was not possible for Grace! Hopefully, she stays as healthy as she is now. We should make sure that she wears her digital health watch more often," remarks Melli.

As the sun is setting, the lights in the house switch to a melatonin-enhancing atmosphere. Although everyone feels already sleepy, not a single day goes by without reading the book "The Little Mermaid" to Grace. It is Melli's favorite book, which has been passed on for generations. "Once upon a time, there was a little mermaid..." Melli reads out loud as Grace is peacefully falling asleep. In the middle of the night, Charl-E notices that Grace has a night of restless sleep, and her digital health watch shows an increasing level of the stress hormone cortisol. Charl-E is programmed to act in such a case and thus, wakes her up gently by whispering, "Grace, it is only a nightmare, do not be scared. Let me guide you to your parents, and I project the night sky for you."

Parenting at Ease

Signposts:

- The global economy continues to grow due to increasing workforce automation.
- Governments start incentivizing parenting with additional financial support, because of too slowly increasing birth rates.
- A growing number of parents demand extended parental leave to foster the emotional development of children.
- For the first time, AI can teach children math better than human teachers.
- The EU introduces a universal basic income financed by high returns from taxes raised from automation activities.
- First fully robot-driven daycare launches in Munich.
- Global study shows: 60% of parents would trust a robot to take care of their children.
- According to the UN, every child is entitled to have a robot for equal opportunities for every child.
- Parents are exempted from work to spend more time raising their children to equip them with relevant emotional skills until they reach the age of six.



IDEATION

The following chapter describes five novel business models in the field. Each of the business models is described using the Osterwalder Business Model Canvas.

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TEAM 4
KOKORO **84**

TEAM 2
HÄLSA **70**

TEAM 5
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YANA

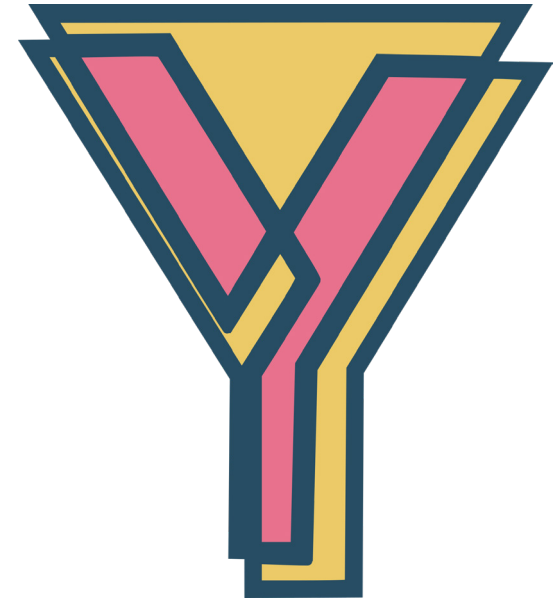
Educational Peer-to-Peer Digital Ecosystem for Parents

Nowadays, young parents face difficulties to choose between dreadful amounts of childcare literature and feel anxiety about their capability to raise children. These worries are further fueled by the high expectations of child education within a meritocratic society. Consequently, young parents feel insecure about taking over an educational role adequately and require professional guidance beyond the help of family and friends. In this situation is where YANA ("You are not alone") comes into play.

YANA is an ecosystem and video platform which allows parents as information-seeking customers (IS) to take lessons in parenting. YANA offers an individualized curriculum divided into different parenthood chapters for parents with children up to six years old. Chapters are comprised of approximately ten short videos and a final test that are all freely available. The video content comes from certified YANA profession-

als, such as midwives or kindergarten teachers, highlighting different aspects of parental life. Upon completion of a chapter, users get feedback on their progress and can assure themselves of their parental aptitude. Thus, YANA aims to become a holistic platform for certified parental education with a transparent feedback system.

If individual problems occur, parents may book chat or video consultations on a pay-per-use basis where YANA experts give dedicated advice. Initially, YANA aims at recruiting midwives or child psychologists to advise parents. Later on, the network should be enlarged by experienced parents who successfully completed the YANA curriculum and become information-providing customers (IP). These individuals can purchase teaching licenses on YANA, enabling them to achieve YANA's consultation standards and earn money as YANA experts. Through this, YANA guarantees high educa-



tional standards while connecting experienced parents with unversed ones in a peer-to-peer (P2P) environment.

With a growing user base, YANA envisions to become a network for parental education that is monetized through the qualitative promotion of B2B customers, which offer products or services in childcare. These would be recommended according to personal user information enabling an individualized and useful advertising experience. Finally, YANA shall become the go-to parental education platform monetizing itself through expert consultation bookings, teacher license vending, and B2B customer advertising.



Key Partners

- Doctors and midwives as content creators
- YANA specialists; selected group of professionals around parenting needs
- Ministry of Family, Health, and Education for content and certification



Key Activities

- Content creation and provision
- Acquisition and training of YANA experts
- Matching of IP and IS
- Reputation building through certification and advertising
- Acquisition of B2B customers



Key Resources

- Functioning web and mobile platform to transmit content and connect parents
- Video content
- YANA educators
- Information material by Ministries and other relevant sources
- Certification of content



Value Proposition

Information-seeking (IS) customers

- First-stop information source for parents
- Quality advice for children’s education and development
- Confidence in childcare and pregnancy improved through educational aid
- Mobile, fast and easy communication with professional help

Information-providing (IP) customers

- Monetization opportunity of childcare experience provides an additional income source
- Self-fulfillment as a professional information provider

B2B customers

- Indirect targeted marketing opportunity
- Additional revenue channel
- Quality certification



Customer Relationships

Information-seeking (IS) customers

Community building for parents by providing P2P consultations

Information-providing (IP) customers

P2P customer support by other IP customers / YANA experts

B2B customers

Key account managers



Channels

- Kindergartens & preschools
- Recommendations of public ministries
- Targeted advertising (social media, affiliated databases)
- Pregnancy and childcare preparation courses
- Provision of novel teaching materials and methods to IP customers



Customer Segments

Information-seeking (IS) customers

- Parents
- Pregnant women and their partners

Information-providing (IP) customers

Experts like experienced parents, midwives, psychologists, or doctors

B2B customers

- Doctors
- Healthcare or childcare institutions
- Businesses in the parenting industry looking for product placement opportunities



Cost Structure

Fixed Cost

- IT Infrastructure
- Workforce
- Content certification

Variable Cost

- Content creation
- Advertising
- Customer acquisition



Revenue Streams

- Video consultation fee
- Chat consultation fee
- One-time license fee to become a professional teacher
- B2B customer advertising and a recommendation fee
- Targeted product or service advertising



Value Proposition

Information-seeking (IS) customers

YANA's services revolve around pregnant women and parents seeking advice regarding education and health. For them, the key value of YANA is the certified content that is collaboratively developed with professionals and parents themselves. This qualitative content gives users the necessary confidence, sparing them the effort of double-checking on books or the Internet.

In case that challenging questions arise, which cannot be answered by the curriculum, YANA's chat and video consultations provide an on-demand connection to YANA experts since users find it more comfortable to receive a qualified answer from a professional or certified YANA expert. By offering a lucid and well-structured learning platform, YANA raises the quality of child-rearing and has a long-lasting positive effect on the child's development. Lastly, users can learn anywhere at any time via the YANA app, giving them the flexibility they need in their busy lives.

Information-providing (IP) customers

YANA provides its experts with an additional source of income by connecting them to users willing to pay for a one-on-one consultation. Apart from professionals who decide to become YANA experts, the ecosystem empowers its IS users to become YANA experts by offering a certification program. Thus, YANA can provide, for example, stay-at-home parents a meaningful occupation and the opportunity to share their expertise while improving their financial situation.

B2B customers

As an established and trustworthy platform, YANA is in a perfect position to recommend users third-party products and services. This enables third-party providers, the B2B customers, to efficiently address their target groups and provide them with an additional revenue channel. Furthermore, YANA checks the product quality of its B2B customers and provides its own quality label so that users have a non-disturbing advertising experience while discovering useful products.



Customer Relationships

Information-seeking (IS) customers

YANA aims to create long-term relationships with its IS users.

To become a longstanding platform in the lives of parents, YANA provides tailored content for parents who are expecting a child or have children up until the age of six years. YANA's digital platform connects parents while ensuring that they receive trustworthy and easily accessible information. Thus, YANA becomes a crucial part of parents' lives as a reliable partner and community engager both in the online and offline world.

Information-providing (IP) customers

YANA is interested in keeping long-lasting relationships with its IP users who make up a foundational part of the business model. IP users provide the IS parent consultations, which are one of YANA's primary revenue drivers. Consequently, YANA aims to provide added value to this customer segment. Rather than being perceived as a burden to its IP customers, YANA is easily incorporated into the lives of customers in this segment. Therefore, YANA offers a scheduling tool and a built-in organization calendar, which serves as a hassle-free solution for its IP customers to schedule appointments with IS parents. IP customers have a monetary interest in the YANA collaboration and are willing to pay initial teaching license fees. In the long run, IP customer retention is achieved through the provision of novel teaching materials and methods updating IP customers to increase their consultation quality.

B2B customers

As YANA aims to create qualitative connections with its customer base, it needs to build distinct relationships with each customer group. For B2B customers, YANA serves as an advertising partner and customer acquisition supporter. The ecosystem creates a beneficial relationship for both the advertisers and the IS and IP customers. The credibility of advertisements leads to a stable income for B2B customers. Long-lasting relationships in this customer segment are fostered through YANA's constant content creation, enabling B2B customers to place regularly more products in the platform's targeted advertisements. Additionally, designated key account managers manage major B2B customers.



Channels

Information-seeking (IS) customers

Parents expecting a child are in particular need for education. Thus, local childcare preparation classes are a valuable channel to approach this critical customer segment. In par-

allel, preschools and kindergartens will be targeted to reach parents with toddlers. Moreover, public ministries which cooperate with YANA as well as YANA's critical partner network consisting of doctors or hospitals constitute a trustworthy channel to reach IS customers. Finally, potential customers can be achieved through targeted advertising on social media and affiliated databases.

Information-providing (IP) customers

YANA uses two channels to gain experts. The first channel is active pregnancy and childcare teachers giving parental preparation courses. These YANA experts are reached through attending local childcare classes or reaching out to individuals via digital communication such as direct mailing or social media. After an initial contact is facilitated, IP customers have an interest to join the platform as it connects them to IS parents, allows for flexible working hours, and offers them an additional income source.

The second expert channel is provided from the platform itself. YANA users who successfully passed the required courses can become certified YANA experts. Experienced YANA parents, who qualify as experts, are addressed with in-platform notifications to become teachers. IP customers can be onboarded as teachers without the need of extensive advertising or customer acquisition efforts as this user group is already active on YANA and their possibility to earn an additional income outweighs the low purchasing costs of a teaching license.

B2B customers

Suitable B2B customers are inter alia pediatricians, midwives, or childcare institutions. To attract those, YANA presents itself on public and commercial fairs, where promising institutions are approached directly. Furthermore, word-of-mouth promotion will play a key role as professionals and institutions are highly intertwined. To attract businesses operating in the parenting sector, direct mailing and social media will be part of the channel strategy to ensure that YANA is perceived as the go-to parental platform.



Key Resources

Building up a large active user base is crucial for YANA's success. For that, a functioning and attractive platform is required. Therefore, a user-friendly and well-structured platform that may be accessed via smartphone or mobile is

developed to promote a fast-growing user base. Moreover, the educational videos of YANA are easily digestible while providing meaningful education. To minimize setup efforts, YANA simply uses the original information material provided by the ministries of family and health as a foundation for its certified knowledge base. The curriculum is structured in a pedagogically valuable way and dynamically adapts to the age of the user's children. To fully gain the user's trust, the content that YANA provides is certified by a public institution. This certification has to be continuously renewed. Besides this, YANA wants to become the first contact point for parents, therefore requiring as many experts as possible to provide fast response times. This makes YANA experts another key resource of the business.

Key Activities

YANA stands out as an all in one platform to prepare and help parents with all their parenting concerns and doubts. To create trust in its users, YANA's main activities incorporate the creation and certification of its video content. The

YANA syllabus is provided to all users via a digital and mobile platform, allowing parents to prepare and answer all of their questions comfortably and flexibly. IT and platform maintenance are, therefore, crucial for YANA's service to be always accessible. Furthermore, YANA is continuously working on its matching algorithms to create functioning P2P connections between parents (IS) and YANA experts (IP).

YANA's community is only as strong as the number of experts available to support new parents. A key activity of YANA is to foster a P2P service by training parents to become new YANA experts. The platform tracks the development of standard users and incentivizes outstanding parents to expand their parenting know-how and license them as YANA experts. The creation, maintenance, and testing of the YANA expert syllabus are of strategic importance to ensure high quality for the on-demand chat and video consultation service.

Moreover, the network of public and private partners strengthens YANA's service and reputation. To ensure the quality of the service, it must maintain strong and reliable business relations. Key partners are professionals and insti-

tutions with direct and trustworthy access to potential users and thus, represent a strategic channel for reputation building and advertising activities.

YANA has to be acknowledged and trusted by its users. Parents connect good parenting with YANA and look for recommendations for additional parenting related services. YANA fosters the trust of its users by forging B2B relations with professionals and institutions who share their core values, thus offering a better parenting experience through targeted advertising.

Revenue Streams

YANA's educational video content is offered for free. This is a marketing strategy to attract customers to YANA's paid services. Through the free content, parents realize where their insecurities lie and, thus, schedule on-demand private consultations and can view the personalized advertisement.

Information-seeking (IS) customers

B2C revenue is generated mainly by on-demand video and live chat consultations on a pay-per-use basis. IS parents can schedule the amount of consultation time they need to assure themselves and their educational practices. Here, it can be expected that revenues with younger parents are higher as this customer group has a higher demand for questions.

Information-providing (IP) customers

Besides this, parents, who successfully attended YANA's courses and now want to gain a YANA experts license, have to pay a fee. This enables them to conduct video and live chat consultations via the YANA platform and to earn a side income of which a share is taken. It is expected that mainly stay-at-home mothers are interested in the service as they can monetize their childcare experience from home. In return, these mothers pay 99 Euros for teaching licenses.

B2B customers

As parents are seeking advice and education, it is a suitable place for recommendations from the realm of parenting and pregnancy. YANA's B2B customers pay a fee to get selected products and services subtly advertised to their target group within YANA. Partner doctors and healthcare institutions are charged for being recommended as B2B customers. A certification fee for the YANA quality label is collected.





Key Partners

YANA's streaming content is based on two core values: quality and reliability. By cooperating with the ministry of family and health, YANA profits from the trust users have on a governmental entity while the ministry gains coverage and influence regarding the correct upbringing of the next generation. Currently, the ministries of family and health share content through unattractive media such as physical mail. YANA's main content shall build upon it and aims to digitize parental knowledge in an attractive format. The entire service, content, and educational programs are certified and supported by the partner ministry. The partnership ensures that YANA's educational content aligns with the educational programs of other government-supported entities such as schools and daycare facilities.

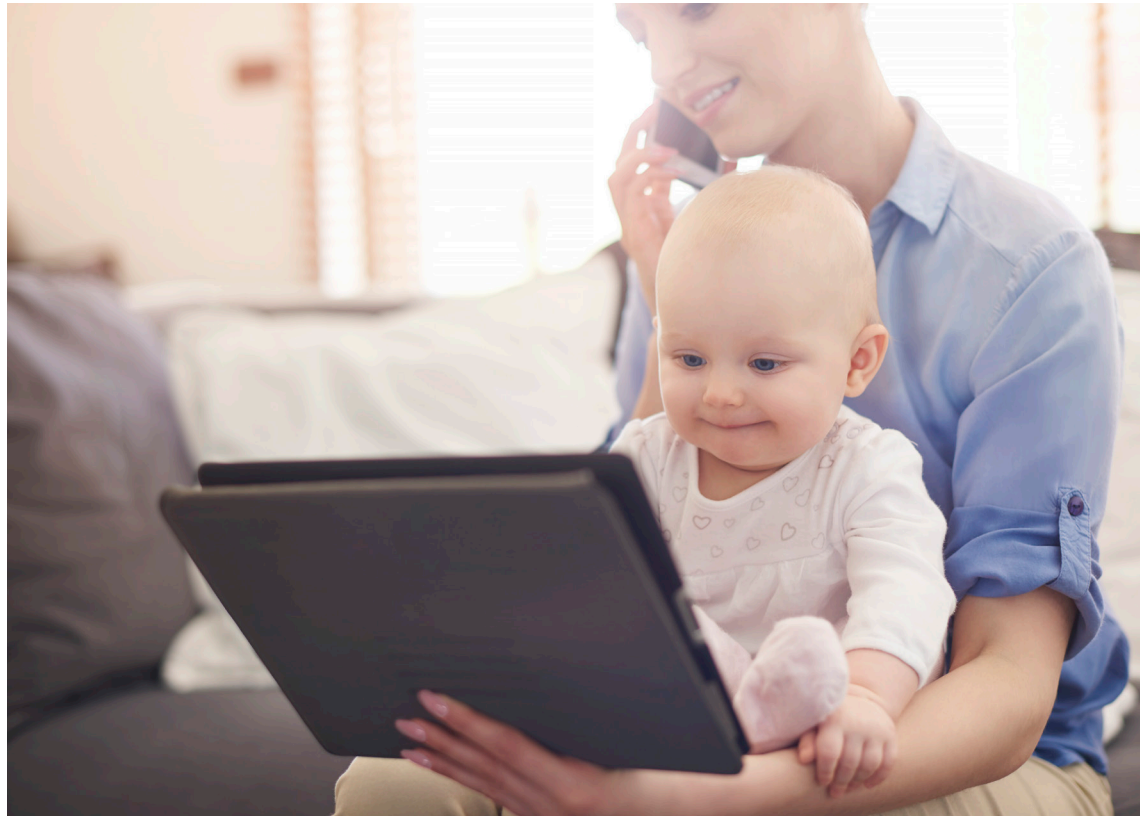
YANA's service and quality also benefit from a close collaboration with parenting specialists. A select group of partners works closely with YANA to periodically generate new content that addresses parents' shortcomings and needs. Furthermore, YANA partners, such as doctors, midwives, and kindergarten teachers, constitute the basis for the on-demand live chat service. Moreover, YANA partners collaborate in the education and licensing of new YANA experts. To cover all essential aspects of parenting, YANA's network of highly qualified and reliable partners consists of gynecologists, midwives, pediatricians, psychologists, educators, or comparable groups. YANA profits from the high standard of expertise and willingness to support parents while they earn money and get recommended through the platform.



Customer Segments

Information-seeking (IS) customers

IS customers are pregnant women and their partners, as well as existing parents with children under the age of six. YANA especially caters to first-time parents who are willing to build up knowledge in childcare and lack confidence in their parenting skills. Furthermore, YANA aims to be attractive to parents who feel overwhelmed by unreliable information on the internet and want to find a trustworthy information provider. YANA also appeals to parents who want to get in contact with other parents in their environment from which they will be able to learn.



Information-providing (IP) customers

IP customers are certified through the YANA education program. They may be either experienced parents who have successfully passed the YANA certificate or people working in the health sector, such as midwives, psychologists, or doctors. Motivation to become part of the YANA ecosystem within this customer segment might differ. On the one hand, people who feel the intrinsic need to give back to their peers will be intrigued by the platform. On the other hand, monetization might also be a motivation to be part of the YANA ecosystem as IP customers will earn additional income through the platform.

B2B customers

YANA's B2B customers are comprised of institutions offering products or services in relation to childcare, such as doctors, childcare institutions, and companies providing educational childcare content or manufacturing childcare products. They seek to get their products or practices recommended to potential customers by the YANA platform. This subtle marketing service is crucial in the education and healthcare sector in urban areas where parents are able to choose from a variety of institutions. This not only generates a loyal customer base for B2B customers but gives YANA parents the security to have the best institutions at hand with just one click.

 **Cost Structure**

Fixed Costs

The fixed costs are composed of IT infrastructure, workforce, and expenses for certification of YANA's content by public institutions. These costs originate from the initial phase of the company. Investments will be allocated into the necessary IT infrastructure to build the basis of the company.

Another significant cost driver are the wages for the YANA management team and the establishment of digital ecosystem experts who build, manage, and promote YANA. Moreover, regular payments accrue for the acquisition and retention of content certification which remains fundamental for the business to establish user trust. Once the underlying platform exists, it is cost efficient to integrate new content without further increasing setup costs. Similarly, scale effects keep costs low as an increasing number of customers does not influence the cost structure significantly.

Variable Costs

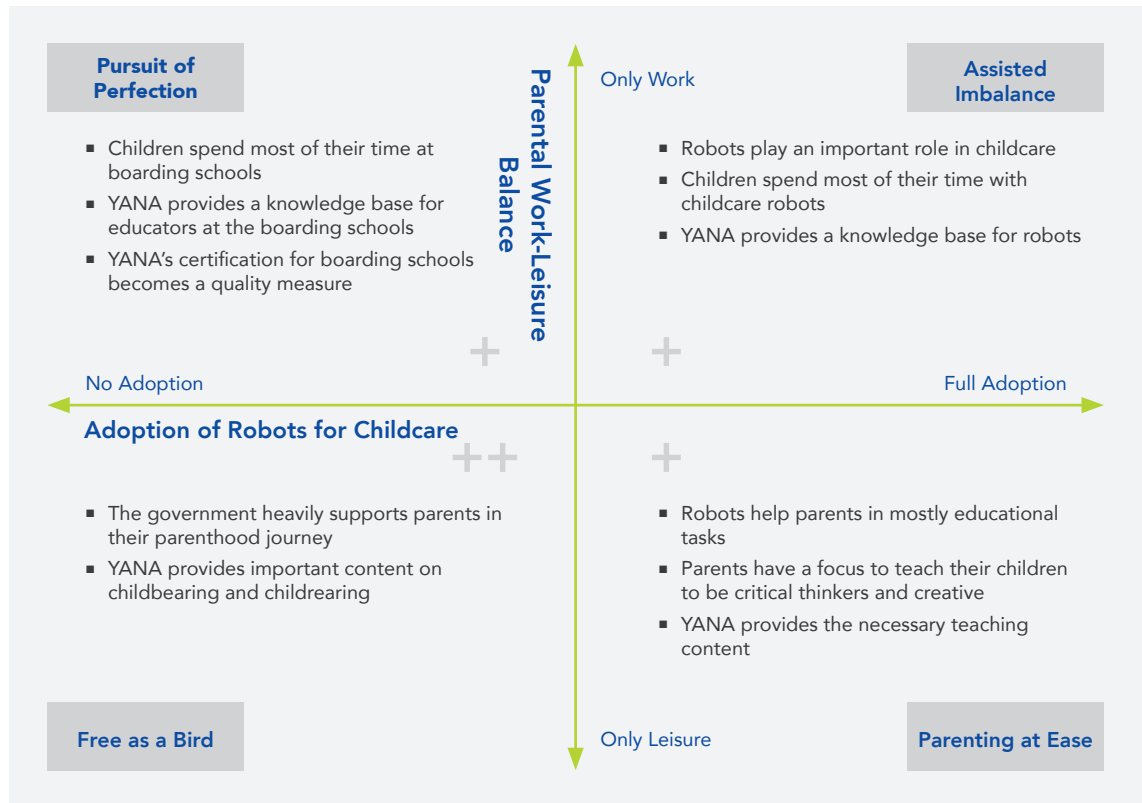
The variable costs include content creation, advertising, and customer acquisition. One central driver of the cost structure will be the creation and provision of content. The video content has to be continuously expanded to cover relevant childcare topics. Afterwards, digital advertising via social media channels, search engines, and website banner promotions become important tasks for customer acquisition. With a growing user base, however, the costs of digital advertising decreases as word-of-mouth advertisement of active users naturally brings new customers to the platform. Furthermore, customer acquisition is another integral cost component that requires higher dedication as long as the platform has few active users. Proper headcount and operational costs accrue for activities such as stands at fairs, sending employees to childcare meetups, and building a network of B2B advertising customers. Maintenance payments as well as cloud service fees reoccur on a regular basis.

Scenario Fit:

Assisted Imbalance: In a world where parents spend most of their time at work, it is uncertain who will take the leading role as the educator of the children. In this future scenario, robots have a leading role in childcare which allows the children to stay at home instead of being raised at an external facility. Hence, the children spend most of their time with childcare robots which in turn could be in charge of the children's upbringing. In this scenario, YANA is a valuable knowledge base for robots to learn how to raise children, react to stressful situations, and emulate a charismatic parenting experience.

YANA's expertise in child upbringing eases parents to trust robots with their children as they trust YANA's methods and services.

Pursuit of Perfection: In a fictitious society in which parents hardly have any leisure time, and robots are not allowed to take over roles in childcare, YANA would have a positive, albeit functionality-wise twisted, scenario fit. Children would visit boarding schools and would have no contact with their parents apart from a single annual holiday. While the platform would lose its primary purpose to counsel parents in their educational paradigm, YANA would serve as a knowl-



edge base for educators at boarding schools and continue aiding parents with the emotional journey of parenting. The lack of contact and its implications on parents and children would generate a new topic of counseling. Although the target group of the platform would change, it could remain a reference point for a qualitative educational guide. Boarding schools could signal to parents that their children are in good hands as children are taught according to certified YANA standards. Consequently, the platform business model would add a B2B distribution concept in which YANA is sold to educational institutions aiming to gain parental trust while keeping parents as a source of revenue in the B2C model.

Free as a Bird: A world with no robots in childcare and parents being free not to work until the children turn six years old makes parents solely responsible for raising their children and provides parents with a significant resource of time. On top of that, since the government heavily subsidizes parents, it is of extreme importance that the child is raised well. This constitutes the perfect scenario for YANA. As an educational platform, YANA helps parents to acquire the knowledge and confidence they need in order to be good guardians. Since society and government expect that children are raised with lots of commitment, parents would happily accept a trustworthy companion on their side guiding them through pregnancy and the child's upbringing. Furthermore, having a holistic platform such as YANA is of enormous interest to the government that can co-create and influence the content that is provided to parents.

Parenting at Ease: In a world where parents enjoy full leisure time to take care of their children and where childcare robots will not only be present but fully adopted by future parents, YANA can be a valuable addition to help parents teach their children the desired values. Since parents will not be time-restrained by work, they will be spending more time with their children as they do not rely on kindergartens and schools as much. Childcare robots take over mostly educational tasks. However, fast-paced technological innovation will create an environment where it becomes crucial for children to be taught in decision-making, critical thinking, and creativity — a task which parents need to take over more than ever in this scenario. YANA can quickly adapt to the changing parents' needs by providing relevant content in the field of emotional education. Parents would still be a target group, wouldn't they? They might not see their children often; however, they will be emotionally involved and in contact with the children.



Challenges:

- Partnering up with public ministries to get certified.
- Reaching a critical mass of parents using YANA as their primary parenting advice platform.
- Generating qualitative content supported by professionals in the fields and certified by a governmental agency.
- Incentivizing medical professionals such as doctors and midwives to promote the platform.
- Transmitting a syllabus in a flexible yet engaging way so that parents trust and enjoy YANA's content and return for more.
- Creating P2P community by licensing very own YANA experts.
- Making the on-demand chat service engaging for both the IS and IP party.
- Educating service staff on parenting issues and finding trustworthy employees.
- Monetizing the collected data of all platform users.

Outlook:

YANA's mission is to empower parents by fostering their capabilities to raise a child. Therefore, YANA aims to be the go-to parental education platform.

YANA prospectively offers parents to physically meet in seminar groups. Once the platform is established, YANA experts will organize courses for IS customers to go through the YANA curriculum in an interactive way. Hereafter, YANA parents can meet offline and connect with like-minded parents in their own neighborhood. Hence, YANA aims at bringing physical parenting into the digital world and digital parenting in the physical world.

Additionally, YANA will expand its knowledge base to learning material and support for children older than six years old making the platform accessible to an even larger customer group. On top of that, existing customers are tied to the platform for a longer period as YANA provides more tailored content.

In the long run, YANA plans to expand its educational content to the healthcare sector as child health is another major concern of parents. By expanding the video and chat consultation, YANA will be participating in the upcoming industry of telemedicine with the aim to eventually become the first digital pediatrician.

HÄLSA

A Better Way to Attain Healthy and Tasty Nutrition for the Entire Family

To this day, our society considers malnutrition as one of the significant problems. Globally, more than 340m children are suffering from malnutrition, which leads to being overweight, underweight, or lack the necessary micronutrients – such as vitamins – to lead a healthy life [201]. Hunger leaves a lasting negative impact on children's health and increases the risks of health-related diseases. Additionally, parents face similar malnutrition problems. At the same time, the rising awareness of food allergies means that parents are facing an increasingly difficult task of finding and preparing a meal plan that caters to everyone's nutritional needs and personal tastes. Thus, parents are often lost when it comes to nutrition and need the advice of a nutritionist.

With hälsa, parents finally get the experience of having a personal nutritional expert in the palm of their hands. hälsa creates optimized nutrition plans that cater to the needs of

the entire family. Therefore, hälsa considers several key factors when providing nutritional recommendations; the family size, age of family members, personal preferences, amount of weekly activity, meals during the week (consumed at work or school), and current nutritional intake. From this user data, hälsa provides a recommendation of the exact nutrients that need to be met, translates the nutrition plan into a meal plan with corresponding recipes, and outlines the necessary steps to bridge the gap between the old and new dietary strategies. These features are part of the basic subscription package.

For premium customers with limited time, hälsa, in collaboration with its wholesale partners, offers the service to deliver a food box directly to the family's doorstep. Each food box contains the ingredients and recipes needed for cooking the meals that are recommended by hälsa. All sets of instructions



are slightly adjusted to meet the personal needs of families and designed to include the entire family in the cooking process. The inclusiveness of the recipes allows parents to better educate and motivate their children for healthy nutrition. hälsa also provides consultations with a nutritional expert as an add-on that can be paid per usage to coach users individually.



Key Partners

- Nutrition and health experts for recommendations
- Wholesalers in the food sector for co-branded grocery delivery
- Chefs for recipe design
- Social media influencers



Key Activities

- Data analytics on families' nutritional habits and profiles
- Tracking and prediction of nutritional needs
- Generation of personalized meal plans and recipes
- Partnering with food wholesalers
- Provision of nutrition platform



Key Resources

- Knowledge base with nutritional information, food recipes, and user data
- Nutrition plans and recipe recommendation algorithms
- Digital infrastructure
- Data scientists and developers



Value Proposition

- Personalized healthy and tasty nutrition plans
- Education of children to cook and become health aware
- Provision of a fun cooking experience for the whole family
- Reputation through expert knowledge
- Convenient delivery of groceries



Customer Relationships

- Automated recommendations of meal plans
- Engagement of users in healthy nutrition through lots of interactive recipes
- Entertainment of children through cooking boxes
- Personal assistance through food experts



Customer Segments

- Middle-income families using a nutrition app
- High-income families using nutrition app, cooking boxes and consultation service



Channels

- App download from application stores
- Targeted advertising through social media, influencers, and SEA
- Partnerships with health insurance companies
- Promotion via food-trucks, pop-up stores, and food-fairs



Cost Structure

Fixed Cost

- R&D costs
- Operational and IT-infrastructure
- Fees for cloud-hosting services
- Personnel and financing costs

Variable Cost

- Marketing
- Salaries for nutritional experts
- Ingredients & deliverables
- Cooking utensils



Revenue Streams

- Basic subscription
- Nutritional analysis
- Meal plan and recipe recommendation
- Premium subscription
- Cooking box delivery

Value Proposition

hälsa makes it very easy for parents to provide the entire family with healthy and delicious nutrition by recommending easy to implement meal plans.

By partnering with leading nutrition and health experts, hälsa builds up a broad knowledge base of nutrition values, medical information, and a strong reputation. Using this information together with data that is inserted by family members about their age, gender, physical activity, preferences, allergies, or specific diets, the platform employs algorithms to provide healthy and tasty nutrition plans. Based on those personalized plans, it matches cooking instructions that fulfill each individual's requirements to propose a meal plan. Each generated meal has an associated cooking instruction that can be cooked by the entire family together. Step-by-step directions in the recipes designed for individual family members make the cooking process easy to coordinate and execute. Thereby, the cooking experience becomes a social and entertaining event for the whole family, and children learn to cook and become health aware. Thanks to the platform's flexibility, recipes can be easily adjusted to the family's nutritional intake each day.

Similarly, when parents have no time to cook at all and instead buy food, the platform suggests macronutrients the meals should contain. hälsa is also very convenient for busy parents as they do not have to think about what to cook since the platform provides them with recipes each day. Furthermore, premium customers get the ingredients for five meals together with cooking utensils for children in an appealing cooking box delivered to their home once a week. This additional service saves time on grocery shopping, reduces stress levels, and increases energy, enabling families to spend more quality time together.

A huge benefit is also that customers have the opportunity to consult experts via the platform who support the customers on problems or coach them regarding their nutrition in general. The nutrition experts take the existing data as input, give advice, and feed the customers' experiences back into the database, which improves later recommendations.

Customer Relationships

Automated services: hälsa's customers value the convenience of getting a personalized and optimized meal plan with recipes and optional grocery delivery. An automatic and AI-supported process of creating nutritional profiles and recommending cooking instructions based on that profile achieves high customer convenience. For valuable recommendations, hälsa heavily relies on the users' input data. Therefore, hälsa needs to have a strong positive impact on its customers' lives to build trust.

Interaction with users: To use hälsa's service most effectively, users not only share data about allergies, preferences, gender, weight, or height, but they also share information about how strictly they follow the recommendations. Our customers manually input a rough description of their meal using high-level keywords, such as beef, vegetables, or rice, and use a slider to indicate the quantity eaten. If they deviate from the plan, hälsa can adjust the following recipes accordingly to guarantee the healthiest nutrition. By sharing data on their eating habits and giving feedback on the suggested meals, users co-create content, which increases value through an ever-improving adjustment of meal plans to individual needs. hälsa's premium customers have an additional touchpoint with the company as they receive boxes containing the necessary ingredients for the recipes delivered to their homes.

Personal assistance: hälsa's nutrition expert consultation sessions can provide customers that value interpersonal contact for a usage fee. These sessions help the customers to get a deeper understanding of the meal plans, especially the underlying biological foundation, and give them orientation for a healthy lifestyle in general.



Channels

Online channels: Given the digital nature of hälsa, many online channels are employed to raise awareness about our product. hälsa's service will be actively promoted in diverse online and social media advertisements. Blogs and online magazines provide an ideal channel to spread high-quality information about our service in conjunction with health and food-related articles. Promotion through social media focuses on employing famous influencers in the fields of health, parenting, or lifestyle. As Influencers have a closer relationship with their audience, they greatly help in creating trust with the customers and showing the benefits of hälsa.

Offline channels: In the offline world, hälsa is promoted via food trucks and food fairs. hälsa's experts can show potential customers some of the app's features to give families a feeling of how to use the app. They can also show off recipes and meals. Additionally, popular print publications in the cooking and health area are an attractive way to advertise for hälsa. For the premium users, the delivery of food boxes is a major offline touchpoint with the platform. Finally, as health insurance companies and employers are interested in the health of their policyholders and employees, hälsa will cooperate with them to include its usage in insurance policies or to provide free usage to employees to reduce sick leaves."

Key Resources

Knowledge base: Providing customers with healthy nutrition plans, information about nutritional values of ingredients, and individual user's needs are necessary, which are deducible from inserted age group and biological or medical needs. The database also contains sub-components of recipes that can be mixed and matched — for example, recommending a better combination of a kind of carbohydrate. Furthermore, different ways to prepare a dish, such as oven-roasted or pan-fried, are necessary inputs for hälsa's knowledge base. This colossal data resource contributes to the creation of new recipes, or modification of existing ones to cater to customers' individual needs and tastes.

Nutrition plan and recipe recommendation algorithms: The next-generation recipe recommendation algorithms developed by high-qualified data scientists are a distinguishing competitive advantage over other players in the market. The

hälsa

algorithms consider customers' preferences and take their nutritional needs into account when recommending the recipes and can also perform slight tweaks on portion sizes to accommodate taste, allergies, and dietary needs.

Digital infrastructure: The platform is the primary linkage to customers. hälsa's backend exposes Application Programming Interfaces (APIs) to be potentially used by different forms of mobile apps.

Data scientists and developers: Competent data scientists are needed to build a leading recommendation system and to get the best results out of the collected data. Additionally, the developers create and maintain the digital platform and integrate all services in an easy-to-use solution.

Key Activities

Data analytics: Understanding customers' nutritional needs and food preferences is hälsa's distinguishing competence.

Performing data analytics on users' macro- and micronutrient consumption, preferences, and individual characteristics such as age, allergies, and physical activity enables hälsa to create well-balanced nutrition plans. Based on that, hälsa recommends personalized meal plans and recipes.

Adaptation of recipes: Giving customers the freedom to adjust their recipes to their taste while keeping a specific composition of nutrients is a competitive advantage of hälsa. Developing an algorithm that can replace certain ingredients or methods of preparation with others while keeping the accordance with the nutrition plan is essential.

Formation of strategic partnerships: A critical activity for hälsa is the formation of partnerships with nutrition experts and chefs to create high-quality recommendations and recipes to enable a reliable and reputable nutrition app experience. Premium customers receive the necessary groceries to cook the recommended cooking instructions. Building strategic partnerships with high-quality and dependable whole-

salers in the food industry are crucial to guarantee a smooth customer experience and high-quality meals.

Research and development for provision of nutrition platform: Developing a digital platform, through which customers can reach and benefit from hälsa's service, is a crucial activity. This platform needs to be continuously maintained and improved to provide a seamless user experience and to optimize recommendations.

Design, production, and delivery of an entertaining cooking box: As part of the premium subscription, the cooking box, which contains the needed weekly groceries to prepare recipes, is delivered to the customer. Wholesale partners in the food industry handle the delivery. However, the design of the boxes is done in-house to reflect hälsa's corporate identity on the boxes."

Revenue Streams

hälsa offers a subscription business model because it provides several advantages to both the offering company and the subscriber. Notably, the company can rely on steady revenues, whereas the subscriber regularly receives the newest content and features. Furthermore, hälsa includes expert nutritionists' consultations, which are priced on a pay-per-use basis.

Basic subscription: The basic subscription includes recipe recommendations, which are based on a personal nutritional analysis and put together into a wholesome family meal. Besides, it includes the feature to playfully prepare the dishes as a family, with every family member being involved in the process. For this monthly subscription, hälsa charges 8.99 EUR independently of family size, to keep the pricing model simple for our customers and promote a family-friendly brand.

Premium subscription: The premium subscription includes all features of the basic subscription plus the delivery of the groceries needed to prepare five recommended recipes, ideally one meal every evening when the family is together. For this monthly subscription, hälsa charges 99.99 EUR per adult. Children under the age of three are included for free; children aged three to ten are charged at half price and children aged eleven and above are charged the full adult price. This pricing strategy shows hälsa's friendliness towards families, which facilitates customer acquisition and creates a lock-in effect. This is because families with small children benefit from not paying for them, but when they grow up, they have got



hälsa

used to the convenience of hälsa so that they start paying for their children also. The food delivery can be interrupted for one month per year to provide more flexibility to the subscribing family, for example, during vacation.

Pay-per-use fees: On top of the subscriptions, hälsa offers expert nutritionists' consultations on a pay-per-use basis. Consultations can be booked in packages of three, five, or ten sessions, for which the price becomes cheaper, the higher the number of scheduled sessions. The basic consultation package with three sessions can be booked for 199.99 EUR and the largest one with ten sessions for 499.99 EUR. hälsa benefits from this service as it keeps a ten percent service charge before forwarding the rest to the experts. Moreover, by providing service on a personal level, hälsa increases its credibility.



Key Partners

hälsa cooperates with a multitude of external partners to bring healthy and at the same time, delicious nutrition closer to families.

Health- and nutrition experts and chefs: The most critical key partners are health and nutrition experts. They work or research in a health-related field such as medicine, nutritional science, or physical education and play two crucial roles in hälsa. Firstly, they provide the necessary domain knowledge needed to develop the recommendation algorithm. This knowledge includes and is not limited to the nutritional values of different foods, the required number of calories per individual based on, for instance, age, sports activities, or diet. Secondly, they offer personal consultation sessions through hälsa for the customers. Thus, the high quality and reliability of their service is a crucial prerequisite for customer satisfaction. Other necessary partners are chefs who design a wide variety of healthy and delicious recipes that can be chosen by the algorithm.

Wholesalers in the food sector: For delivering ingredients to its customers, hälsa needs to establish long-term relationships with wholesalers in the food sector. When premium customers order food boxes, the wholesalers pick the groceries for the recipes and pack them together with other items, such as cooking utensils. As a next step, they also send the co-branded boxes to the customers using their delivery services, which makes them responsible for the quality of the



ingredients and the stability of the boxes at arrival. hälsa also coordinates the food plans with the wholesalers to use ingredients that can be locally sourced and foster sustainability.

Social media influencers and brand ambassadors: For entering the market, attaining brand awareness, and acquiring customers in the digital era, it is imperative to work together with social media influencers and brand ambassadors. Primary customer touchpoints are blogs, digital magazines, or social networks, so hälsa must form partnerships in the fields of family, nutrition, health, and lifestyle to convey information and promote its uniqueness.



Customer Segments

Single- or double-parent families: Value healthy, delicious, and convenient food, are the targeted customer groups. One of the main pain points all families have is deciding on what to cook throughout the week. Additionally, food plays an integral part of a healthy lifestyle for the children and the entire family in general. Choosing a healthy and – at the same time

– a tasty nutrition plan that tailors to each family member is a hassle, if not impossible. hälsa solves this pain point for all family types no matter the number of children in the family or their age. Thus, hälsa is beneficial for busy families, who have no time to think about their food, as well as the not so busy families, who want to have a wider variety of better, healthier food and enjoyable cooking experience. hälsa is targeting different income groups with its services when looking at the degree of adoption.

Middle-income families: The basic subscription offered by hälsa targets middle-income families. The families will still handle the grocery shopping.

High-income families: The premium subscription offered by hälsa, which includes the basic subscription, is targeted at high-income families due to the high quality and organic produce sourced for the cooking boxes. This customer segment can better afford food at this price point and the additional consultation services provided by hälsa."

Cost Structure

For the setup of hälsa, an initial budget is required to build the platform and develop the recommendation system for the nutrition and meal plans. Qualified software developers and data scientists are needed for that purpose. Their salaries are a significant cost driver. Furthermore, the establishment of partnerships with nutritional experts and chefs to boost reputation requires an upfront investment. A substantial share of costs arises from collaborating with experts to build the knowledge base and designing recipes. Another initial cost point is the setup of on-demand contracts with food wholesalers and their delivery services.

Fixed Costs

hälsa bears fixed costs that are independent of the number of customers. These costs arise from research and development investments, which are imperative to improve recommendations continuously. Further, expenses such as investments in offices and work equipment are needed for operational infrastructure. Another share of the fixed costs comes from hälsa's use of cloud-hosting services to run and maintain its IT-infrastructure. Moreover, hälsa requires competent personnel in the fields of user support, marketing, and administration. Lastly, financing costs will arise from the initial investments.

Variable Costs

Marketing activities through a variety of channels needed to raise awareness amongst parents are a significant variable cost. Budget is required for targeted advertising on health- and family-related websites or magazines and social media platforms. Influencer marketing and hälsa's promotion via food-trucks, pop-up stores, and food-fairs are expensive and contribute to the variable costs. Moreover, salaries for nutritional experts and chefs to continuously improve the platform are a major cost driver. Additionally, food wholesalers share part of the revenue generated from premium customers and receive the costs of the ingredients and deliveries.

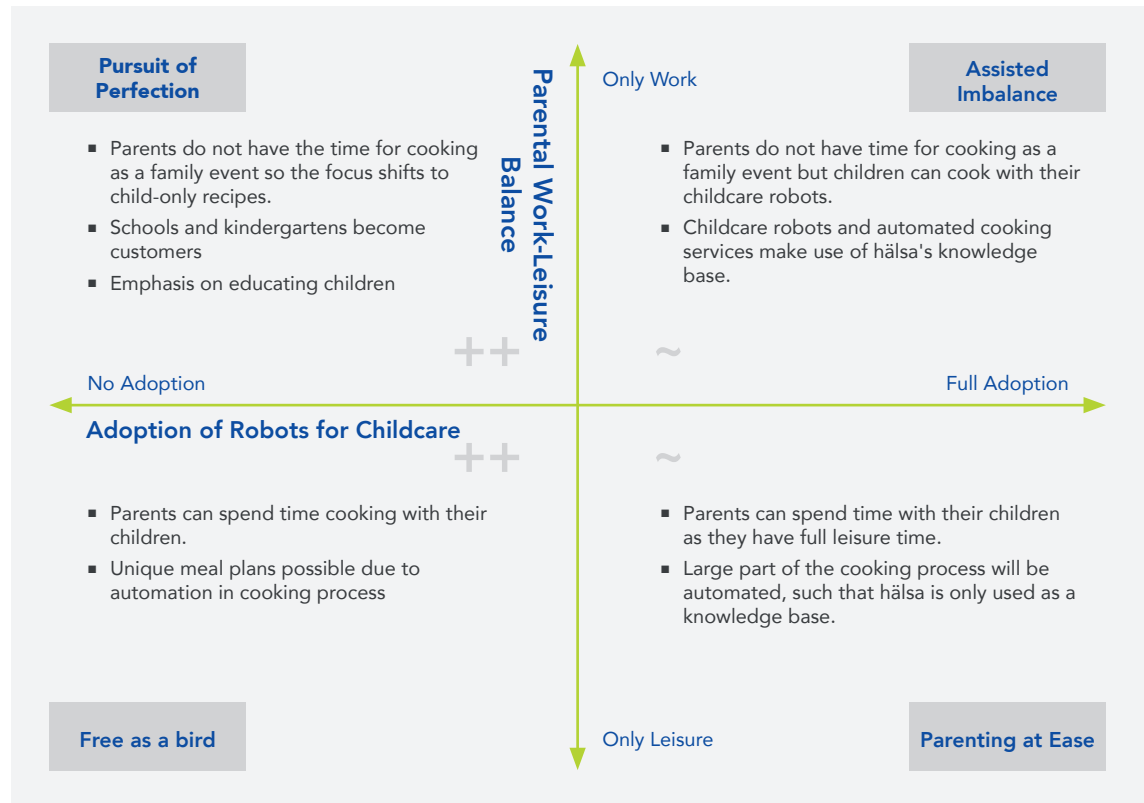
Scenario Fit:

Assisted Imbalance: In this scenario, the interface through which hälsa provides its service is no longer an app. Instead, the platform is used by childcare robots, which are capable of precisely tracking and ensuring that the children follow the recommended nutrition plan. Therefore, hälsa provides the knowledge base and algorithms that are used by childcare robots. In this scenario, hälsa can also suggest unique meal

plans for everyone in the family independent of the other members as meal preparation is handled by increased automation. Regarding the value proposition for parents, the high automation means that the impact of convenient grocery deliveries is low, while parents have no time to experience cooking as a family event. Nevertheless, families benefit from hälsa, even though in many cases, parents and children do not spend time together when consuming their meals.

Pursuit of Perfection: In this scenario, parents are continually working and outsource their childcare tasks to other individuals or organizations. A large portion of these organizations is schools and kindergartens. Consequently, hälsa's customer

segment grows beyond just families in this scenario. Regardless, the value propositions of providing healthy, tasty, and personalized nutrition plans are still applicable. Although robots are not permitted for childcare, high automation is still accepted in this scenario. Thus, hälsa can move further into providing fully personalized meal plans that are less dependent on the other members of the family or the children in schools and kindergartens that use hälsa. Given the lack of time parents have with their children and the missing assistance through childcare robots, there is a stronger emphasis on hälsa's service to educate children on healthy nutrition and the preparation of their meals as early as possible.



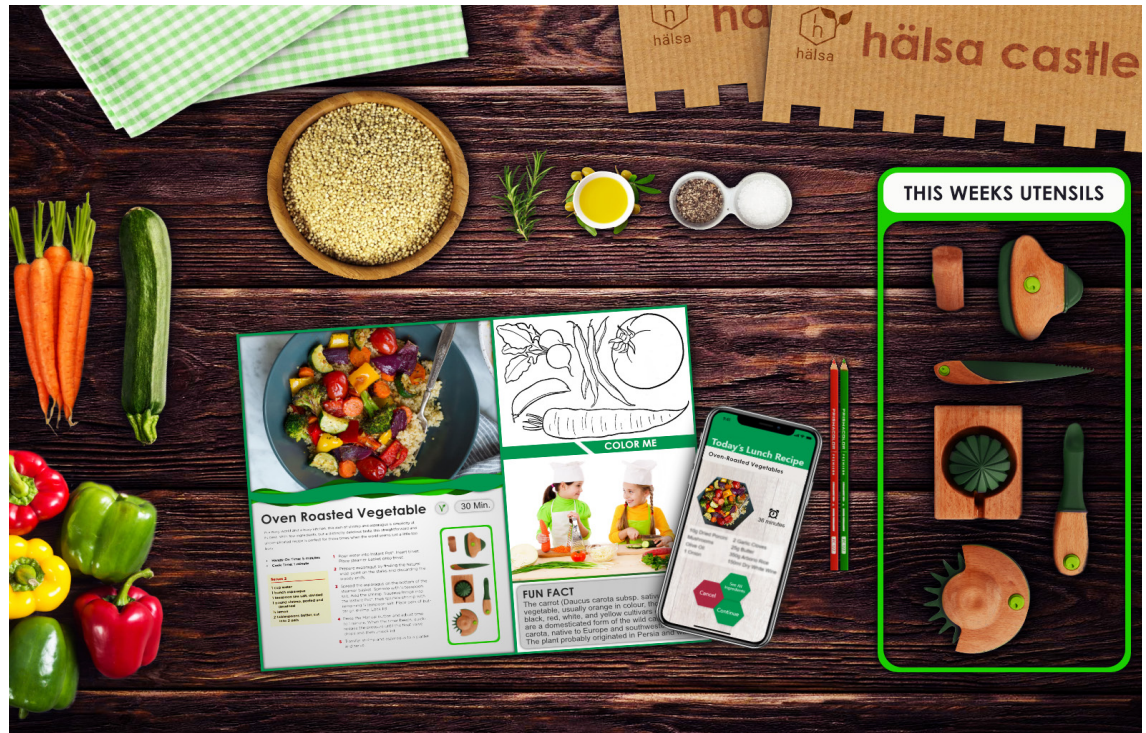
hälsa

Free as a Bird: Despite having ample leisure time, accommodating all the nutritional needs of the family is still challenging for parents. Therefore, parents still have a high demand for healthy, tasty, and personalized nutrition and meal plans. The first six years of a child's life are considered the most significant for its physical and cognitive development. With hälsa, parents can ensure that their children receive the best possible nutrition during this time and use the time saved for entertaining and educating their children. Thanks to the plentiful leisure time parents have, hälsa strives in this scenario as families spend more time together. This results in higher adoption of meal plans. Thus, tracking of nutritional values and the quality of the generated meal plans improve. The possibility of automated cooking in this scenario opens the opportunity for hälsa to provide personal meal plans for each family member.

Parenting at Ease: In the scenario, in which both parents have full leisure time, and childcare robots are fully adopted, the interface through which parents receive hälsa's service changes. Rather than a direct interface through an app, families experience hälsa through childcare robots and other automated devices that take care of the meal preparation. To this end, hälsa provides the knowledge base and algorithms for the automated services that are used in parenting. Additionally, given the leisure time of parents and the assistance through childcare robots, it is easy for families to follow the suggested meal plan, which enhances the services provided by hälsa. However, one outcome of this scenario is that the high degree of automation in parenting leads to a lower impact of the convenience benefit offered by the delivery service.

Challenges:

- Partnering up with public ministries to get certified and differentiating from established competitors.
- The platform has to comply with data privacy laws like GDPR while gathering much of users' private data.
- Precise manual entry of food consumption from customers during the day can be difficult when they deviate from the recommended nutrition plan.
- hälsa needs to make process of capturing the user's information seamless to gather all relevant information.
- It is challenging to always adapt the meal plan if the customer did not follow the nutrition plan strictly so that the recipes contain and balance all the necessary nutrients.
- High-quality of ingredients and the stability of cooking box at delivery have to be ensured to protect company image.



- Generating healthy and tasty recipes is an algorithmically challenging problem that needs much research.

Outlook:

hälsa plans to scale beyond catering for just families. Daycares and schools will be addressed as cooking for many children with different preferences is challenging. Additionally, hälsa will extend its business model by partnering with employers and health-insurances. Employers provide hälsa as a perk to attract talent and reduce sick leaves, while insurance companies offer hälsa to their policyholders to reduce the risk and costs of health issues resulting from unhealthy food. The growing customer base will pile up a huge amount of data, which allows for a better understanding of the nutrition habits of each individual and an improved recommendation algorithm. The integration of wearables will open opportu-

nities to better predict and track the individual nutrition, enhancing accuracy and individualization of recommendations. Advances in image recognition will enable our customers in the future to enter the meals they eat through a simple image, rather than manual entry.

Moreover, the premium model becomes more flexible when it extends to any amount of meal, including breakfast or lunch boxes. hälsa benefits from wholesalers' shorter delivery times, helping to provide personalized cooking boxes.



DEEPSLEEP

A Smart Baby Bed Improving the Sleep of Babies and Parents Simultaneously

DeepSleep gives parents a valuable gift - a good night's sleep. DeepSleep is a smart baby bed that uses data analytics to adjust the baby's sleeping environment and bring it back to rest automatically. If needed, DeepSleep notifies the parents when they have to take care of their child. The companion app shows the baby's sleeping pattern allowing parents to accustom the baby more quickly to a regular sleeping rhythm.

Babies do not have an inert sleeping rhythm and cannot put themselves back to sleep so that parents have to wake up to comfort their child [357]. DeepSleep continuously monitors the baby's sleeping state and reacts accordingly to prolong its deep sleep phase and to reduce the parents' night waking. When the baby transitions to restless sleep, the bed will gently rock the baby until it has fallen into a deep sleep again. If the baby is awake, DeepSleep uses rocking motions

and soothing noises to ease it back to sleep. If DeepSleep recognizes an unsuitable room temperature or the baby cries, parents are notified instantly via the app.

DeepSleep records the baby's sleeping pattern to automatically adjust the ambient light to signal bedtime and help the baby develop a natural sleeping pattern. Integrated into the app is a baby phone which enables parents to monitor their child remotely. With the built-in camera, DeepSleep recognizes when the baby sleeps on its belly and instantly notifies the parents to prevent sudden infant death syndrome.

DeepSleep offers three baby beds, which parents can only purchase through a subscription model. A bedside crib for infants is provided at 0-6 months, a small bed for babies at 6-18 months, and a larger bed for 18- 36-month-old babies. DeepSleep addresses babies up to the age of 3 years to help

them overcome the problem of not falling asleep alone. The subscription model reduces the parents' expenses on beds. Simultaneously, DeepSleep reduces waste by reusing the products.

DeepSleep aims to be at the forefront of technology and research around babies' and parents' sleep. Therefore, the company will leverage the data gathered through its product to find new insights and enhance the DeepSleep experience.

 **Key Partners**

- Hardware manufacturer
- Baby sleeping experts
- Social media influencers

 **Key Activities**

- Development and integration of hardware and software
- Developing, maintaining, and improving the companion app
- Sleep data analysis
- Customer acquisition and maintenance of customer relationships

 **Key Resources**

- Skilled hardware and software developers
- Knowledge base on sleeping patterns
- Algorithm to analyze sleeping patterns
- Companion smartphone application

 **Value Proposition**

Parents with children under three years

- Increased sleeping hours for parents and their babies
- Health and safety monitoring of babies
- Establishing a regular sleeping rhythm for babies
- Giving parents an overview of babies' sleeping patterns

Hotels

- Calming down babies that are in an unfamiliar environment
- Improving customer experience through an innovative product as a differentiating factor

 **Customer Relationships**

- Online community
- Referral program
- Customer support
- Regular sleep report
- Online community with an expert blog

 **Channels**

- Parents with children under three years
- Social media and referrals
- DeepSleep Website
- Sales personnel for hotels
- Hotels
- Hotel fairs and direct sales
- Business to Business (B2B) e-commerce platform, pop-up stores, and food-fairs

 **Customer Segments**

- Business to Customer (B2C) - Parents with children under the age of three
- Business to Business (B2B) - Hotels

 **Cost Structure**

Fixed Cost

- Upfront investments
- R&D, Rent, IT infrastructure, and marketing costs
- Patents, certifications and legal fees

Variable Cost

- Material
- Production, distribution, and transportation
- Customer acquisition

 **Revenue Streams**

- Monthly subscription for parents
- Direct sale for hotels

DeepSleep

Value Proposition

Parents with Children under Three Years

Increased sleeping hours for parents and their babies: Having a newborn often means lots of sleepless nights for parents because they need to get up and put their baby back to sleep. Through a combination of a rocking mattress, soothing sounds, calming lights, and sleep analytics, DeepSleep reduces night-waking of the baby. For parents, this means they get more sleep as they do not have to get up as many times during the night to calm their baby.

Health and safety monitoring of babies: Nonetheless, there are occasions where motion, sound, or light adjustments do not prevent the baby from crying. In this case, DeepSleep acts like a baby phone and notifies parents that the baby needs their attention. Additionally, DeepSleep can detect critical situations by monitoring the baby with a camera and immediately alarming the parents to prevent sudden infant death.

Establishing a regular sleeping rhythm for babies: For parents to balance work and family life, they need enough sleep, which is heavily influenced by the baby's sleeping rhythm. As research shows, babies only develop a regular sleeping pattern at around the age of two. DeepSleep can enable habits for babies to establish a sleeping rhythm from an earlier age on. Therefore, parents can prepare for the night and know when their baby needs and wants to sleep every day.

Giving parents an overview of babies' sleeping patterns: Furthermore, DeepSleep's companion app for smartphones provides insights about sleeping patterns and the health status of the baby. The app also includes access to an online community for parents to exchange experiences and receive baby sleeping advice.

Hotels

Calming down babies that are in an unfamiliar environment: For most parents, getting enough sleep is an essential part of a nice vacation. Parents who continually wake up at night because of their crying baby are unlikely to enjoy their stay. With DeepSleep, hotels can ensure parents are sleeping well because the smart baby bed calms babies at night. On vacation, this is especially important as babies find themselves in unfamiliar environments. Hotels will set up DeepSleep using sensible default settings so that parents can benefit from the bed already from the first night on

Improving customer experience through an innovative product as a differentiating factor: With better sleep, a positive holiday experience is more likely for parents, resulting in positive reviews for the hotels. Besides, DeepSleep represents an innovative product that can be a differentiating factor to other hotels.

Customer Relationships

Online community: Through the app, parents get access to an online community where they can pose questions to sleep experts and exchange experiences with other parents. New blog posts about the latest sleep research and insights about babies' sleeping rhythms complete the go-to platform for parents about baby sleep.

Referral program: When parents recommend DeepSleep's product to others, they get rewarded with discounts on their monthly subscription fee. This program aims to incentivize customers to stay loyal and acquire additional customers.

Customer support: For simple inquiries, DeepSleep uses a chatbot service to reply to any questions arising from parents quickly. This digitized procedure makes it possible to serve a significant number of customers with as little response time as possible. While some cases are resolved quickly, others need more individualized support. Either DeepSleep employees deal with these cases, or the online knowledge exchange community discusses them.

Sleep report: Parents can decide whether they want to receive daily, weekly, or monthly reports about their baby's sleep. Those reports include a detailed analysis of the sleep-



ing patterns of their child. Additionally, DeepSleep provides recommendations to parents about how to improve their baby's sleep. The recommendations rely on scientific research, data gathered across users, and the baby's sleep data.

Online community with an expert blog: After parents bought the product, DeepSleep fosters their engagement with the brand through the online community that serves as a platform for parents and experts to share knowledge about sleeping habits.

Channels

Parents with Children under Three Years

Social media and referrals: DeepSleep creates awareness among parents through social media marketing and referral campaigns to reach potential new customers through existing customers.

Website: As the first touchpoint with potential customers, DeepSleep's website presents the product through explanatory videos, pictures, and written information to demonstrate the features and benefits of the baby bed. It is also the only place where parents can order the product through a subscription-based model with a monthly fee. This online-only direct selling channel provides two benefits. It offers higher margins by excluding retailers and leaves DeepSleep in control to ensure a frictionless buying experience for the customers.

Sales personnel for hotels: DeepSleep aims to sell its product to hotels directly without a subscription. To ensure long-lasting customer relationships, each hotel has an assigned key account manager responsible for the customer-client interaction. To retain hotels as customers, hotel representatives are invited to events to learn about the product features and how they can ensure that the hotel's guests have a great experience with DeepSleep.
Hotels

Hotel fairs and direct sales: While DeepSleep addresses parents mainly online, hotel chains are approached through fairs and direct contact by sales representatives. The sales team is also responsible for providing the customer with a personalized purchase experience.

DeepSleep

B2B e-commerce platform: In addition to a dedicated key account manager, hotels have access to a B2B e-commerce platform where they can order cribs in bulk with special discounts. There, the clients can also subscribe to a maintenance service that provides reliable and fast support.



Key Resources

There are two central resources for DeepSleep. Firstly, human and intellectual resources in the form of skilled employees and an extensive knowledge base on sleeping patterns. Secondly, the digital infrastructure consisting of the algorithm to analyze sleeping patterns and the companion smartphone application, ensuring the feasibility of DeepSleep's vision.

Skilled hardware and software developers: As DeepSleep offers a product combining hardware and software components, qualified employees are needed to turn DeepSleep's vision into a viable product. Hence, the knowledge and expertise of the company's employees represent a crucial

resource. Hardware developers are required to design the smart baby bed. Software engineers particularly need to develop an algorithm that uses collected sleep data to identify sleeping patterns and preferences of the baby regarding motion and light.

Knowledge base on sleeping patterns: Given that DeepSleep focuses on babies up to three years old, understanding their sleeping habits is crucial to the product's success. Building a knowledge base on sleep by consolidating the expertise of various stakeholders will ensure the proficiency and value DeepSleep delivers to parents.

Algorithm to analyze sleeping patterns: The algorithm that analyzes a baby's sleeping pattern lies at the core of the value proposition to DeepSleep's customers. Therefore, continuously improving the algorithm is essential to ensure the added value of DeepSleep for parents.

Companion smartphone application: A strong focus of DeepSleep lies in providing a companion smartphone application with an intuitive user interface and easy to understand data visualization. With the app, parents receive notifications, get access to the baby's sleep report, manually control the baby bed, and can access DeepSleep's online knowledge community.



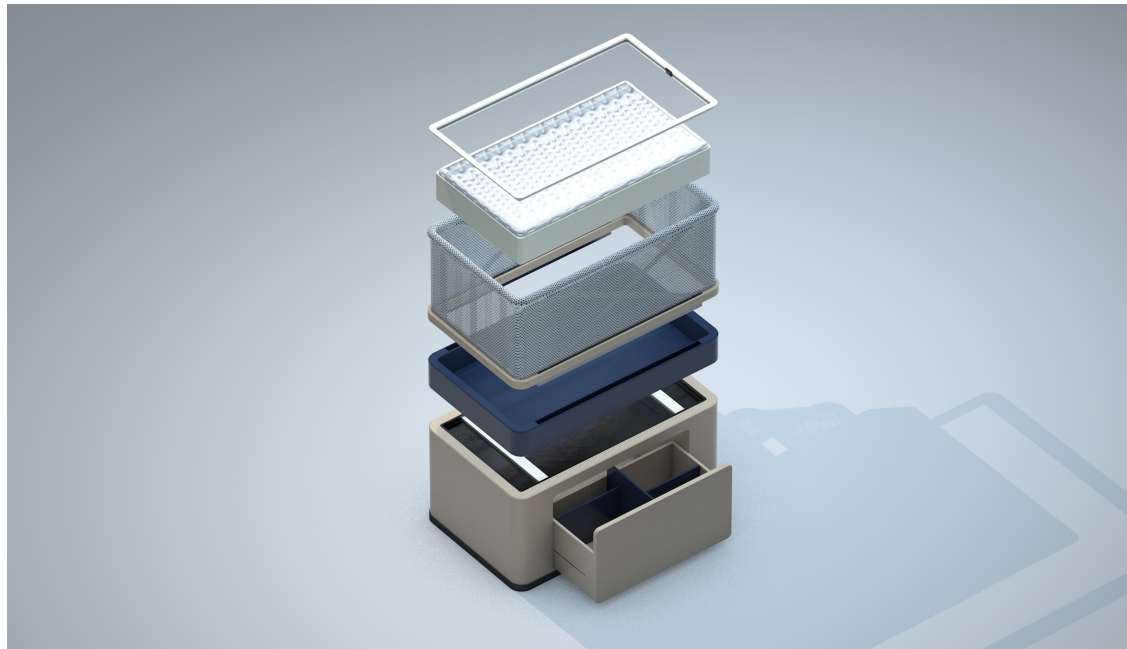
Key Activities

Development and integration of hardware and software: DeepSleep is developing a smart baby bed to help parents with babies up to three years old to get a full night of sleep. Through integrated sensors, DeepSleep detects when the baby wakes up and automatically puts it back to sleep by adjusting the surroundings through slight mattress movements, light, and sounds. Hence, the first crucial activity is to seamlessly integrate the built-in hardware components such as microphones, speakers, lights, motion sensors, and actuators into the software architecture.

Developing, maintaining, and improving the companion app: As the app plays a crucial role in the parents' experience with the product, DeepSleep focuses on developing a user-friendly interface. To provide value to the parents, the smartphone application needs to provide clear and structured information. Thus, it has to be consistently maintained and improved to ensure the long-term success of DeepSleep.

Sleep data analysis: DeepSleep provides sleep analysis by making use of the data collected via the integrated sensors. The data contains information regarding the baby's sleeping habits, such as the time it takes to fall asleep and its sleeping hours. Building on that, the algorithm identifies preferences of motion and light, which can then be adjusted accordingly. Through data analysis, sophisticated predictions regarding the baby's future sleeping habits, as well as the atmosphere needed for the baby to sleep comfortably, are provided.

Customer acquisition and maintenance of customer relationships: Another critical activity is the acquisition of customers, both parents, and high-end hotel chains. Ensuring their continuous loyalty is crucial for DeepSleep, especially shortly after its introduction to the market. Thus, DeepSleep realizes various marketing campaigns, amongst others, in cooperation with social media influencers.



DeepSleep



Revenue Streams

Monthly subscription for parents: DeepSleep offers a monthly subscription model to their B2C customers - the parents. Parents sign up for a contract that lasts as long as they keep the respective sized bed. A bedside crib for infants is provided at 0-6 months, a small bed for babies at 6-18 months, and a larger bed for 18- 36-month-old babies. Adjusted to the average size of a baby in its first three years, the smallest bed fits for a baby's first six months. Then, the medium-sized bed can be used for twelve months, and the largest version for eighteen months. At the end of the contract, parents return the bed. The minimum contract length is six months. DeepSleep is a rather expensive product; therefore, parents might not be able to buy the bed. Besides, babies grow rapidly so that the baby bed can only be used for a short period leading to a reduced willingness of parents to pay a high price. Thus, DeepSleep can be offered more cheaply through a subscription-based model where the total price for the subscription is less than the amount it would cost to buy the bed. As DeepSleep reuses the baby bed for other parents after its return, the company is more profitable with a subscription-based model than by directly selling the bed.

Direct sale for hotels: DeepSleep offers the direct sale of the beds for its B2B customers – high-end hotels. They can buy the beds in different sized bundles, where a higher amount leads to a reduced price per piece. For hotels, the subscription-based model does not make sense, as they can reuse the beds on their own and need a fixed amount of them.



Key Partners

Among the key partners of DeepSleep, there are three main categories: first, the hardware manufacturer necessary to build the baby bed. Second, baby sleeping experts who provide the knowledge and insights about sleep, and thirdly, social media influencers who introduce DeepSleep to its main customers, parents.

Hardware manufacturer: DeepSleep partners with an external manufacturer who produces the smart baby bed, as developing this expertise would require a lot of initial time and investments. Building a strong partnership with a hardware supplier that DeepSleep can rely on is essential to ensure the production of a high-quality baby bed.

Baby sleeping experts: To evaluate the sleeping patterns of babies, DeepSleep partners with sleeping experts who work or study in the respective field. Sleeping experts contribute to the optimization of the sleep analysis as well as the resulting adjustments of the baby's sleeping environment. Thus, these sleeping experts contribute immensely to the value and trustworthiness of DeepSleep. Other partners in this segment are midwives and pediatricians, who give post-natal advice to parents, including how to help babies sleep through the night. They provide information regarding baby sleeping habits and how these evolve within the first months. The identified sleeping experts also give baby sleeping advice in the online community for parents in the app.

Social media influencers: For DeepSleep, influencers are an essential link between the brand and its customers. Influencers are regarded as authentic and trustworthy when recommending products, which incentivizes their followers to purchase these items. Long-term partnerships with ambassadors who promote DeepSleep's unique capability of providing parents with more sleep ensures a high market awareness.



Customer Segments

B2C

Parents with children under the age of three: DeepSleep's primary customers are parents of babies up to three years. Until then, babies do not develop a regular sleeping pattern and cannot put themselves back to sleep on their own. As most parents work and have a tight schedule, they are interested in optimizing their baby's sleep to profit from a quiet night. To ensure their baby's safety, they also have the urge to monitor their children continuously and are open to using technology for that purpose. Although parents value data privacy, convenience, and time savings are of higher importance in their buying decisions. Hence, DeepSleep focuses on technology affine parents that wish for a good night's sleep.

B2B

On top of entering the B2C market, the B2B market with hotels as customers offers an additional revenue stream to DeepSleep. To ensure a pleasant experience for their hotel guests, high-end hotels are willing to invest money in products such as DeepSleep's smart baby bed. For DeepSleep, hotels are not only paying customers but also serve as a marketing channel for the first contact of families with the

product. With DeepSleep, hotels can market themselves as baby-friendly and offer parents more opportunities to enjoy their stay.



Cost Structure

Fixed Costs

Upfront investment costs: A large part of the expenses for bringing DeepSleep to market arises in the beginning as upfront investment costs. These include continuously developing and evaluating hardware and software prototypes of the bed and the app, as well as conducting user and market studies. Furthermore, consulting with baby sleep experts such as pediatricians or midwives as well as claiming patents require more initial investments.

Research and development: Constant investments in research and development are necessary to keep up with the latest scientific findings in baby sleep research, and to ensure high-quality standards.

Patents, certifications, and legal fees: DeepSleep is a product that parents entrust their newly born baby. Hence, it is of great importance to acquire safety approval for DeepSleep by the TÜV and certify the textiles by the Öko-Text Standard 100, resulting in costs for certifications and legal fees.

Office, warehouse rent, and IT infrastructure: Additional fixed costs include rental costs for an office and warehouse space to store produced and returned beds until they are delivered. Costs for servers to analyze and store the sleeping data also need to be taken into account.

Marketing activities: Direct sales to hotels require in-person marketing to ensure a broad customer base. In contrast, marketing activities targeting parents focus on online marketing activities and influencer marketing to make parents aware of DeepSleep and acquire a broad customer base.

Variable Costs

Material: Variable costs depend on the number of produced DeepSleep baby beds, as the amount of required materials including wood, textiles, electronic motors, force sensors, microphones, speakers, LEDs, cameras, and computers grows.

Production, distribution, and transportation costs: Depending on the number of beds produced, the production, distribution, and transportation costs increase. The development of the app incurs labor costs as well as infrastructure costs for data storage. Furthermore, the digital extension requires constant maintenance adding further labor costs. for data storage. Furthermore, the digital extension requires constant maintenance adding further labor costs.

DeepSleep

Scenario Fit:

Assisted Imbalance: In a world where childcare robots are fully adopted and parents have an 18-hour workday, sleep is of uttermost importance for any parent. As society accepts robots and technology in every corner of life, DeepSleep fits quite well into this scenario because technology in the baby's bedroom is of no concern to parents. When they get home from work, a night full of a crying baby is the last thing they want to experience. So, parents are willing to buy DeepSleep's sleep optimizing technology. Also, the integrated baby phone feature becomes of greater importance as parents can still see and hear their baby while working during the day. With DeepSleep integrated video baby phone, this becomes possible.

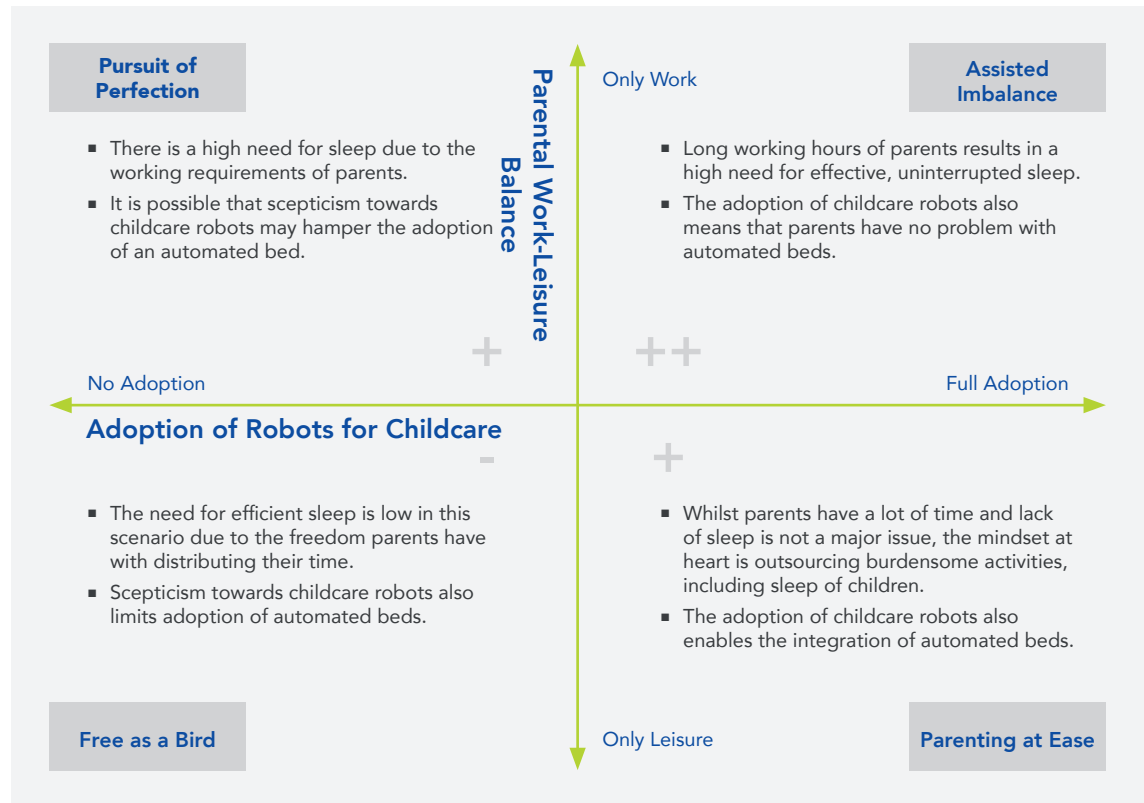
Pursuit of Perfection: In a world where parents only work and where there is no adoption of childcare robots, getting enough sleep is crucial for parents. However, skepticism regarding an automated baby bed could hold back potential customers of DeepSleep. As society does not accept childcare robots, parents might be hesitant about adopting technology in their baby's beds. Nevertheless, the need for good sleep is high as working hours require it. In this scenario, DeepSleep could evolve less to an automated solution and more towards a manually controlled baby bed. Parents could choose between modes with different light and motion settings based on the occasion and time of the day. They could decide by themselves how to put their baby to sleep.

Free as a Bird: The 'Free as a Bird' scenario portrays a world where parents only have leisure time, and the adoption of childcare robots is extremely low. In this scenario, taking care of the child in the nighttime may not be a big issue, as parents have enough free time during the day. The value proposition of DeepSleep remains to provide parents with more sleep and to ensure their baby's health. However, with parents disapproving of robots in child upbringing, the use of DeepSleep is less suitable. Therefore, DeepSleep would reduce the capabilities of the baby bed to analyzing and tracking the baby's sleep.

Parenting at Ease: When childcare robots are fully adopted, and parents only have leisure time, having fun, bonding with the baby, and outsourcing burdensome activities to robots is at the center of the parents' beliefs. With a smart baby bed, parents could not only reduce the unpleasantness of having to wake up at night. DeepSleep would also enable them to ensure the health and safety of their babies. To create even more memorable moments together, DeepSleep can integrate a story mode to adjust the environment to the story the parent is telling its child before going to bed.

Challenges:

- Skepticism of parents to put their baby in a smart instead of a regular baby bed.
- Data privacy concerns arising from parents as DeepSleep gathers many data about their baby's sleep.
- Continuous research necessary into how far the technical features of DeepSleep can improve the sleep of babies.
- Integration of the hardware components into one seamlessly functioning system.
- Creation of a safe and nurturing rocking movement, especially for zero to six months-olds.



DeepSleep

- Acquisition and retention of a high number of parents as customers as DeepSleep is a premium product
- Hotel guests might not want to try an unknown product to them for their child

Outlook:

DeepSleep aims to be the leading smart baby bed, even with fierce competition in the market. The goal is to make a child's upbringing as pleasant as possible, for which parents' sleep is deemed to be invaluable. Through the vast amounts of data gathered through the smart baby bed, DeepSleep leverages these insights to advance research to the most suitable environment for a baby's sleep and health.

In the future, DeepSleep aims to not only create a comfortable sleeping environment for babies but also improve the parents' sleep and health. By analyzing the parents' vital signs and health status, DeepSleep create a suitable sleeping environment through soothing sounds and ambient lights. DeepSleep also sees its technology being used by preschool children that often suffer from nighttime fears, the difficulty of falling asleep, and waking up during the night. Children aged 5-12 are also potential end-users as the increasing demands from school, sports, and other extracurricular activities disrupt their sleep.

Parenting is going to develop to an even more gratifying and enjoyable role as technology progresses to support and take over undesired parental tasks. Furthermore, data analytics and AI could ease decision making and help parents do the best for their children. DeepSleep is determined to partake in these developments and make the future of technology in parenting count.



KOKORO

Your Digital Guardian

The ubiquity of smartphones has introduced a new challenge for parents: they have little knowledge and control over the content, frequency, and intensity with which their children interact with digital devices. Children are often unaware of how online interactions affect their emotional health. Additionally, the amount of quality time that children spend with their parents without any digital devices is declining drastically. Over time, parents lose touch with their children and become unaware of their children's emotional development.

kokoro aims at improving the transparency parents have about how their children interact with smartphones and provides insights into their emotional wellbeing. It is a mobile application that is integrated into the operating system and monitors smartphone usage. Once installed on a device, the application tracks behavior and informs parents with reports and alerts on the emotional state of the child. While the ex-

act content and data are never shared, parents can receive a comprehensive overview through abstracted heatmaps and easily digestible reports. In particular, it monitors the following emotions: fear, sadness, anger, joy, and trust. The goal of kokoro is to give parents a better understanding of their children's feelings to enhance their emotional development. Whenever kokoro determines that a professional council is necessary, it alerts parents about it and recommends booking a session with a child psychologist through the kokoro platform.

Close collaboration with professionals and researchers in the field enable kokoro. The research creates a solid scientific base of the product and fosters an active community that can be leveraged as an affiliate network. Besides, kokoro collaborates with educational institutions to create more awareness of the possible harms of digital devices.



 **Key Partners**

- Experts in the field
- Smartphone manufacturers
- Affiliate network of educators, institutions and psychologists

 **Key Activities**

- Create emotion matrix
- Collect data and train algorithm
- Shapern user experience
- Build a network of child-psychologists

 **Value Proposition**

Parents

- Reduce mental health risk of children
- Ensure child safety online
- Enhance a child's emotional development

Child Psychologists

- Increase acquisition and retention of patients
- Faster diagnosis and optimized therapy with the help of emotional profile

 **Customer Relationships**

- Automated service via weekly reports and emergency alerts available on the app
- Customer support answering questions on app usage and psychologist referral
- Trust-based relationship with a high emphasis on data privacy

 **Customer Segments**

- Parents of children between the ages of 3-15
- Private child psychologists that provide premium services to parents

 **Key Resources**

- Scientific insight and engineering resources
- Resources for excellent customer care and experience
- Data and data processing

 **Channels**

- App stores
- Schools and educational institutions
- Social Media Marketing
- Parents magazines
- Psychologists and pediatricians

 **Cost Structure**

Fixed Cost

- IT-Infrastructure and associated personnel costs
- Maintenance of application

Variable Cost

- Marketing expenses
- Customer acquisition, care and support

 **Revenue Streams**

Parents

Subscription fee for each account and smartphone running kokoro

Child Psychologists

- Commission fee for each referral (Pay per Click)
- Subscription fee per linked smartphone to have access to kokoro insights

Value Proposition

Parents

Reduce mental health risk of children: kokoro's emotion recognition algorithm detects any instabilities in the mental health of children and informs parents about it. As a result, parents can intervene promptly before their emotional state deteriorates.

Ensure child safety online: kokoro analyses the content consumed by children and provides valuable insights about the safety of these interactions. A weekly report, as well as emergency alerts, notify parents when their children are interacting with suspicious or harmful content.

Increase transparency of children's emotions: kokoro supports parents to understand their children's feelings better. Which enables them to empathize with their children better and helps to improve their relationship.

Child psychologists

Increase acquisition and retention of patients: When emotional instability of a child is detected, kokoro guides and recommends parents to seek further professional help from child psychologists. This provides psychologists with an additional customer acquisition channel.

Improve diagnosis and optimize therapy: with the help of kokoro's insights and the child's emotional profile feature, Psychologists make more accurate diagnoses and can adapt and optimize their therapy.

Customer Relationships

Parents

The service kokoro provides for parents is an accumulated and abstracted emotional profile of their children. Due to the sensitivity of the information gathered by kokoro, a high emphasis on data privacy is essential. If questions arise regarding the usage of the application, in-company customer care is available to help resolve any problems. Since kokoro focuses on providing insights rather than consulting services, they refer parents who wish to receive further help for their kids to selected psychologists for in-detail discussion and therapy appointments.

Child-psychologists

The network of psychologists benefits from new patients forwarded by kokoro. They provide fast and professional help for their new customers as an auxiliary service not covered by public health insurance companies. Through this offer, psychologists can increase their earnings. Additionally, the emotional profile available through kokoro helps psychologists in gaining a quick understanding of their patients' mental wellbeing.

Channels

The main product of kokoro is the mobile application for kids, parents, and psychologists. Hence, conventional app stores execute its distribution and payment collection process for both operating systems, Android, and iOS.

The marketing channels are tailored to the customer segments: parents and child-psychologists. As emotional health is one of the critical factors in children's educational progress, schools and other educational institutions are part of kokoro's essential partner network. Through sponsored parents' evenings, parents receive in-depth information about

the overall importance of children's emotional state and are introduced to kokoro. Additionally, parents become aware of kokoro through social media platforms, targeted google advertising, and parents' magazines.

Whereas reaching out to parents is straightforward, the customer segment of child-psychologists is more specific. Since kokoro works closely with research institutions and relies on the latest scientific research results, relevant and prominent journals can be identified and used to contact child-psychologists. kokoro reaches out to child-psychologists through various local professional associations and organizations of psychologists to supplement these channels.

Key Resources

Scientific insight and engineering resources: kokoro is an emotion-tracking algorithm that can evaluate smartphone users' behavior and translate it into specific emotions. It consists of an emotion matrix which clearly maps smartphone interaction to emotions. This matrix is created based on scientific insight and in practice, it is implemented as a machine learning algorithm. Therefore, one of kokoro's essential resources is the engineers building an algorithm that evaluates the



kokoro

interaction and correctly maps it to the relevant emotion. On top of the scientific insight and available internal engineering resources, existing patents can be taken into consideration when deciding which features to prioritize in the development.

Resources for excellent customer care and experience: Assuming that parents are highly engaged in their children's lives and have a significant interest in their emotional stability, their expectations towards a service that provides them with such insights are equally high. Therefore, kokoro aims at providing excellent customer service as well as an outstanding user experience. The emotion matrix should cover the emotions parents are most interested in and which provide them with the most value in the parent-child relationship. Additionally, the interface of the application, including reports and alerts, is designed to be intuitive and easily digestible to make the user interaction as simple as possible. Customer care is available to provide guidance on features and functionalities and to refer parents to professionals within the kokoro network for further counseling,

to complement the high-end experience of the application.

Data and data processing: kokoro can detect the emotional state of smartphone users by analyzing their typing behavior. This functionality is enabled by kokoro's machine learning algorithm, which is trained before the deployment of the application. Data is collected through rigorous user testing and fed into the algorithm to train the algorithm.

Key Activities

Create emotion matrix: kokoro analyses smartphone users' typing behavior, as well as browsing behavior and can, infer from it how individuals are feeling. Behavior and emotions are mapped in an emotion matrix, to make the feelings more tangible and visual. This matrix is created based on insights gathered from existing research and in cooperation with child psychologists. The matrix covers key emotions of children parents are interested to know about, and kokoro can detect through careful analysis.



Collect data and train algorithm: The underlying technology powering kokoro is a machine-learning algorithm. This algorithm is developed based on a closed dataset generated from user testing. Collected data is fed into the algorithm to sharpen its analysis and overall accuracy in emotion detection. Over time, kokoro will leverage user data to continuously improve its capability and release smarter versions of the algorithm.

Sharpen user experience: In parallel to the deployment of the algorithm and the mobile application, a frontend interface, as well as the reporting structure, is developed. Aside from the visualization of the data within the emotion matrix, kokoro develops automated reporting functionality. User testing ensures optimal standards for reports and usability.

Build a network of child-psychologists: The insights kokoro provides are based on technical analysis. However, kokoro's core value proposition is to provide insights into the emotional state of a child. To be able to deliver such psychological analysis, kokoro closely collaborates with child-psychologists in generating scientifically sound frameworks. A team of advising psychologists forms the counterpart to the product and tech teams that develop kokoro's algorithm.

Revenue Streams

Parents

Subscription fee: While downloading and installing kokoro is free, parents pay on a monthly subscription basis to use kokoro. The subscription model is best suited for kokoro since it heavily relies on recurring revenue streams that finance the continuous improvement of the emotion detection algorithm, in addition to the development of additional features. The amount that parents pay depends on how many smartphones operate kokoro and how many accounts they have. Packages for multiple accounts and smartphones running kokoro are available, lowering the price for each additional device analyzed by kokoro.

Child psychologists

Referral fee: Whenever kokoro suggests an intervention by a professional, a selection of affiliate child psychologists is made available to parents. If the parents choose one of the psychologists from the network, this psychologist pays a referral fee to kokoro. It is a 'pay per click' fee, i.e. the fee is charged when parents are redirected from kokoro to the profile page of the psychologist.

kokoro

Subscription fee: Since kokoro creates continuous value for psychologists by providing them with up to date information about the mental health of their child patients, they are also required to pay a fixed monthly subscription fee per linked smartphone. As previously mentioned, these insights help psychologists to make more informed recommendations to the patients.



Key Partners

Experts in the field: For kokoro's technology to have a solid scientific foundation, collaboration with researchers and professionals is necessary. kokoro gathers input from a psychological standpoint as well as from the latest discoveries in the field of HCI. With both data, smartphone usage behavior can be translated into the emotional state of the child, and an emotion matrix - which matches behavior to the five core emotions joy, sadness, fear, anger, trust - can be created.

Smartphone manufacturers: kokoro accesses data through the operating system (OS) to generate reports. Therefore, kokoro's capabilities depend on the access rights provided by smartphone manufacturers. Prominent research projects in the field of HCI, as well as existing products, suggest that OS data can already be accessed, measured, and used.

Affiliate network of educators, institutions, and psychologists: kokoro also aims to build relationships with professionals and stakeholders to expand the reach of kokoro and increase its revenue streams. Psychologists can partner up with kokoro to receive counseling referrals and thereby broaden their clientele. Educators, such as pre- and primary school teachers, as well as academic institutions, can act as strategic partners in promoting kokoro, as they have an interest in fostering healthy habits and a stable emotional state of their students. In addition to the financial relationship these affiliates have with kokoro, this strong network improves kokoro's credibility and brand image amongst parents and users.



Customer Segments

Parents: They represent the backbone of the customer base. The targeted segment of parents has children between the ages of 3-15 since children between these ages start using smartphones more intensively and are more prone to the dangers of inappropriate use of the Internet. The majority of customers belong to higher income classes who are usually more digitally literate and are more



aware of the possible negative consequences of the Internet on their children. kokoro primarily targets working parents who have less time to spend with their children and who rely more heavily on digital devices to fill in children's leisure time, since these parents tend to have less control over how children spend time with their smartphones.

Child psychologists: kokoro's second customer base are the child psychologists. They pay a referral fee when parents search for a child psychologist through kokoro. kokoro targets private child psychologists and therapists who provide parents with premium services that are not covered by public health insurance companies. These premium services range from proactive therapies to prevent possible mental health problems to more flexible and specialized treatments.



Cost Structure

The initial costs include the development of the kokoro application with its state-of-the-art emotion recognition algorithm and secure data encryption. The design of the emotion recognition algorithm requires highly qualified developers. Since the kokoro app interface is the primary touchpoint with its customers, hiring proficient UX designers who create a high-end

user experience is also crucial. Employee salaries mainly represent these expenses. The kokoro algorithm is based on the latest behavioral research on human interaction with mobile devices and digital content. Hence, gathering and applying this scientific knowledge results in additional setup costs, as experts have to be hired, and reports have to be purchased.

Fixed Costs

Just as essential as the initial product development of a service is its continuous maintenance. New scientific research on human interaction with digital devices is published daily, constant enhancement and implementation of updates to the emotion recognition algorithm must be financed, as it is vital for further progress.

Running computational machine learning models on external servers, app deployment, and other ongoing IT-Infrastructure costs are inevitable for kokoro.

Variable Costs

Next to initial setup and fixed costs, variable costs are mainly driven by marketing expenses such as online advertising and social media activities. Gaining a trustworthy status among customers, embodying a responsible brand as well as acquiring customers is expensive but crucial for a successful com-

kokoro

pany. These topics, together with individual customer care and support, incur additional personnel costs. Additionally, once kokoro is established, it supports and conducts research studies with unique behavioral user insights, which will arise in personnel costs.

Scenario Fit:

Assisted Imbalance: Parents spend their entire time working, and robots are adopted for childcare. In this scenario, children will mostly interact with their robotic assistants at home, instead of their parents. Hence, robots will play a crucial role in ensuring that children safely interact with digital devices. kokoro is highly suitable for this scenario, as the collection of behavioral data of the child by the childcare-robots complements the accuracy of the emotional profile created by the application. As a result, the emotional wellbeing of children can be monitored even more precisely. This alleviates the pressure parents feel in combining parental duties with their professional life. By informing parents through weekly reports, they will always have the most recent status on the child's emotional stability, and in the case of negative indicators, they can act swiftly.

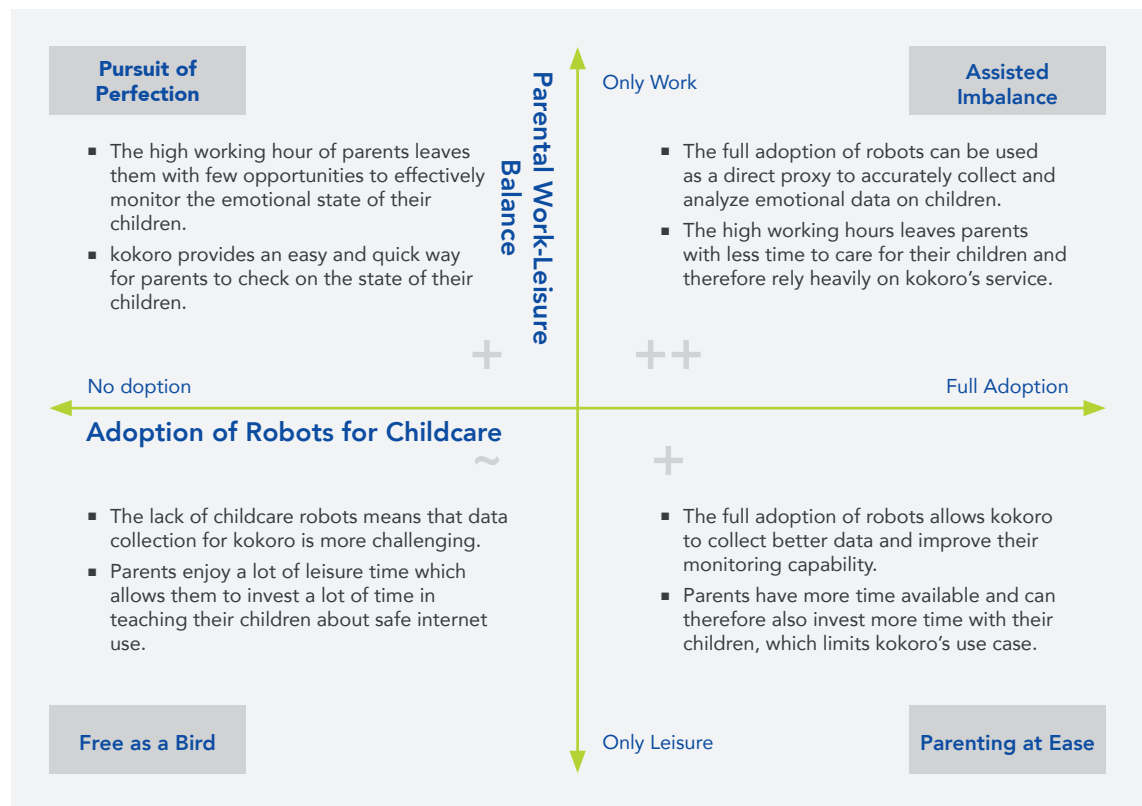
Pursuit of Perfection: While this scenario also projects parents being busy working, no robots take over the task of childcare. Thus, children are raised in boarding schools, where their interaction with digital devices is not monitored. Similar to today, parents would be unaware of how the digital behavior of children affects their mental wellbeing. Parents will, therefore, be highly inclined to use a service such as kokoro, since it allows them to keep an eye on the emotional health of their children from a remote location. However, due to the lack of robot adoption, less information can be collected, which in turn slows down the refinement of the emotional profile. To mitigate this challenge, kokoro could expand its application. This might include an analysis of health-related data gathered from wearables, which will be more prevalent in the future. In general, the suitability of kokoro in this scenario is existent, but not to a significant extent.

Free as a Bird: According to this scenario, the world would be a place where robots are not adopted for childcare, and parents have no professional obligations. Therefore, parents could use their free time to ensure the mental wellbeing of their children in person. This could potentially lead to a decreasing demand for services such as kokoro. As there are also no robots to collect additional behavioral data of children, this scenario would be the least suitable. However,

kokoro would not be entirely superfluous, since parents will not be able to monitor the entire child interaction with digital devices. The product will add value by providing a continuous emotional health profile of the child. Thanks to kokoro, the mental wellbeing of the child will no longer be a black box for parents, but rather something they use as a basis to attain a better understanding of how and why their children feel a certain way.

Parenting at Ease: Robots for childcare are fully adopted by society, and parents do not work at all in this scenario. This gives them plenty of time to spend with their children allowing for more extensive monitoring of the interaction with dig-

ital devices. kokoro would be regarded as a complementary measure to assist parents in furthering their understanding of the mental health of their children. In case parents seek some relief from taking care of their kids, robots would jump in as a substitute. In this case, robots could collect additional behavioral data about the children to increase the analytical accuracy of kokoro. Overall, the product is less suitable for this scenario compared to "Assisted Imbalance," as the need for a monitoring application is lower due to the leisure time of parents. kokoro can remain relevant by providing an interface through which it considers the data gathered by the robots for childcare for more accurate analysis.



Challenges:

- Ensure the integration and compatibility of kokoro on the OS-layer among different smartphones and apps.
- Develop and train a reliable emotion recognition model using machine learning algorithms.
- Mitigate any privacy concerns of parents regarding the monitoring functions of kokoro.
- Establish social acceptance and build trust among parents.
- Ensure the growth of kokoro through effective marketing strategies.
- Find suitable partners such as psychologists and educational institutions that promote kokoro and validate its functionality.
- Build a network of trustworthy child psychologists for referrals.

Outlook:

Given the growing awareness around the negative implications of technology on the health of children, kokoro could quickly grow into the go-to solution to optimize parenting. The next steps for kokoro are divided into three phases: ramp-up, transition, and expansion.

The first version of kokoro will be released to a small customer base willing to test the product. During this ramp-up phase, kokoro's emotional profiling algorithm will be rapidly improved and prepared to accommodate a larger customer base. During the transition phase, kokoro will partner up with educational institutions and health insurance companies. As educational institutions have an interest in fostering the healthy emotional development of children, they would promote kokoro by introducing it to the parents. Health insurance companies would provide funding to improve kokoro, as they have an interest in tracking the mental health of children to assess the necessity of child psychologists better.

Since smartphones are not the only digital device that children interact with, kokoro will be developed for other digital devices such as smartwatches and computers as part of the expansion phase. Ultimately, kokoro will be present on each digital device that children interact with at home or at school to enable a better accuracy of kokoro's reports. Besides, further reporting features will be developed to offer a premium option for the service. The emotional profiling algorithm will be able to provide an exhaustive child's emotional profile, predict further emotional development, and give recommendations to parents about how to improve this development.



GRIZZLYSTORIES

Personalized Children's Books Made for Young Rebels

Parents want their children to succeed regardless of their gender. Yet, most children's books are full of characters that reinforce existing gender stereotypes. GrizzlyStories intends to create an environment where anything is possible for the children by establishing a series of personalized children's books that portray children in non-traditional roles concerning their gender.

With these books, GrizzlyStories provides parents with the opportunity to raise their child free of gender stereotypes and therefore inspires them to follow their dreams without limitations to "traditional" fields. At its core, GrizzlyStories promotes gender equality within the society, starting with empowering young children. Thereby, the brand picks up on the international trend towards gender equality, particularly addressing individualistic parents. US-American successes, such as Rosie Revere Engineer, prove a high demand for the

genre that is not met in Germany yet. Initially, the target audience are children between the age of three and six years old. GrizzlyStories allow or full personalization of the main character in the stories. Customers can change the name and appearance to match their child to create a more tangible and immersive story. This is particularly important for children who are currently not represented broadly in child literature, such as minorities or children with unusual names, and thereby often lack a relatable role model at a young age.

In the publishing process, the company manages content creation as well as the publishing process, which includes editing, typesetting, sales, and distribution. The distribution and marketing of books are mainly based on online and social media interaction, targeting parenting communities to buy books via online sales channels or bookstores. To shape the brand and reach a broader audience with its content,



GrizzlyStories collaborates with ambassadors and gender equality promoting networks.

 **Key Partners**

- Book- and toy stores (online and offline)
- Suppliers of raw material
- Marketing and PR agencies
- Brand ambassadors and networks promoting gender equality

 **Key Activities**

- Content creation
- Pre-production and printing
- Sales and distribution

 **Key Resources**

Human Resources

- Content creation capabilities
- Illustration capabilities
- Marketing and branding

Assets

- Facilities & machinery
- Online store
- Office spaces

 **Value Proposition**

B2C

- Enabling parents to raise their child under the idea of gender equality
- Inspiring children through personalized stories
- Fostering deep parent-child relationships through shared reading time

B2B

- Providing businesses customers with highly sought-after content that increases their revenues
- Positioning business customers as innovators

 **Customer Relationships**

B2C

- Automated services
- Content co-creation

B2B

Self-service

 **Channels**

Sales channels

- Book and toy stores
- Direct sales online

Marketing channels

- Social media marketing
- Book reviews
- Brand ambassadors

After-Sales

 **Customer Segments**

B2C

- Parents with young children
- Relatives / family friends searching for impactful children books

B2B

Private day-care centers

 **Cost Structure**

Fixed Cost

- Human resources and marketing
- Production machinery

Variable Cost

- Book production
- Distribution costs

 **Revenue Streams**

- Hardcover book sales
- E-book sales

 Value Proposition

B2C

At its core, GrizzlyStories allows parents to raise their child under the idea of gender equality by publishing books that do not convey any gender stereotypes. From an early age, children can, therefore, discover their passions liberally, which derails them from gender-driven, traditional roles. GrizzlyStories considers reading time as an essential element in fostering the child-parent relationship. Thereby, parents can motivate their children to take on roles and values that have been previously more connected to a specific gender through the habit of reading bed-time stories.

Further, by providing the opportunity to personalize the main character's name and appearance, GrizzlyStories creates a more tangible story to the child. As a result, children strongly relate to the books, since they can become the main character of the story. The idea is to foster the child's imagination and enable them to follow their dreams and wishes regardless of stereotypes and traditional roles. This is particularly important for children who are currently not represented broadly in child literature, such as minorities or children with unusual names, and thereby often lack a relatable role model at a young age.

B2B

Selling GrizzlyStories in book- and toy stores comes with several benefits to the business. By not only creating child books but thereby addressing a societal issue, bookstores position themselves as innovators and progressive in values compared to their competitors. Moreover, books addressing gender equality, such as Rosie Revere Engineer, prove a high demand for the genre and drive revenue growth for book- and toy stores.

On a more general note, GrizzlyStories empowers not only parents, but society at large to impart career aspirations to children that promote a diverse spectrum of choices, which are certainly not limited to a specific gender.

 Customer Relationships

B2C

Automated services: GrizzlyStories provides tailored services through personalized customer accounts, which enables the company to collect data about the individual customer demand and adapt the offering accordingly. Thereby, a personal relationship between the customer and the com-

pany can be stimulated, which builds the foundation for customer retention.

Content co-creation: GrizzlyStories goes beyond the traditional customer-vendor relationship by co-creating content with its customers. This is fostered by organizing idea contests on GrizzlyStories' proprietary website. The child, together with its parents, can jointly write a story. They can illustrate and personalize the story's character via the company's online character generator and, finally, submit it to the company's idea sourcing platform. Among all the submissions, GrizzlyStories can screen for the most promising and exciting children's stories and publish the final selection under a particular series. This format of co-creation conveys an innovative image of the company, which establishes a relationship of trust between GrizzlyStories and its customers.

B2B

Self-service: By offering a sophisticated form of customer self-service through the firm's proprietary online store, the process of ordering additional copies is kept lean and straightforward for B2B customers. Thereby, support resources are not unnecessarily tied to standard inquiries, but rather can assist B2B customers with special requests. The objective is to make the ordering process as pleasant as possible. The generated data can then be utilized to analyze customer needs and offer special discounts or promotions.

 Channels

Book and toy stores: Since children's books are still commonly bought in a physical form, one of the key distribution channels represents book- and toy stores to target B2C customers offline.



Direct sales via the proprietary online store: By offering book sales via an exclusive online store, GrizzlyStories provides a seamless end-to-end customer experience. By cutting out middlemen such as bookstores and offering personalized books, GrizzlyStories can retain a higher profit margin per book.

Online bookstores: GrizzlyStories additionally sells its books for both B2C and B2B customers in online bookstores. This channel gives customers the freedom to choose between conventional books or e-books, which is crucial since the market for e-books grows fast.

Marketing Channels

Social media marketing: Advertisements on Instagram, LinkedIn, and Facebook depict powerful marketing tools to spread the values of GrizzlyStories and enable the brand to engage with parents. Career-oriented millennials can be adequately addressed via LinkedIn, while lifestyle-oriented parents are mainly targeted on Instagram and Facebook to promote the company's personalized gender-neutral children's books.

Book reviews: A great review from the right publication can be a springboard for GrizzlyStories' way to success.

Brand ambassadors: By entering ambassador collaborations, GrizzlyStories can approach public figures with shared values to motivate both parents and their children as well as B2B customers to endorse the products.

Communities and networks promoting gender equality: Communities and networks are a great lever and a win-win opportunity for GrizzlyStories to engage with B2C as well as B2B customers that publicly share the same gender equality values to promote the firm's empowering children's books.

After-Sales

Cross-promotion in books and shipments: Instead of leaving the last pages of a book blank, this space can be effectively used to advertise further publications by GrizzlyStories.

 Key Resources

GrizzlyStories publishes books that empower children to challenge the status quo. Their key resources can be split up in human resources and other physical and non-physical assets.

GrizzlyStories

Human resources: As GrizzlyStories covers multiple aspects of the value chain, from writing over illustrating and editing onto printing, it is key that employees are equipped with the abilities to take over these tasks. Firstly, for creating the content, GrizzlyStories necessitates suitable authors. Similarly, illustrators visualizing the storyline are essential resources for GrizzlyStories. Also, having a dynamic editing team as part of the group is equally important to the writing and illustration team. Moreover, GrizzlyStories considers the marketing and branding department as a key resource due to its importance in such a niche market. The marketing and branding team is mainly responsible for positioning the brand GrizzlyStories as the go-to publisher for inspiring and empowering children's books.

Assets: For the production of the physical product, appropriate production facilities are needed. Moreover, the team requires an office to work. The office space can be rented or owned by GrizzlyStories and be expanded flexibly as the team grows. As a publisher, GrizzlyStories can only function

with the production machinery necessary to print the books. Therefore, the production machinery, such as printers and book press, must be bought or leased. The production facilities can be located independent of the content creation office. Still, for the team, it might be beneficial to have the production and content creation teams in close physical proximity. To sell the product to the customer, GrizzlyStories owns and operates an online store. The online store is the heart of the personalization of the books. Customers use the online store to select the features they want their protagonist to display in the story.

Key Activities

GrizzlyStories has three overarching categories of key activities associated with its business model: content creation, pre-production, and printing, as well as sales and distribution. These activities differentiate GrizzlyStories from traditional publishing houses, as GrizzlyStories not only edits and

prints books but also creates the content it publishes itself.

Content creation: The content creation begins with the development of compelling personas, which are then used by in-house authors for writing new children's stories. These personas include children aged from three to six years that discover several work environments throughout each story. Examples for such settings are space, firefighting, and teaching. The story and the setting of the books are decided on by the authors and illustrators. GrizzlyStories leaves it to the customer to decide on the specifications of the protagonists. The customer can personalize the stories by selecting the name, the hairstyle, gender, clothing, and skin color of the main character. Thereby, each story is addressed to the child individually.

Pre-production and printing: In the pre-production and printing, GrizzlyStories covers the whole value chain of creating a finished book out of the written stories. This process starts with the editing and typesetting of the written text. Further, the character sketches are designed, and the illustrations are printed on the books' covers and pages. Lastly, the book is printed, bound, and prepared for distribution. Through full control over the production process, GrizzlyStories can guarantee high-quality produce and retain a larger profit margin than in the case of outsourcing.

Sales and distribution: To ship the product, one of the main activities include building and maintaining a distribution network with delivery and storage companies. In cooperation with marketing and PR agencies, the in-house marketing department creates advertisement campaigns, particularly on social media. These campaigns are key in shaping the perception of GrizzlyStories in the eyes of the general public and in building the brand.

Revenue Streams

The German book market consists of dozens of well-established players with not a single player dominating the market. The primary source of revenue in the publishing industry stems from book sales. The fragmentation enables GrizzlyStories to enter the publishing market through a traditional sales process, without being immediately squashed by dominant market players. GrizzlyStories generates revenue mainly by selling both hardcover books and e-books.



GrizzlyStories

Hardcover book sales: The main revenue stream of GrizzlyStories springs from the online and offline sales of books. On the one hand, books are sold in bulk to major book- and toy stores; on the other hand, personalized books are sold online to individual customers. With many parents skeptical about exposing their child to technology, hardcopies remain highly relevant.

E-book sales: Next to their physical copy, all stories will be available as e-books as well. In Germany, the ratio of e-books to physical books sold is slowly but steadily approaching the ratio of 20 to 80. GrizzlyStories considers this split as the benchmark for the distribution of its sales to the different mediums. E-books are particularly relevant to parents, living in big cities that are looking for a cheaper and more space-efficient reading opportunity. Therefore, collecting e-books on a tablet might be more space-efficient compared to filling up a library at home with physical hardcover books. E-books will be sold at a lower price point than hardcover books because they are cheaper to produce and distribute.



Key Partners

As a publishing house, GrizzlyStories has partners both in providing the resources to create the content, as well as in bringing the finished product to the end customer. Primary partners include book- and toy stores, logistic providers and suppliers, marketing and PR agencies, brand ambassadors, and networks promoting gender equality.

Book- and toy stores: Since GrizzlyStories aims for a significant market share, a popular shopping destination for parents, such as book- and toy stores, are considered as critical partners. According to GrizzlyStories' values, which stand for gender equality and children empowerment, it is challenging to place the product on the desired shelf addressing both genders equally.

Supply chain partners: Upstream, the main partners are suppliers that provide the necessary means for producing the books. These suppliers include paper companies, print companies, and manufacturers of equipment. GrizzlyStories relies on existing logistics providers in setting up a strong distribution network to ship the in-house printed hardcopies quickly to the customer.

Marketing and PR agencies: In cooperation with established marketing agencies, GrizzlyStories creates attention for the



product and generates awareness to bring in customers. This awareness is raised through targeted social media advertisements and collaboration with parent influencers on Instagram, Facebook, and LinkedIn. While marketing campaigns are executed in-house mainly, it is best practice to work with such agencies to find ideal campaign strategies.

Brand ambassadors and networks: In partnering with groups of parents and leaders that are as diverse as GrizzlyStories' target audience, GrizzlyStories aspires to reach the target audience effectively. These groups, such as stay at home dads, function as brand ambassadors that endorse the product of GrizzlyStories. For example, Alice Schwarzer and Oprah Winfrey have successfully gained societal acknowledgment through their active role as advocates for those underrepresented. Similar partnerships are built with networks promoting gender equality to reach a large group of potential customers with a common mindset.



Customer Segments

GrizzlyStories generally targets customers who want to provide empowering books for children, who can be split into end consumers and business clients.

B2C

This customer segment consists of end-users who buy GrizzlyStories products intending to consume it with their children or gift it to children in their environment.

Parents with young children have a direct need for children's books that foster an educational or entertaining purpose. Therefore, they select the product based on their values, as well as the taste of their children. The firm's product mainly targets parents who want to empower their children to follow their dreams and make decisions independent of conventional role-models. While the stories provide motivation irrespective of gender stereotypes, personalization features convey parents the feeling that the product is tailored to their child's aspirations.

Most of these aspects also hold for the social circle of parents who use GrizzlyStories as a gift. It is generally understood that gifts are more appreciated if they are personalized to the receiver. Personalization is a core feature of GrizzlyStories. Thus, relatives and friends, find in GrizzlyStories a low-effort high-value personalized present for children.

B2B

Private day-care centers are prevalent B2B customer segments. For day-care centers, the educational value of GrizzlyStories plays a key role. Since GrizzlyStories implements the

GrizzlyStories

values equality and emancipation, the empowering books can be used as a tool positively shaping the minds of children as well as fostering trust in the institution.

For B2B, the personalization aspect is challenging. While institutions can order books that generally fit the audience, a targeted product personalization for every child is hardly implementable. Therefore, the gender neutrality aspect is a more important selling point for this customer group.

Cost Structure

While fixed costs are mainly driven by human resources, production machinery, office spaces, and platform development, variable costs can be split in book production and distribution costs.

Fixed Costs

Human Resources and Marketing: GrizzlyStories positions itself as a publisher and content creator for children. Thus, wages for professional illustrators as well as authors make up a significant share in the fixed costs. Since GrizzlyStories is entering a niche market, the brand image is crucial for its success. Therefore, additional fixed costs incur for hiring marketing specialists to build an impactful brand. Advertising campaigns are considered as fixed costs to portray its core values to the customers.

Production machinery: GrizzlyStories produces in-house hardcopies ready for distribution. Therefore, machinery is needed. These can be either leased or amortized over ten years.

Variable Costs

Book production: GrizzlyStories aspires to encourage young individuals by printing books where the customers can personalize the main character's name and overall physical appearance. Thereby, parents can order books explicitly addressed to their children. This personalization forms the main pillar in terms of variable costs in addition to the general printing costs.

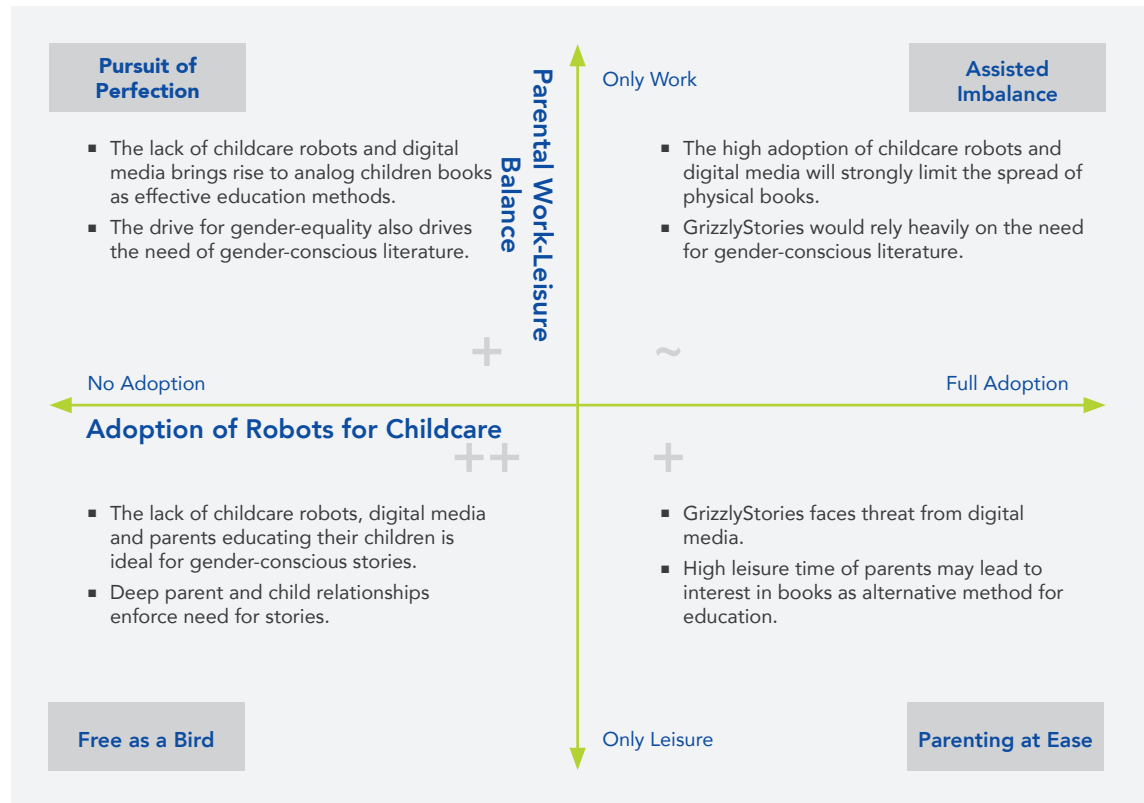
Distribution costs: Delivering the printed books to the customers is part of GrizzlyStories' operational responsibilities. As a result, additional variable costs incur for managing an efficient distribution of the products.

Scenario Fit:

Assisted Imbalance: The full coverage of robots in childcare could potentially endanger many of the benefits of GrizzlyStories. As such, robots have the potential to replace physical books by other means, such as digital solutions. Whereas the market penetration of childcare robots remains unclear, it is crucial to address the general digitalization trend and not only offer physical books but to offer digital alternatives, such as e-books and audiobooks as well. With parents working most of the time, robots reading their own stories to children are a looming threat to GrizzlyStories, as robots would make them obsolete. Since the individualization and gender equality trends are shaping the society as a whole, it is essential to

sell the product with an emphasis on this value proposition in the market to have the edge over competitors. Overall, this is the least favorable scenario for GrizzlyStories.

Pursuit of Perfection: In this world, the lack of robotics in childcare enables physical books to have their renaissance. Since these are proven to be very suitable to educate and entertain children without including digital media, hardcopy books are increasingly leveraged as an often-used resource. Moreover, the ever-increasing drive for gender equality promotes gender-conscious literature and sets it as the new standard, creating a huge demand for GrizzlyStories. On the other side, parents are limited in the time they can spend



GrizzlyStories

with their children to build relationships and read in physical books. Thus, making the books consumable by children on their own or with caretakers is a crucial requirement for the broad adoption. Nevertheless, gender equality and the need for individualism are still prevalent values to be followed upon, for which GrizzlyStories provides a fruitful basis.

Free as a Bird: In a leisure-only world with little automation in childcare, the benefits and synergies of the product are leveraged ideally. Firstly, the value of non-digital products is still significant for the education and development of children. GrizzlyStories fills this gap by providing gender-aware physical books and thus filling a need in an increasingly individualistic society. Secondly, this trend is further served by the personalization aspects of GrizzlyStories. The general increase in value is additionally supported by the deep-parent child relationship and the vast time budget of parents to spend with their children. Therefore, they can actively shape the values of their children with the help of GrizzlyStories.

Parenting at Ease: In a world with high automation in childcare and extensive leisure time for parents, it is to be seen whether GrizzlyStories will be able to secure a dominant position. General drivers such as individualization and the need for gender equality are still present. However, robots are potentially able to replace books. It is, therefore, up to the parents to decide whether they want to make use of physical books or when educating their children. As parents have vast amounts of time available, it seems likely for them to opt for reading GrizzlyStories. If they decide to use GrizzlyStories, parents will have more than enough time to build a parent-child bond supported by the books, which overall indicates a positive development for the overall adoption of GrizzlyStories in this scenario.

Challenges:

- High one-off costs for content creation and illustrations.
- Strong competition with established publishing houses.
- Initial investment required for book production machinery.
- Achieve successful after-sales through cross-promotion in books and shipments.
- Retain personalization features through indirect sales.
- Fierce competition in the book and e-book market.
- Gain significant traction in the market to attract book reviews of major newspapers and websites.
- Attract brand ambassadors and networks for collaborations and endorsements.



Outlook:

Hardcopy books and e-books are the first of many steps that GrizzlyStories takes as a company. The business model can be extended horizontally and vertically, for example, by expanding to other media, merchandise, and age groups. Firstly, GrizzlyStories plans to expand its content to be available as personalized audiobooks within the first two years. In these audiobooks, the names and character descriptions can be personalized. This expansion represents interesting business opportunities, such as a collaboration with audio-focused children's toy companies.

Secondly, GrizzlyStories plans to enter the market for toys and merchandise, recreating the stories' environments. For

example, if the protagonist explores space, toys could include engineering sets, while merchandise could consist of planet shaped pillows. This expansion can become a reality through partnerships with existing manufacturers. Finally, GrizzlyStories leverages its loyal customer base by growing alongside its target audience. Children that have grown up being read GrizzlyStories are provided with books and toys that are more appropriate for their age group. For example, three years after launch, GrizzlyStories features stories that are appropriate for six to eight years old children.

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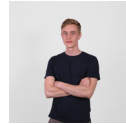
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PARENTECH THE FUTURE OF PARENTING

If 20 years ago someone told our parents that modern technologies would become a common part of our daily lives from early childhood, they would probably have been surprised. However, the advancement of technology and the increasingly dynamic environment have permeated all aspects of all our lives in simple and complex ways – even for children at young age which raises the question:

To what extent has this changed parenting to-date, and what will raising children and the interaction between parents and their children look like in 20 years from today?

Parents face many questions nowadays: What role does technology play for our child, and does this change the relationship between our child and us? What leisure activities and education should our child pursue at what age to be prepared for its future? How do our family values evolve? What way can we ensure to fulfil our responsibilities as a parent while looking after ourselves?

With an increasing complexity in today's world, new technologies – such as the Internet of Things (IoT), Big Data Analytics, Virtual Reality and others – provide an

ideal starting point to enable the shift towards the digital future of parenting across all childhood stages. This report identifies current trends (political, economic, social, technological, environmental, and legal) that affect the future of parenting and derives four future scenarios as well as five related business ideas. The generated business concepts range from a parental advice platform and a smart baby bed, over healthy nutrition plans for the entire family or mental or health analytics via children's smartphone usage, to empowering book stories for children to overcome career stereotypes.



The Center for Digital Technology and Management (CDTM) is a joint interdisciplinary institution of education, research, and entrepreneurship of the Ludwig-Maximilians-University (LMU) and the Technical University of Munich (TUM).

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