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| **geforderte Keywords:** | **Personalized Nutrition** | genutzt: 0 Mal https://intern.textbroker.de/img/fail.gif (Zu erreichende Keyworddichte: 2-3 Mal) |

1. Origins (Herkunft)  
2. Definition  
3. Role of technology (IoT/Wearables, Smartphones, Fitness Tracker, etc.)...  
4. Consumer role: Consumer acceptance – Cognitive dissonance  
5. Legal and ethical: Laws / Policies, DSGVO, etc.  
6. Stakeholders involved (Nutritionists, Food Technologists, Food Chemists, New Product Developers, Academics, Researchers, Physicians, Biologists, ...)  
7. Distribution concepts & Value chain (Direct-to-Consumer ist ein Muss für die Produktion von Personalized Nutrition, da die Produkte ja auf das Individuum zugeschnitten werden)  
8. Market situation (Marktgröße & Wachstum) and outlook (Covid-19 impact)  
  
Der Text soll also in 8 Absätze gegliedert sein. Diese müssen nicht alle gleich lang sein. So kann z.B. Definition ein eher kürzerer Absatz sein. Wirklich wichtige Kapitel sind 3-5 sowie 7 und 8. Kapitel 1 und 2 dienen als Einleitung und Kapitel 6 dient der Übersicht aller Stakeholder. Als Zwischenüberschrift nimm bitte die Überschriften aus dem Inhaltsverzeichnis.  
  
Der Leser soll wissen, was Personalized Nutrition ist, welche Aspekte im Bereich Lebensmittelindustrie von Personalized Nutrition betroffen sind (Technologie, Konsument, Lieferkette) und wie die aktuelle Situation ist.  
  
1. The Winning Formula in Personalized Nutrition | BCG  
https://www.bcg.com/de-de/publications/2020/winning-formula-in-personalized-nutrition  
  
2. What’s the Business Case for Personalized Nutrition? - FutureBridge  
https://www.futurebridge.com/blog/whats-the-business-case-for-personalized-nutrition/  
  
3. Full article: Toward the Definition of Personalized Nutrition: A Proposal by The American Nutrition Association  
https://www.tandfonline.com/doi/full/10.1080/07315724.2019.1685332  
  
4. For personalized nutrition to reach its full market potential, brands must better explain benefits  
https://www.foodnavigator-usa.com/Article/2020/03/16/For-personalized-nutrition-to-reach-its-full-market-potential-brands-must-better-explain-benefits  
  
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https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7217104/  
  
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https://mediatum.ub.tum.de/doc/1375825/1375825.pdf  
  
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8. 5 Top Personalized Nutrition Startups Impacting The Healthcare Industry  
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9. Personalised Nutrition | mymuesli ®  
https://www.mymuesli.com/neuheit/personalised-nutrition?gclid=Cj0KCQiAtqL-BRC0ARIsAF4K3WGcGoRaoM\_RBOX2\_aAkGgdx2fyEza1hcp6VulE4wVHaVvfGOdSHS7caAm\_QEALw\_wcB  
  
10. Personalised nutrition: Why it's popular...and why it's not  
https://www.foodnavigator.com/Article/2020/09/21/Personalised-nutrition-Why-it-s-popular-and-why-it-s-not  
  
11. Could personalised nutrition be the next big market disruptor after plant-based meat?  
https://www.ubs.com/global/en/investment-bank/in-focus/2020/future-of-food.html  
  
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Wenn du den Inhalt einer Quelle wiedergibst, kennzeichne dies bitte mit einer Zitation/Quellenangabe. Gerne im Format APA.  
  
Whitepaper - Personalized Nutrition

3500 Wörter

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1. Originis

Until the middle of the last century, nutrition itself was not a “world-shaking issue” within the industrialized countries. The concept of genetically and metabolically coordinated nutrition was first considered around 1960. Research on this topic then ceased for about half a century. The breakthrough – and thus also the basis for further research in this area – came with the sequencing of the human genome. This was initially accompanied by the idea of ​​personalized medicine, before the field of personalized nutrition also opened up. In contrast to ubiquitous nutritional principles, therapeutic steps or diets should be tailored to the individual patient. Nutrition itself also moved more and more into focus in terms of personalized medicine, as it was seen as the key to the development of diet-related diseases and a variety of diseases of the affluent. In the course of this research, the Institute for the Future published an impressive report in 2003: "Around a third of all Americans would actually implement a large number of nutritional decisions in everyday life with the knowledge of personalized nutrition optimization". Food manufacturers, packagers, retailers, pharmacies, health insurers and magazine managers soon recognized the huge potential of personalized diets.

1. Definition

The personalized nutritional concept uses individual information relating to the phenotype and genotype to create individual nutritional advice, food products and services. These are intended to help the respective customer to tailor his diet specifically to his body and his genetic basis, so that this has a lasting positive influence on his health and his capacitive properties at work and in private life. At the same time, the personalized nutritional concept should serve to heal and prevent genetic diseases. Corresponding nutritional strategies are to be determined individually for each customer and serve to optimize their health according to their individual, genetic characteristics. Personalized nutritional concepts can also be tailored to specific phases of life – for example, pregnant women or nursing mothers require a different nutritional composition than, for example, women during menopause. In summary, personalization in terms of nutrition aims to take the following aspects into account:

• genotype

• phenotype

• individual life situation (including nutritional physiology)

• metabolism

• food intolerance

• personal goals in the area of ​​family, career or competitive sport

• existing medical conditions

1. Role of technology

The trend towards individualized nutritional concepts brought with it a multitude of new technologies that focus, for example, on counting calories, breath analysis or the cardiovascular system. This wide range of technical gimmicks covers almost everything, from diagnostic approaches to the creation of individualized therapy concepts and holistic follow-up checks. While genotyping takes place primarily on a scientific level in order to develop the topic, the industry primarily provides potential customers with a variety of diagnostic tools for daily use. With the help of this, the user can, among other things, monitor his detailed, physical and metabolic profile and regularly assess or influence it through targeted nutrition and exercise monitoring. A self-carried out blood collection and evaluation of this with special equipment should play an increasingly important role in the creation of individualized nutritional concepts. The increasing complexity of daily health protocols, which make it necessary to monitor diet, lifestyle and exercise patterns, will promote increasing independence of the consumer from doctors or other institutions of the health system and thus also relieve the latter. There are already a large number of practical tools in this area that are presented in more detail below.

3.1. Artificial intelligence and the Internet of Things are heralding a new era in consumer electronics

From the refrigerator to the TV, a range of devices are currently appearing that transform the innovation of personalized nutrition concepts from theory into practice. Virtual assistants such as Amazon Alexa already offer the option of converting your own home into a hub and integrating a variety of devices into daily decision-making processes. Including the possibility of daily nutrition in the context of the individual nutrition strategy. For example, the smartphone app and refrigerator can be easily connected to one another via the Internet of Things (or “IoT” for short). The smart refrigerator independently monitors its content and checks it based on the user's nutritional strategy – and places reorders if necessary. The optimized kitchen already offers a good basis for an individualized diet (1). Kitchen appliances can be easily connected to one another using IoT technology and thus become a meal planner or even prepare the required meals independently. A further check for the expiration date is also possible. The technology behind the idea should make it possible in the future not only to suggest the right recipes to each user, but also to automatically order all the ingredients for them and ultimately the recipes to be prepared by other devices. The IoT offers the possibility here that the individual devices within the kitchen communicate with one another and create synergies.

3.2. Wearables such as fitness trackers or sensors will become the norm

When it comes to implementing individualized nutritional strategies, wearables such as fitness trackers are initially the entry-level product for many consumers. These electronic devices, also known as activity trackers, are used to record and send health and fitness-related data. This includes, for example, data on running routes, individual energy expenditure, plus activity, pulse and heartbeat frequency and individual sleep quality. These electronic monitoring devices have the common feature that they are all worn directly on the body – for example on the wrist, ankle or the upper arm. Fitness trackers primarily serve as recording devices and then send the data obtained to a computer or smartphone for evaluation, where they can be used or evaluated in conjunction with apps. The idea behind the fitness tracker goes back to 1965, when the idea first ripened to develop a device to monitor the daily number of steps. The Japanese professor Dr Yoshiro Hatano from the Kyushu University of Health and Welfare was intensively involved in research into the fight against obesity. He found that a daily number of steps of 10,000 steps for most people forms the perfect balance between calorie intake and individual, activity-based calorie consumption (2). Other, non-invasive sensors are already being used in a medical context: for example, diabetes sensors for continuous blood sugar monitoring. Another option is the enzyme-based approach to tracking individual micronutrient levels. Corresponding sensors can be used, for example, to monitor vitamin C levels (3). In this way, the potential for the precise determination of a precise diet, in which neither an undersupply nor an oversupply of individual micro- and macronutrients should be achieved, could be fully exploited. Those approaches and devices could also help with the recovery of novel infectious diseases such as COVID-19. Any equipment could be implemented in plaster form using portable biosensors.

3.3. Smartphone apps for individualized nutrition strategies

Advanced smartphone applications can now be equated with fitness trackers and fitness sensors in terms of added value regarding the topic of individualized nutrition. Although these are primarily presented as software solutions, they also make use of numerous smartphone functions. Such apps also offer options for step counting, which is made possible by entering the height of the user in connection with the distance covered (on foot!). You can also monitor your own pulse and heart rate during exercise. The apps themselves primarily serve as data libraries that store different information about foods, such as their macro and micronutrient content, and put this in context with the individual nutritional goals. Possible goals could be, for example, weight loss, muscle building, fat loss and the improvement of one's own vital signs. The apps then create individual nutrition and exercise concepts based on the information collected from many users. The information stored in the databases of the apps can be supplemented by users, so that a certain momentum develops from it. In terms of information technology, the apps are consistently up-to-date with regard to food and nutritional physiology and are therefore quite inexpensive to maintain. The effectiveness of such an app is less a result of their dietary requirements, but rather the fact of gradually increasing self-control in terms of diet and exercise (4). A monitoring of various body parameters such as physical activity, food and fluid intake as well as pulse and heart rate are also the focus of functionality here.

1. Consumer role: Consumer acceptance – Cognitive dissonance

The consumer acceptance of the individualized nutritional concept is almost entirely positive. The perceptible health benefits and the perceptible self-efficacy usually far exceed the perceived, cognitive dissonances. Consumers also generally agree on the type and scope of nutrition coaching or nutrition strategies tailored to them. They prefer the 1: 1 contact via email, phone or Skype. For most consumers, it is important to have a sound, professional background from a specialist advisor who shows them the various options in the area of individualized nutrition and exercise strategies. However, there is much more disagreement about how the financial aspects of personalized nutrition coaching should be regulated. There is also largely a lack of consensus on whether consumers should believe more scientific explanations or evidence based on experience – scientific studies are one thing here, while well-known "before and after pictures" have an equally convincing effect on consumers. Many consumers hope that the use of equipment and coaching in the area of ​​individualized nutritional concepts will result in a gradual change in their individual eating and exercise habits. A sharp cut with old habits is usually not accepted and leads to a negative attitude towards those concepts. Many strategies are therefore based, for example, on giving the user the greatest possible scope for food they have cherished, or on being able to fall back on "Cheat Days" and other short-term rewards in the course of the process. However, potential consumers harbor the greatest aversion to any concepts with regard to data protection and the associated protection of personal data. Here, consumers fear theft of data as a result of hacking. A study by the Food Navigator (a total of 1,000 consumers in 26 countries were surveyed in the second quarter of 2020) also revealed the following opinions and experiences of consumers with regard to the new concepts of individualized nutrition:

• around 39 percent have already heard of individualized nutritional concepts

• only about 11 percent have already examined their genetics for health reasons

• a total of 38 percent of all consumers would use the possibility of genetic testing to prevent diseases

• 76 percent of coaching, equipment and concepts in the field of individualized nutrition are used to maintain individual quality of life into old age

• 54 percent of all consumers fear that genetic tests will reveal unpreventable diseases

• 49 percent of all consumers do not believe in the predictability of genetic tests

• 64 percent fear the fact that a third party might come into possession of sensitive, personal information about their own genetics

1. Legal and ethical: Laws, Policies and GDPR

In addition to the positive influence of individualized nutritional concepts on society, they also bring with them some legal and ethical problems. The way they work, these concepts hold the individual responsible for their diet. This will inevitably lead to society changing its view of nutrition, food as such and individual health in a sustainable manner. Above all, the health system could bring billions of euros in annual savings by “exposing ignorance about nutrition”. Diet-related health problems could soon be a thing of the past, which is primarily aimed at combating widespread diseases. Nonetheless, the individualized concepts will also uncover ethical questions of fairness. For example, not everyone will be able to find the means to implement such concepts. The knowledge of the perfect and potentially life-extending diet could thus further incite social inequality and its potential for conflict. The current legal framework also offers little scope for the implementation of such concepts by health insurance companies. Data protection as such poses another problem. Access rights to personal data in apps and devices are particularly problematic here. Sensitive data can be stolen, especially where there are internet-based interfaces. Here, there is a lack of strict guidelines for the individual providers of individualized nutritional coaching and concepts (5). To date, there are no regulatory authorities required to monitor the individual providers. The field of personalized medicine is currently posing similar problems. Guidelines must also be drawn up to differentiate between actual diet-related health risks and uncontrollable health risks.

1. Stakeholders involved

Since solving complex problems requires a creative and interdependent approach, the relevant stakeholders must create synergies and develop comprehensive thought patterns. After all, individualized nutrition represents a paradigm shift in nutritional science and in health care. Only through interdisciplinary cooperation and consensus can the following stakeholders advance the science of individualized nutrition:

• Nutritionists

• Food technologists

• Food chemist

• Product developer

• Academics

• Researcher

• Biologists

• Doctors

• Consumer

In addition to the actual accumulation of knowledge, the training of practitioners in the field of individualized nutrition is an important step in establishing individual access to the supply of concepts, coaching and technologies in this area. The following stakeholders are required in this area:

• Nutritionist

• Sports trainer (popular sport, competitive sport, personal trainer)

• Sellers of PN technologies

• Grocery vendor

The basic work of the pioneers in the field of individualized nutrition is done, which is why it can now serve as a stepping stone to embed it in the health system. The idea aims to treat potential diseases proactively and not reactively in the future. The potential of individualized nutrition is not limited to individual industries or consumers. The following synergies could result in the B2B area:

• Partnerships between medical companies and producers or service providers

• Partnerships between microbiological and genetic testing laboratories and medical companies

• Partnerships between technology companies and retail companies

• Establishing forums or platforms on which users can exchange ideas

• Partnerships between medical, technology and food companies to match changing demand

1. Distribution concepts & Value chain

The traditional value chains envisage the production of food by food manufacturers who were previously supplied by raw material suppliers. In the further course of the supply chain, the food manufacturers deliver their products to the respective retail stores, which then sell the products to the consumer. However, selling personalized nutritional products will require additional steps within this value chain. Because, unlike the original concept, the motto would no longer be: "Produce what sells well!", but rather: "Produce what the customer actually needs as part of his individualized diet!". Food manufacturers must first find out which products and to what extent they are involved in the form of data acquisition and data analysis. A step that the food manufacturers do not have to take themselves, but could rely on aid from PN companies and providers of such technologies. These would already make recommendations to the food manufacturers or the raw material suppliers in order to boost the production of certain products such as low-fat cheese or lean meat as well as gluten-free or lactose-free foods in this context. The task of the PN company initially includes determining the individual health and nutritional status of its users. This can be done through tests and data obtained in everyday life using the individual devices. The second step would involve the interpretation of the data obtained – of course, the applicable data protection concepts would have to be observed! Step 3 then represents the pronunciation of recommendations or recipes to the actual food manufacturers. For example, PN companies could make recommendations about consumer-oriented food supplements in the form of powders or liquids, which would then be produced by the food manufacturers. In any case, FMCG companies would see a significant increase in the production of D2C products. Future foods would therefore be tailored much more to the individual needs of consumers and would therefore no longer be mass-produced goods. The distribution channel would also be steered in new directions. Instead of regular sales via retail chains, sales would rather go direct-to-consumer channels, in which each consumer would receive the appropriate food in a personalized and fully automated manner based on his or her individual food needs – determined by PN companies. But sales via retail chains, which still exist, would also be conceivable – various traffic light systems that sort the different foods according to categories, for example, are already in use today. PN companies would need the following technologies or capabilities to do their job:

• Access to consumers

• various (remote) diagnostic techniques

• intelligent devices and applications

• Means of performing blood and microbiome tests

• Data collection

• Regulatory authorities to monitor the applicable data protection guidelines

• Evaluation skills of the data obtained

• Sufficient influence on food manufacturers (for example, to set more flexible production processes in motion or to enable or recommend greater product variability and smaller quantities)

Suppliers of raw materials should naturally also be included in this decision-making process. Many suppliers of food ingredients are already working with food manufacturers within the framework of individualized nutrition concepts. Many raw materials companies maintain partnerships with technology startups or retail chains in this regard – including, for example, the German chemical company BASF and the consumer health company Xerion Limited. For example, the Dutch science company DSM has signed a contract with Mixfit, a digital health company.

1. Market situation and outlook

The market for individualized nutrition, coaching and technology is growing at a current rate of around 15 percent per year (6). While the market volume was around 2 billion US dollars in 2020, experts estimate that this will grow to over 11.5 billion US dollars by 2025. As a result, the PN market will grow exponentially rather than linearly in the future. Comprehensive market growth is expected primarily for the North American and European markets. North America with currently 60 percent of all employees in the PN industry will continue to be clearly ahead, followed by Europe with around 18 percent of all employees (7). The production facilities for PN foods, on the other hand, will mainly relocate to the Asian region – the Asia-Pacific region currently has the largest CAGR in this regard and will maintain this between 2020 and 2025. The demographic change in many nations as well as the generally increasing interest of consumers in topics such as health, fitness, physical and mental performance and self-optimization are likely to be the main drivers of development. The accompanying trend towards personalization and individualization of large parts of society should also support this development. In addition to the growth factors already mentioned, there is always a series of events or accelerators to consider. For example, global events such as the COVID-19 pandemic can even accelerate any development. The interest in individualized nutritional concepts and the exhaustion of the individual health potential is becoming more and more important for the individual in the face of global pandemics. For many consumers and for the individual health systems, it could prove to be an advantage to strengthen the immune system of the individual through targeted, personalized measures and thus largely avoid widespread diseases or limit the extent of pandemics. The interest in companies to offer their employees extensive, individualized nutritional options continues to grow. The intention behind this is that the factors workforce, productivity, satisfaction and health of all employees should be supported in the best possible way – also through individualized nutritional measures.

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