Beauty and Fashion Accessory Augmented Reality (AR) & Artificial Intelligence (AI) Technology Market Study
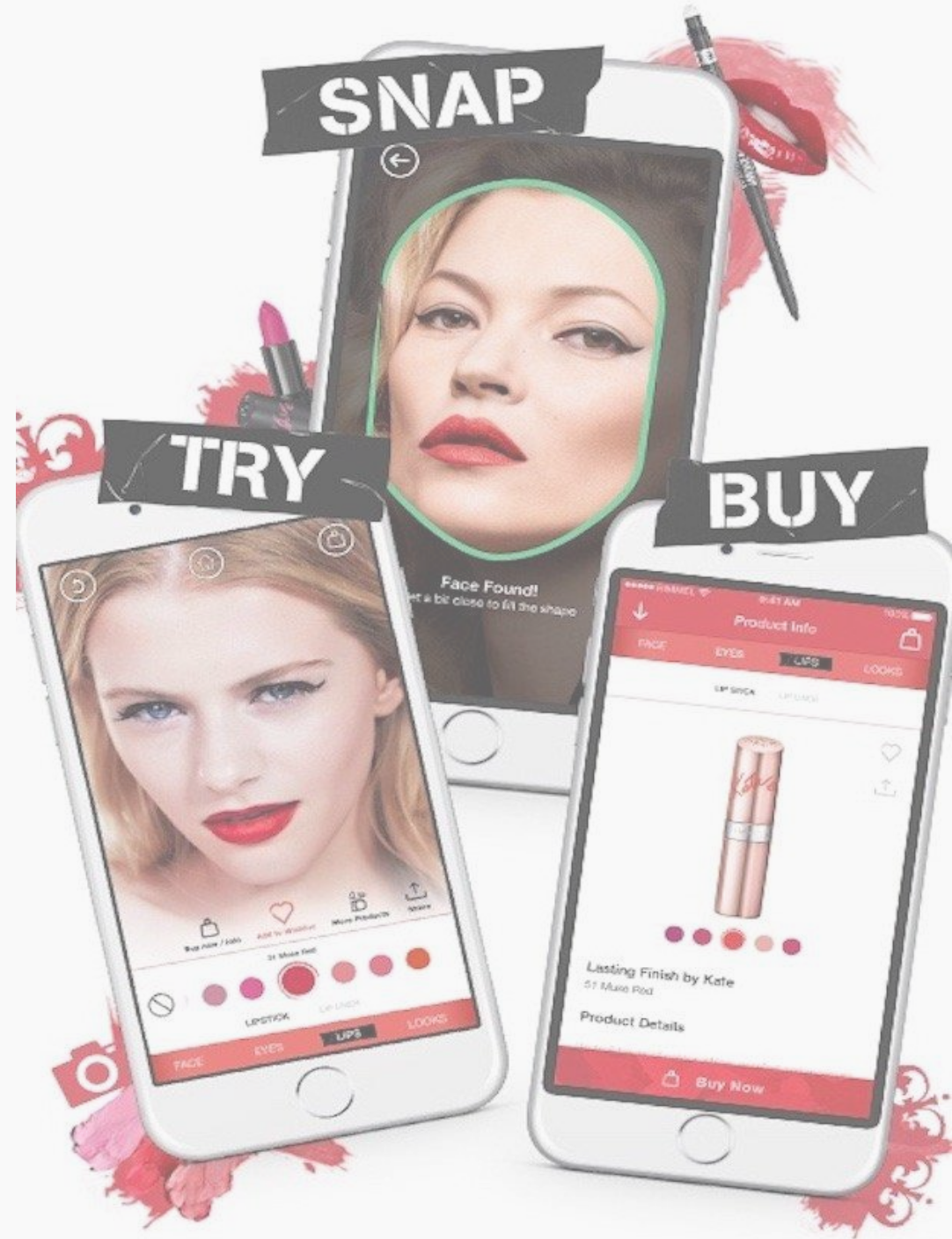
Frost & Sullivan

April 2022

—1961-2021—

FROST & SULLIVAN
沙利文 60周年
60th ANNIVERSARY

FROST & SULLIVAN

"We Accelerate Growth"

Agenda

Scope

■ **The project scope is defined as follows:**

Research period

- **Historical year: 2017-2019**
- **Base year: 2020**
- **Forecast year: 2021E-2026E**

Geographic scope

- **Global**

Industry scope

- **AR&AI Beauty and Fashion Tech Market**

Abbreviations and Terms

- **CAGR:** compound annual growth rate, the annual growth rate of an investment over a specified period of time longer than one year
- **Beauty and Fashion Accessory's Technology:** Beauty and Fashion Accessory's Technology could be defined as the industry using the human body's surface as an interactive platform by integrating technology, including AI, AR, 3D visualization and IoT, into beauty and fashion accessory products applied directly to one's body, skin, fingernails and hair to allow consumers to experience products virtually in real time before making a buying decision and have personalized product recommendations
- **RMB**: Renminbi, the lawful currency in the People's Republic of China
- **US$:** United States Dollars, the lawful currency in United States
- **Business To Business (B2B):** a transaction or business conducted between one business and another, such as a wholesaler and retailer
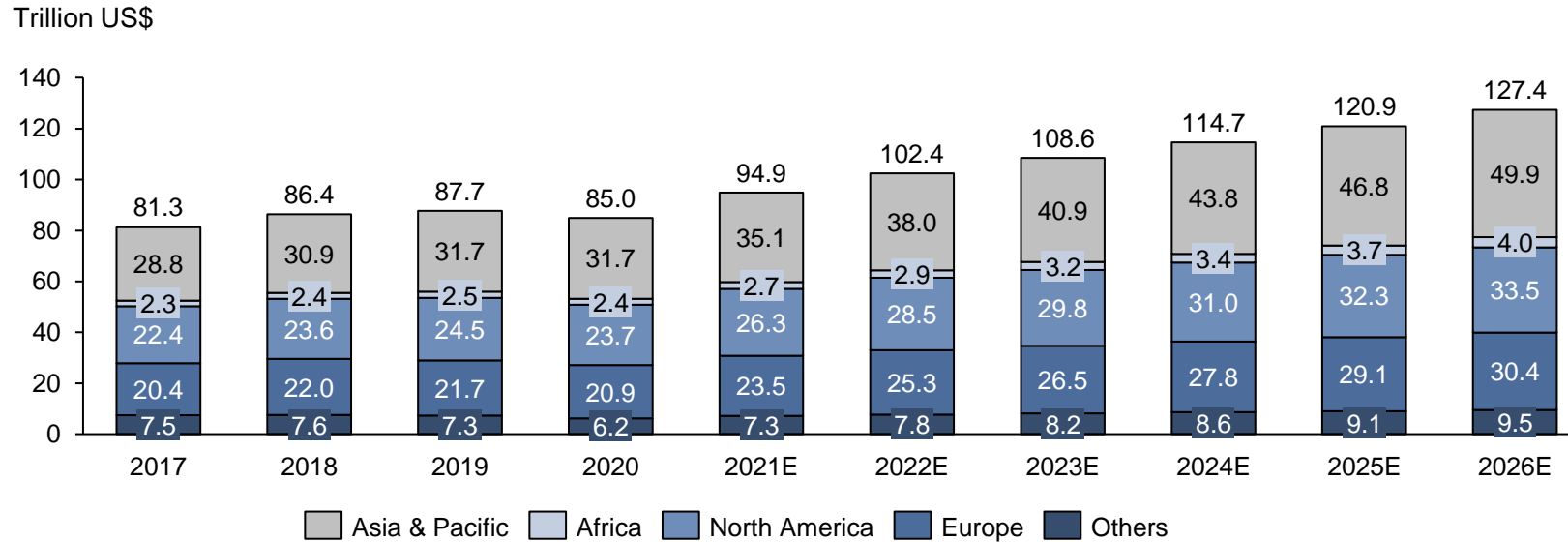
Agenda

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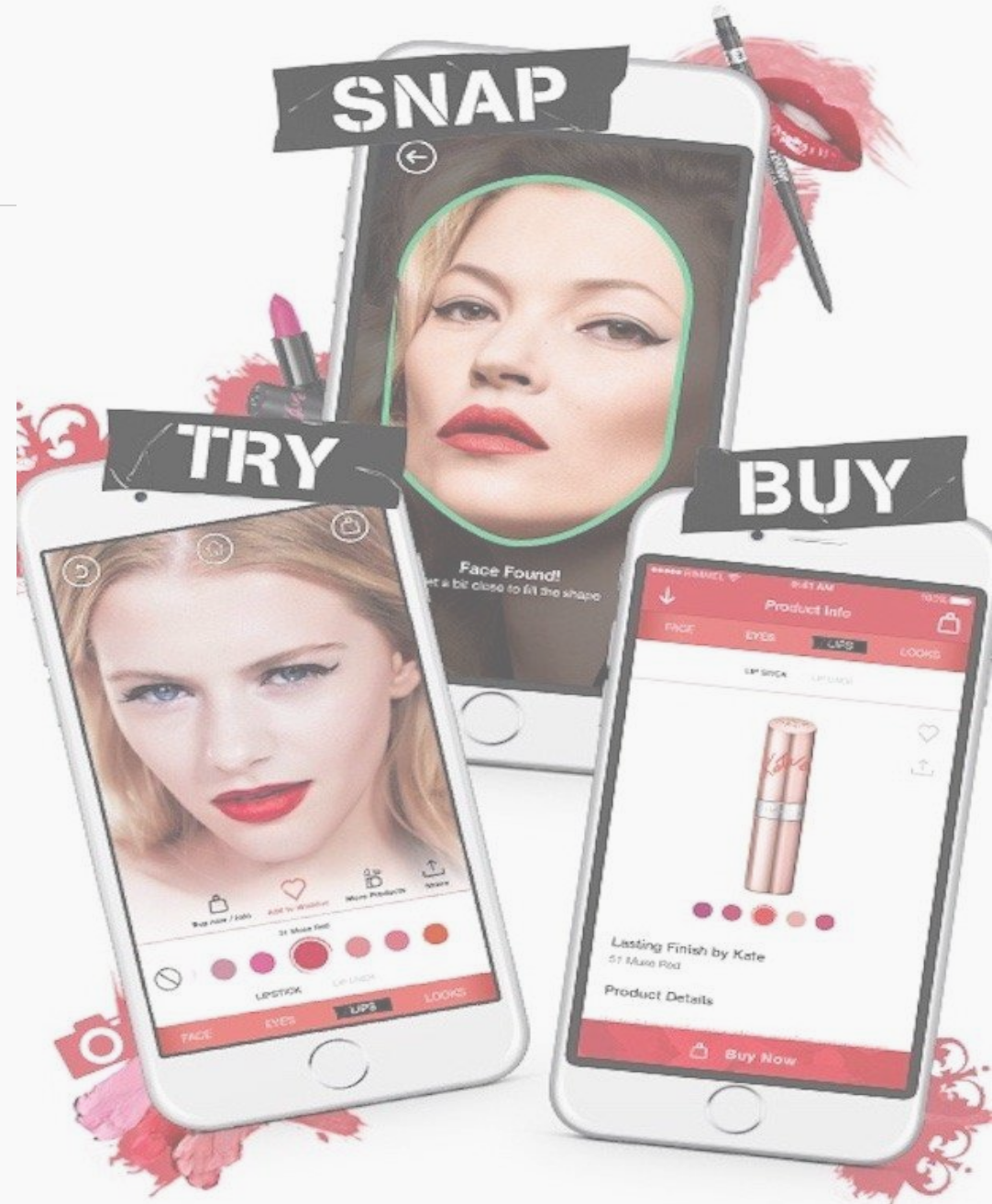
Overview of Global Macroeconomic Environment

Nominal GDP Globally and Breakdown by Regions

Global Nominal GDP and Breakdown by Regions, 2017-2026E

Trillion US$

CAGR	2017-2020	2021E-2026E
Global	1.5%	6.1%
Asia & Pacific	3.3%	7.3%
Africa	1.9%	8.3%
North America	1.9%	4.9%
Europe	0.9%	5.3%
Others	-5.9%	5.6%

Legend: Asia & Pacific · Africa · North America · Europe · Others

- According to IMF, the global nominal GDP has increased from approximately US$81.3 trillion to US$85.0 trillion from 2017 to 2020, representing a CAGR of 1.5%. In particular, Asia& Pacific region has recorded the fastest growth with a CAGR of 3.3% from US$28.8 trillion to US$31.7 trillion from 2017 to 2020, followed by North America and Africa with CAGR of both 1.9% during the period. Due to the COVID-19 pandemic shock, the weak performance of economies has lead to shrinkage in regional nominal GDPs and decrease in global nominal GDP by -3.1% in 2020. In the future, the global nominal GDP will reach approximately US$127.4 trillion by 2026 from US$94.9 trillion in 2021 with a CAGR of 6.1%. Asia & Pacific, Africa, North America and Europe are expected to increase by CAGRs of 7.3%, 8.3%, 4.9% and 5.3% from 2021 to 2026, respectively.

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Overview of Global Macroeconomic Environment

Global Nominal GDP per capita

Global Nominal GDP per capita, 2017-2026E

		2017-2020	2021E-2026E
CAGR		0.3%	6.1%

US$

Year	Value
2017	10,830.0
2018	11,372.2
2019	11,417.2
2020	10,925.7
2021E	11,177.0
2022E	11,836.4
2023E	12,558.5
2024E	13,337.1
2025E	14,164.0
2026E	15,042.1
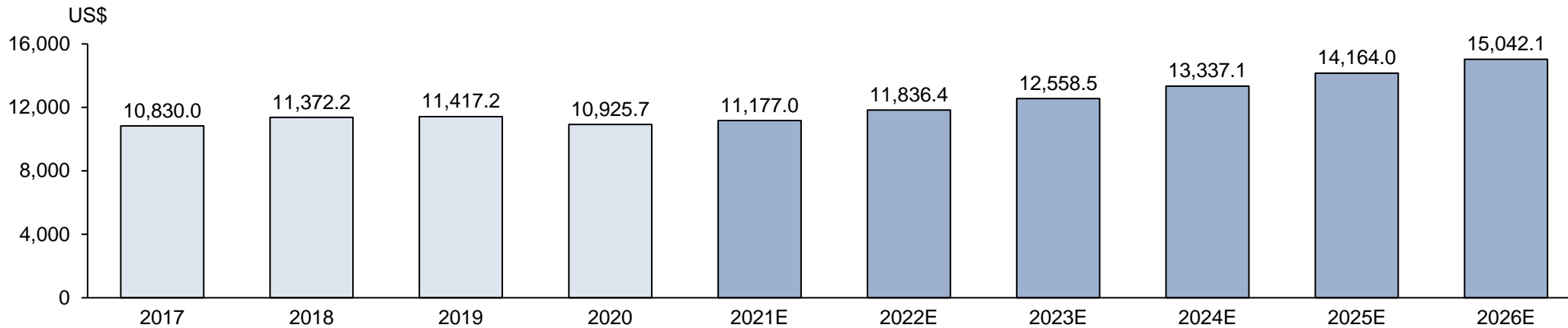
- The global nominal GDP per capita has recorded a growth from US$10,830.0 to US$10,925.7 from 2017 to 2020, representing a CAGR of 0.3%. The COVID-19 pandemic has adversely impacted the macroeconomic environment across the globe, causing the plummet of nominal GDP per capita in 2020. The rebound from COVID-19 is expected to be uneven across different countries, as major economies look set to register strong growth as many developing economies lag. The uneven growth recovering from the COVID-19 pandemic will as well be reflected in the growth of nominal GDP per capita in the upcoming years. It is expected that the global nominal GDP per capita will increase from US$11,177.0 to US$15,042.1 from 2021 to 2026 with a CAGR of 6.1%.

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Overview of Global Macroeconomic Environment

Global Total Population

Global Total Population, 2017-2026E

		2017-2020	2021E-2026E
CAGR		1.1%	1.0%

Million

Year	Population
2017	7,547.9
2018	7,631.1
2019	7,713.5
2020	7,794.8
2021E	7,875.0
2022E	7,954.0
2023E	8,031.8
2024E	8,018.6
2025E	8,184.4
2026E	8,266.2
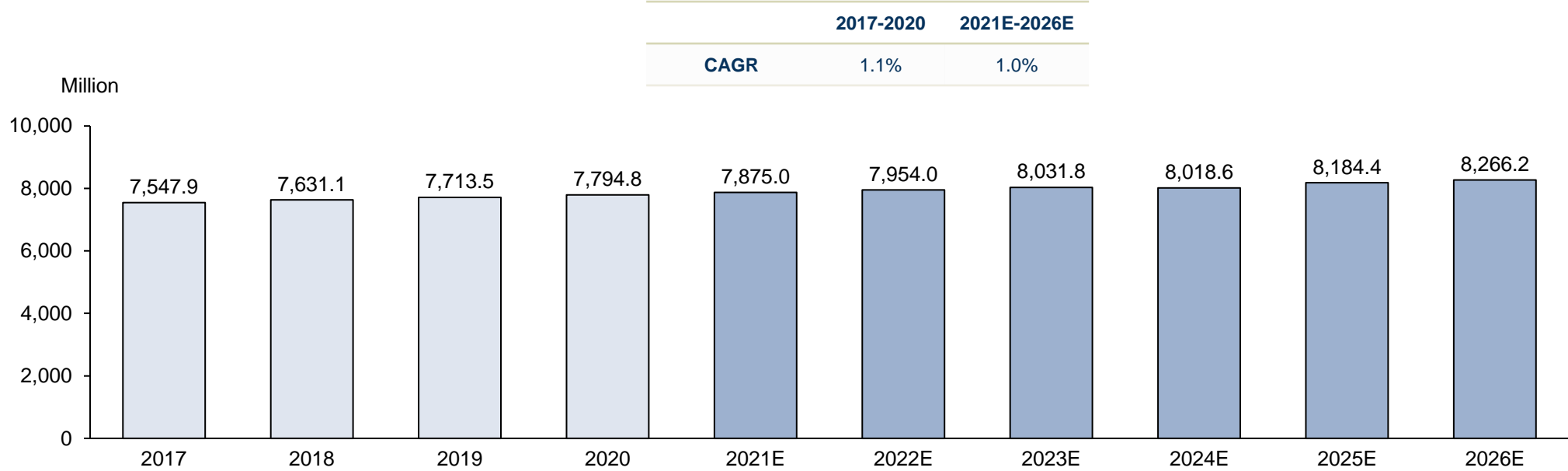
- The global population has recorded an increase from 7,547.9 million in 2017 to 7,794.8 million in 2020, representing a steady CAGR of 1.1%. In the future, it is expected that the global population will increase from approximately 7,875.0 million to 8,266.2 million from 2021 to 2026 with a CAGR of 1.0%.
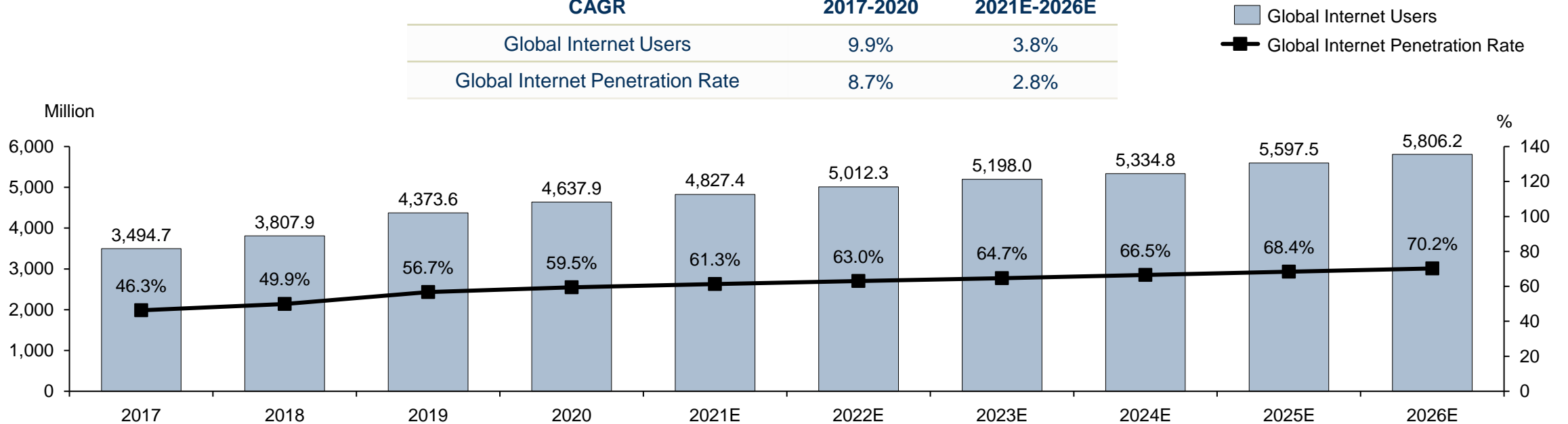
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Overview of Global Macroeconomic Environment

Global Internet Users and Internet Penetration Rate

Global Internet Users and Internet Penetration Rate, 2017-2026E

CAGR	2017-2020	2021E-2026E
Global Internet Users	9.9%	3.8%
Global Internet Penetration Rate	8.7%	2.8%

Legend:
- Global Internet Users
- Global Internet Penetration Rate

Chart: Global Internet Users (Million) and Global Internet Penetration Rate (%)

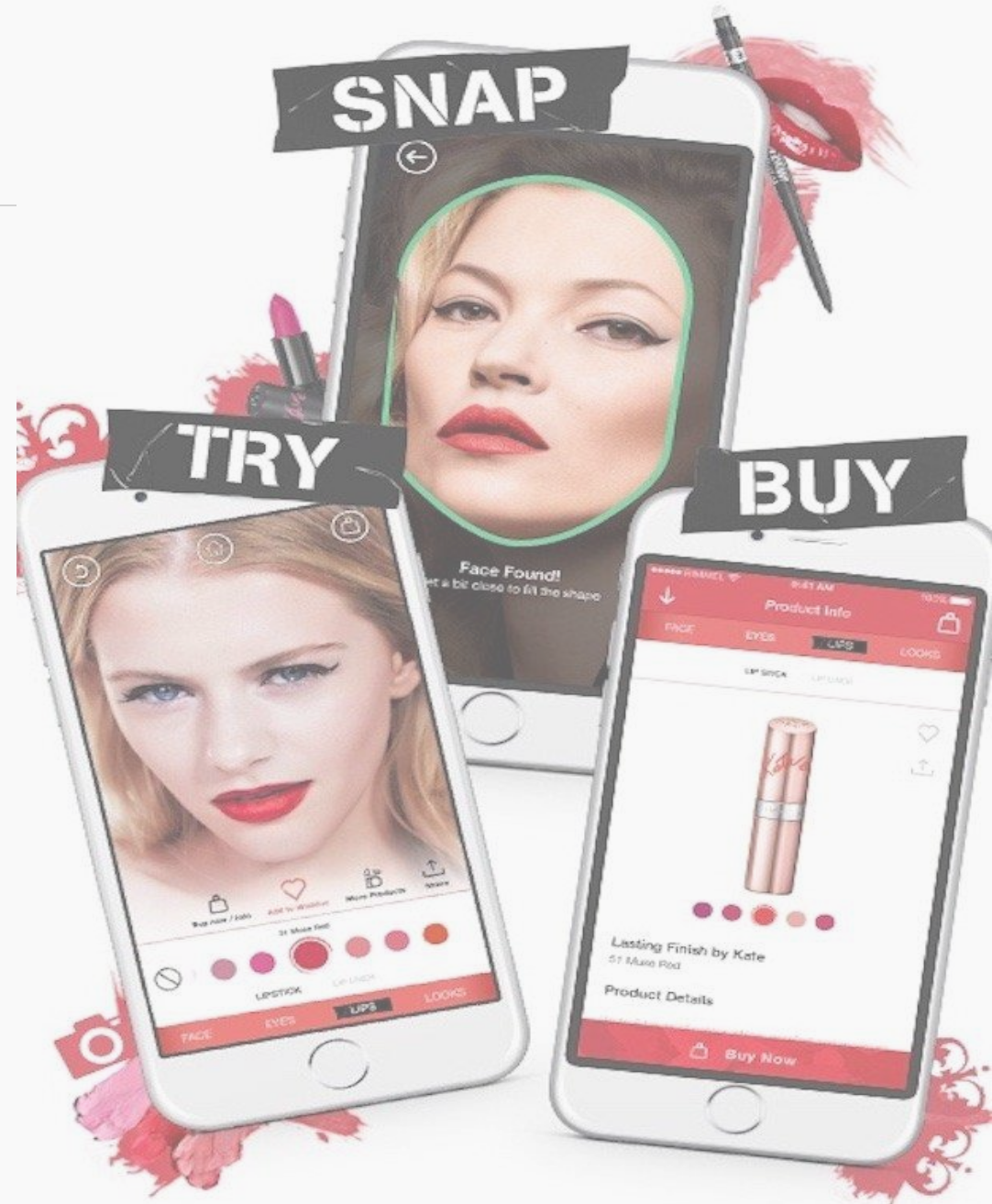| Year	Global Internet Users (Million)	Penetration Rate
2017	3,494.7	46.3%
2018	3,807.9	49.9%
2019	4,373.6	56.7%
2020	4,637.9	59.5%
2021E	4,827.4	61.3%
2022E	5,012.3	63.0%
2023E	5,198.0	64.7%
2024E	5,334.8	66.5%
2025E	5,597.5	68.4%
2026E	5,806.2	70.2%

- The global internet users has increased from 3,494.7 million to 4,637.9 million from 2017 to 2020, representing a CAGR of 9.9%. It is expected to reach 5,806.2 million by 2026. The global internet penetration rate has increased from 46.3% to 59.5% from 2017 to 2020, representing a CAGR of 8.7%. The penetration rate has surged rapidly in the past years, especially in the year of 2019 and in 2020 with growth rates of 6.8% and 2.8%, respectively. The surge in 2019 is due to wide adoption of internet that has rapidly penetrated across the globe, and the growth in 2020 is due to the explosion of COVID-19 pandemic that triggered the transformation of lifestyle towards online consumption, entertainment and other activities as more people stay home due to social distancing. The internet penetration rate is expected to grow from 61.3% to 70.2% from 2021 to 2026, representing a CAGR of 2.8%. The increasing internet penetration rate has driven the growth of online shopping, e-commerce businesses and omni-channel business models.

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Agenda

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Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Methodology

Beauty Technology Total Addressable Market (TAM)

Method 1 - Based on Industry Benchmarking (Top-Down Approach)

Global Beauty Revenue [A]	✕	Sales & Marketing (S&M) & Research & Development (R&D) Spending [B]	✕	Weighted Average of AR/AI Spending as % of S&M/ R&D Spending by Market Share [C]	=	Beauty Technology TAM
US$258,662.9 million		17.1%		1.89%		US$2,830.8 million
				Current Penetration rate of AR/AI application [D]		
				29.6%		

■ = Deriving process

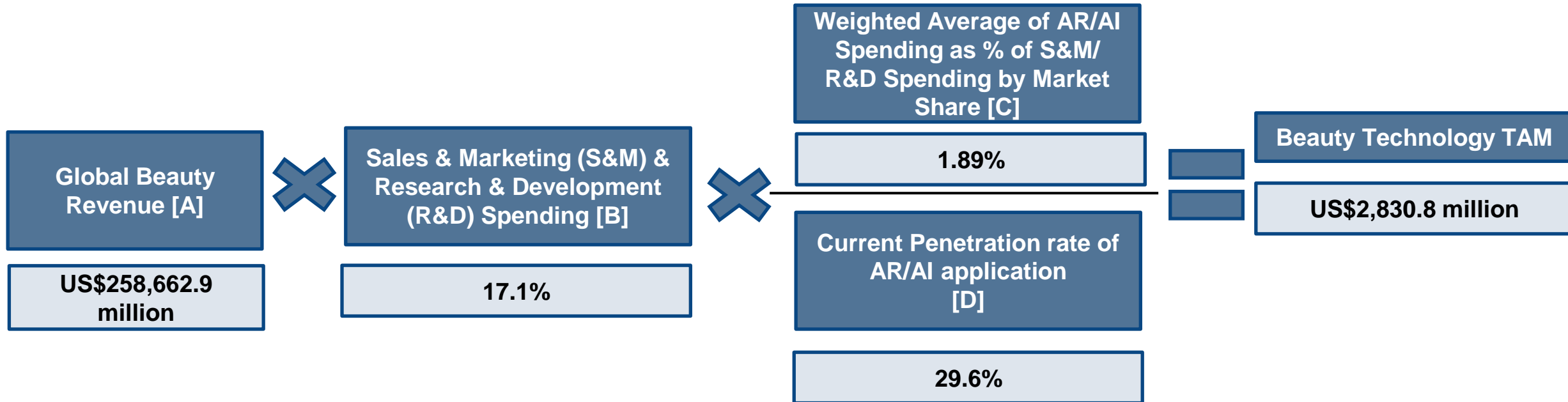□ = Actual figures in 2020

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Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Methodology

Beauty Technology Total Addressable Market (TAM)

Method 1 - Based on Industry Benchmarking (Top-Down Approach)

Global Beauty Revenue [A]	• <u>2020: US$258,662.9 million</u> It is compiled from annual reports of the selected brands/retailers in beauty and fashion accessory product and trade interviews.
Sales & Marketing (S&M) & Research & Development (R&D) Spending [B]	• <u>17.1% as Average S&M/ R&D spending as % of Revenue</u> The percentage of S&M expenditure to beauty sales is calculated based on weighted average dividing the marketing expenditure to the total beauty sales of the top 50 beauty brands, which is 16.7% and is further amplified to 17.1% considering the inclusion of Research and Development (R&D) Spending based on our estimation and will be used to calculate the percentage of cost related to AR/AI technology application.
AR & AI Spending as % of S&M/ R&D Spending [E= C/D]	• <u>2020: 6.4% (i.e. =1.89%/29.6% in the previous slide)</u> Please refer to the following slides for details.

Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Methodology

Beauty Technology Total Addressable Market (TAM)

Method 1 - Based on Industry Benchmarking (Top-Down Approach) – Step 1 to find AR & AI Spending as % of S&M/ R&D Spending

$$\frac{\text{Sales Revenue of Beauty Brands in 2020 [1]}}{\text{Approximately No. of Beauty Brands/ Retailers [2]}} = \text{Average Sales Revenue per Beauty Brands [3]} \times \text{Average S\&M/ R\&D Spending as \% of Revenue [B: 17.1\%]} = \text{Average S\&M/ R\&D Spending per Beauty Brands [4]}$$

- [1]: For beauty brands, it is divided into two groups of beauty brands (i.e. Top 50 Beauty Brands & Other Beauty Brands) in order to calculate their sales revenue respectively. Top 50 Beauty Brands & Other Beauty Brands are represented "Large companies" & "Other companies" respectively. The division of two groups of beauty brands is on the purpose of calculating the weighted average in the next step.

- [2]: It refers to those beauty brands which are capable of acquiring third-party AR/AI technology solution services. It is estimated the beauty brands/ retailers with annual revenue of US$11.7 million will be capable to acquire the service on average. Based on Shopify's statistics and Frost & Sullivan analysis, there was approximately 20,000 potential beauty brands in 2020.
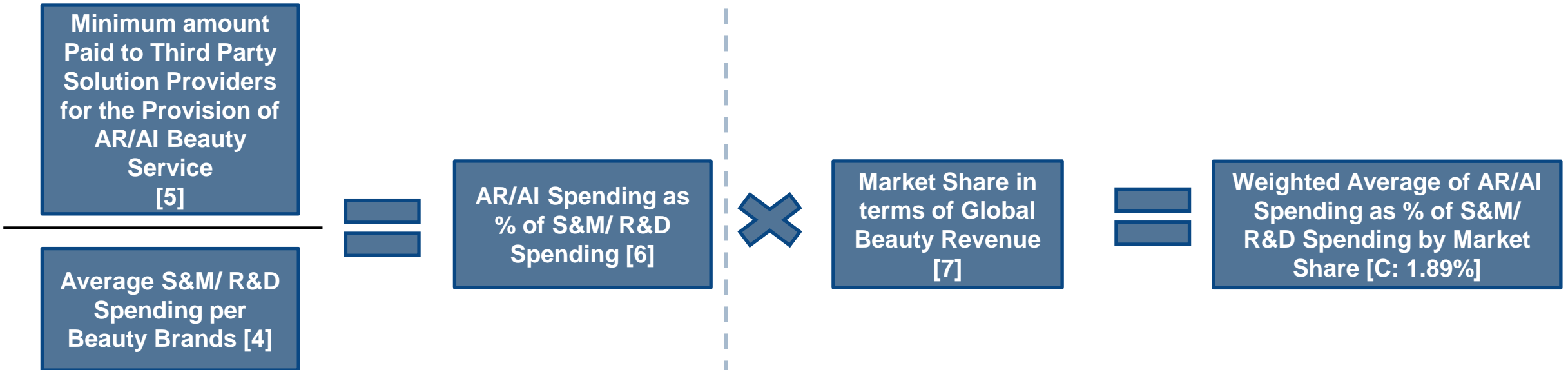
Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Methodology

Beauty Technology Total Addressable Market (TAM)

Method 1 - Based on Industry Benchmarking (Top-Down Approach) – Step 2 to find AR & AI Spending as % of S&M/ R&D Spending

$$\frac{\text{Minimum amount Paid to Third Party Solution Providers for the Provision of AR/AI Beauty Service [5]}}{\text{Average S\&M/ R\&D Spending per Beauty Brands [4]}} = \text{AR/AI Spending as \% of S\&M/ R\&D Spending [6]} \times \text{Market Share in terms of Global Beauty Revenue [7]} = \text{Weighted Average of AR/AI Spending as \% of S\&M/ R\&D Spending by Market Share [C: 1.89\%]}$$

- [5]: It refers to the historical data of Perfect Corp's customers.
- [6]: The historical revenue of top 20 customers of Perfect Corp is representing the AR&AI Spending of "Large companies" and calculate the average maximum AR/AI Spending as % of S&M Spending of "Large companies" (i.e. 0.36%); For "Other companies", their AR/AI Spending is the remainder of [5] divided by [4].
- [7]: The market shares of "Large companies" & "Other companies" are based on their sales revenue (i.e. [1]) in 2020.
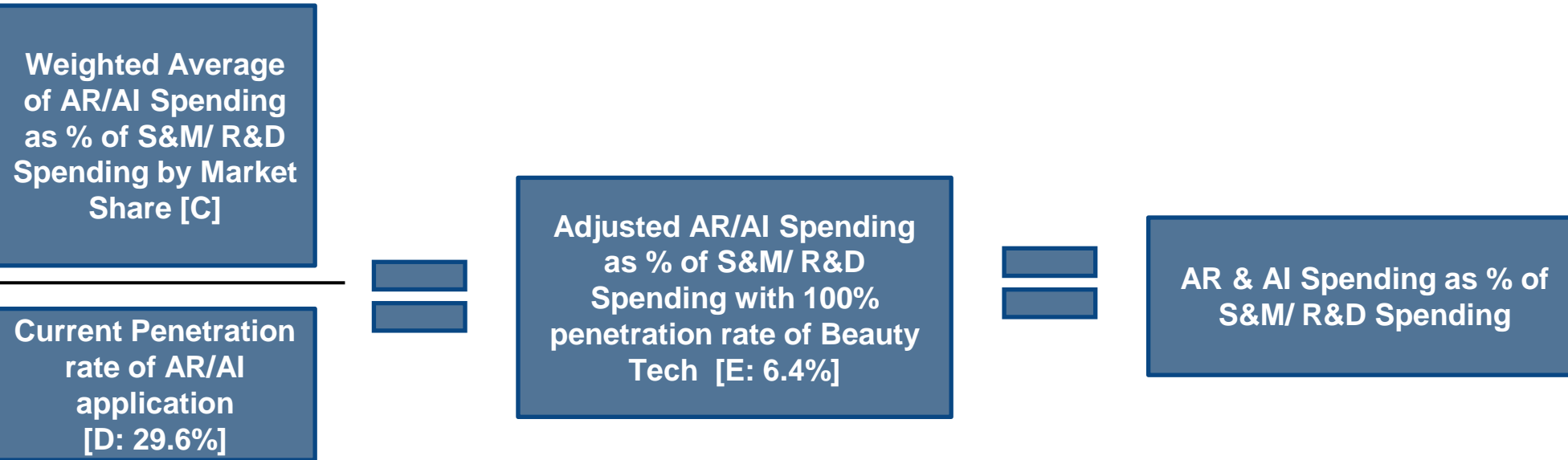
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Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Methodology

Beauty Technology Total Addressable Market (TAM)

Method 1 - Based on Industry Benchmarking (Top-Down Approach) – Step 3 to find AR & AI Spending as % of S&M/ R&D Spending

$$\frac{\text{Weighted Average of AR/AI Spending as \% of S\&M/ R\&D Spending by Market Share [C]}}{\text{Current Penetration rate of AR/AI application [D: 29.6\%]}} = \text{Adjusted AR/AI Spending as \% of S\&M/ R\&D Spending with 100\% penetration rate of Beauty Tech [E: 6.4\%]} = \text{AR \& AI Spending as \% of S\&M/ R\&D Spending}$$

- [D]: The current penetration rate of AR/AI application in the beauty industry is calculated based on the number of retail products applied with AR/AI technology per overall retail products in the beauty industry. Based on the desktop search, there is approximately 29.6% of products applied with AR/AI technology on average in 2020.
- [E]: The outcome is the AR & AI Spending as % of S&M/ R&D Spending of all potential beauty brands that are able to acquire Beauty Tech services (i.e. 6.4% in 2020).
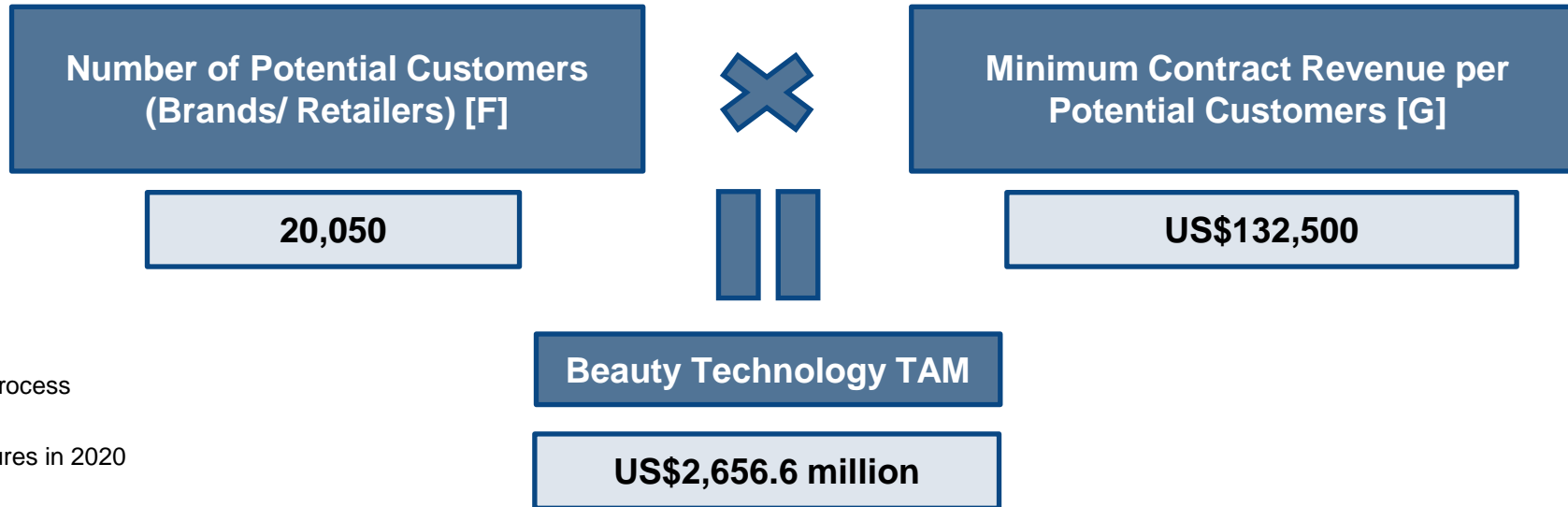
Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Methodology

Beauty Technology Total Addressable Market (TAM)

Method 2 - Revenue Approach (Bottom-Up Approach)

Number of Potential Customers (Brands/ Retailers) [F]	✕	Minimum Contract Revenue per Potential Customers [G]
20,050		US$132,500

Beauty Technology TAM

US$2,656.6 million

| = Deriving process

| = Actual figures in 2020

Number of Potential Customers (Brands/ Retailers) [F]	The figure is based on our estimation on the market.
Minimum Contract Revenue per Potential Customers [G]	Please refer to the following slides for details.

Source: Frost & Sullivan

Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Methodology

Beauty Technology Total Addressable Market (TAM)

Method 2 - Revenue Approach (Bottom-Up Approach) – Step 1 to find Minimum Contract Revenue per Potential Customers

| Average Contract Value in Respective Group [8] | ✕ | Market Share Based on The Number of Beauty Brands/ Retailers in the Industry [9] | = | Weighted Average Contract Value in the Industry [10] |

- [8]: Based on the historical data of Perfect Corp's customers, including the total number of clients:334; total average contract value of top 20 customers: US$619.7 thousand and total revenue of US$23,454 thousand in 2020.

- [9]: It is assumed that number of potential customers (Brands/ Retailers) was around 20,050 in 2020; with 50 brands as "Large Companies" and 20,000 brands as "Other Companies". The basis is the same as that of [2].
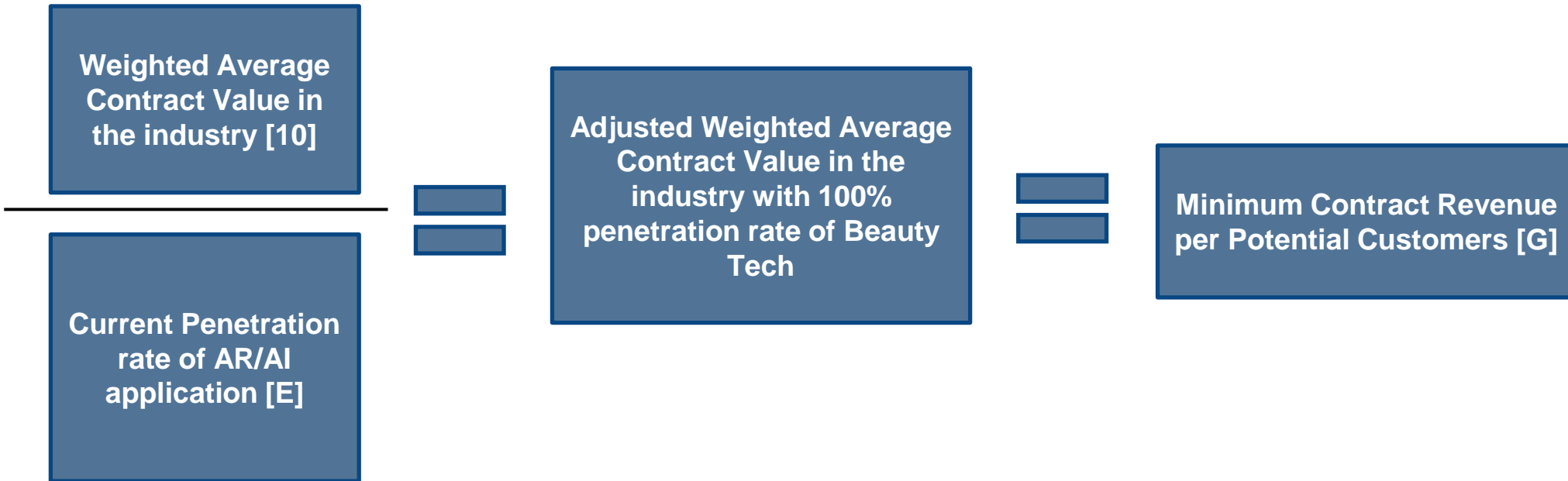
Source: Frost & Sullivan

Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Methodology

Beauty Technology Total Addressable Market (TAM)

Method 2 - Revenue Approach (Bottom-Up Approach) – Step 2 to find Minimum Contract Revenue per Potential Customers

$$\frac{\text{Weighted Average Contract Value in the industry [10]}}{\text{Current Penetration rate of AR/AI application [E]}} = \text{Adjusted Weighted Average Contract Value in the industry with 100\% penetration rate of Beauty Tech} = \text{Minimum Contract Revenue per Potential Customers [G]}$$
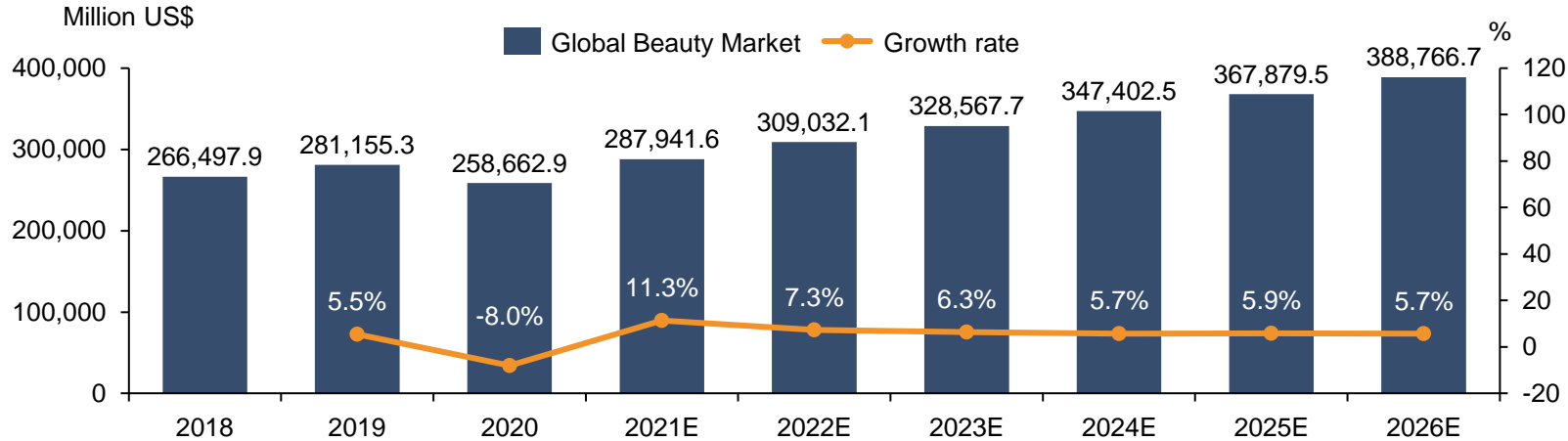
- The above calculation follows the same methodology of "Step 3 to find AR & AI Spending as % of S&M/ R&D Spending" in Method 1.

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Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market – Overall Global Beauty Market

Global Beauty Market

Million US$

Legend: ■ Global Beauty Market ━●━ Growth rate

Year	Value	Growth rate
2018	266,497.9	
2019	281,155.3	5.5%
2020	258,662.9	-8.0%
2021E	287,941.6	11.3%
2022E	309,032.1	7.3%
2023E	328,567.7	6.3%
2024E	347,402.5	5.7%
2025E	367,879.5	5.9%
2026E	388,766.7	5.7%

CAGR	2018-2026E	2021E-2026E
Global Beauty Market	4.8%	6.2%

Note: The global beauty market consists of makeup, skincare, haircare, and hygiene products.

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Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market – Overall Global Fashion Accessories Market

Global Fashion Accessories Market

Million US$

Legend
■ Global Fashion Accessories Market
━●━ Growth rate

Chart data:

Year	Market Size (Million US$)	Growth rate
2018	1,924,686.6	
2019	2,056,500.8	6.8%
2020	1,808,240.0	-12.1%
2021E	2,072,062.2	14.6%
2022E	2,165,719.4	4.5%
2023E	2,280,286.0	5.3%
2024E	2,407,525.9	5.6%
2025E	2,546,921.7	5.8%
2026E	2,700,501.1	6.0%

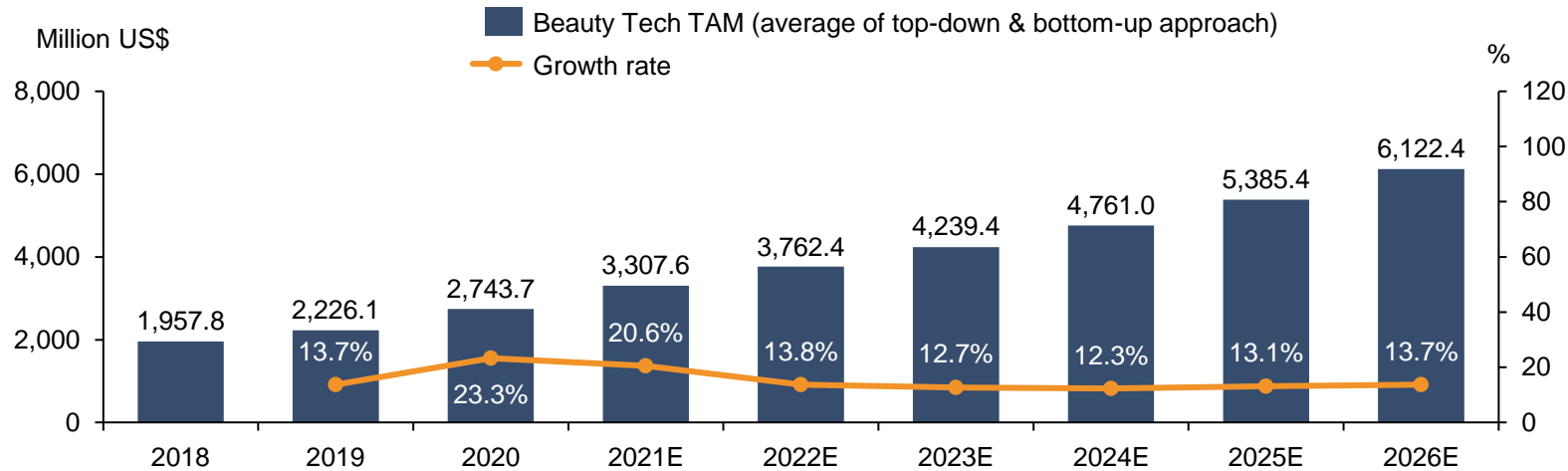| CAGR	2018-2026E	2021E-2026E
Global Fashion Accessories Market	4.3%	5.4%

Note: The global fashion accessories market consists of apparel, accessory, eyewear, watches and jewellery.

Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Result
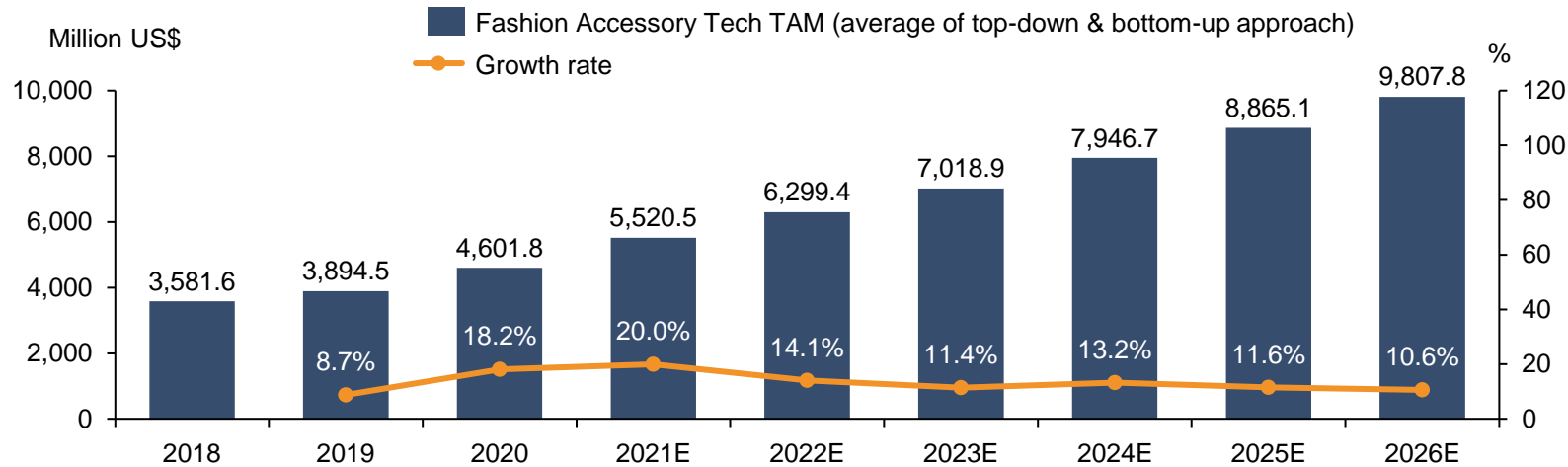
Beauty Technology Total Addressable Market (TAM)

Million US$

■ Beauty Tech TAM (average of top-down & bottom-up approach)
—●— Growth rate

%

Bar values	Growth rate
2018: 1,957.8	
2019: 2,226.1	13.7%
2020: 2,743.7	23.3%
2021E: 3,307.6	20.6%
2022E: 3,762.4	13.8%
2023E: 4,239.4	12.7%
2024E: 4,761.0	12.3%
2025E: 5,385.4	13.1%
2026E: 6,122.4	13.7%

CAGR	2018-2026E	2021E-2026E
Beauty Tech TAM	15.3%	13.1%

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Overview of AR&AI Beauty and Fashion Tech Market

Market Size of Beauty Technology Market - Result

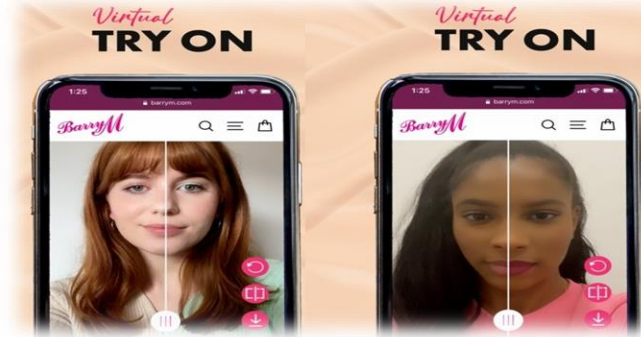**Fashion Accessory Technology Total Addressable Market (TAM)**

Million US$

■ Fashion Accessory Tech TAM (average of top-down & bottom-up approach)
—●— Growth rate

%

Year	TAM	Growth rate
2018	3,581.6	
2019	3,894.5	8.7%
2020	4,601.8	18.2%
2021E	5,520.5	20.0%
2022E	6,299.4	14.1%
2023E	7,018.9	11.4%
2024E	7,946.7	13.2%
2025E	8,865.1	11.6%
2026E	9,807.8	10.6%

CAGR	2018-2026E	2021E-2026E
Fashion Accessory Tech TAM	13.4%	12.2%

Beauty

Statistics & Facts

- Beauty products make up the second-largest product category for engagement across social media platforms, such as Instagram, Twitter, and Facebook. The top 20 beauty groups (ranked by 2020 revenue) have adopted AR and AI technologies by 2020. Over the past few years, for example, the mobile CPU processing speed reached 100 million floating operations per second in 2015 which is supporting the early stage development of beauty tech market.
- The aggregate global beauty revenue, in aspects like colour cosmetics, skincare, and haircare, totally accounted for approximately US$258.7 billion in 2020. For top 20 beauty companies, with about 57% market share, they shared for around US$147.4 billion. For the remaining part, indie beauty brands shared for around US$111.2 billion, with about 43% market share.
- In 2020, top 20 beauty groups have (i) stock keeping unit (SKU) of approximately 1.7 million in total; (ii) presence in around 80 countries and (iii) about 435 brands in total, demonstrating their dominant positions in the market.
- Based on average online channel revenue contribution for listed companies in Top 20 Beauty Groups which have disclosed online channel revenue contribution, including Coty, Henkel, L'Oréal, Natura, P&G, Revlon, Shiseido, Unilever, the average online revenue contribution of top 20 beauty companies has also experienced more than doubled the growth in the last 2 years from 6.7% in 2018 to 16.2% in 2020. It is estimated that there are over 200,000 indie beauty brands and merchants globally in 2020. Among these brands, there are approximately 300 indie brands which have adopted AR and AI technologies in 2020 based on the trade interviews and available information in the public domain. Nonetheless, there is over 99.8% of indie beauty brands have not adopted AR / AI try-on technology as of 2020, indicating the strong growth potential in the beauty tech market.

- Perfect Corp. is a No.1 beauty tech AR and AI industry player based on the number of brand groups served and covers 19 out of top 20 global beauty groups (ranked by 2020 revenue), also serves 90% of the indie brands. In addition, Perfect Corp. has successfully launched the first-ever virtual try-on NFT collection in March 2022, extending the application of AR tech to the digital assets. This shows the personalized and immersive experiences could be further enhanced through AR/ AI technology, witnessing the immense potential of AR/ AI technology for the future world. Moving forward, it is estimated that the number of indie brands that adopt AR & AI technology will grow at a CAGR of approximately 37.3% during 2021 to 2026. The forecasted growth rate of the number of indie brands that will adopt AR & AI technology is derived with reference to (i) the forecasted growth rate of Beauty and Fashion Accessory TAM and (ii) the increasing breadth of application and advancement in AR technology that induces indie beauty brands to leverage these technologies in order to expand their business in a short period of time. Furthermore, it is anticipated that approximately 9.4% of brands' S&M or R&D spending will be attributable to AR and AI technology spending by the end of 2026, demonstrating such enormous growth of beauty tech market in the future.

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Overview of AR&AI Beauty and Fashion Tech Market

Beauty

COVID-19 Impact on the Industry

- With the COVID-19 pandemic, all age groups are shifting more to online shopping, with more than 20% of Beauty products in 2021 being bought online, which means that such consumers will have greater opportunities to interface with and use more AR and AI related technologies and tools. According to L'Oréal's 2021 Half-Year Results, E-commerce continued to grow strongly and now accounts for more than 20% of its sales, with 22% of e-commerce in overall beauty industry in 2020 and 14% of e-commerce in overall beauty industry in 2019.

- During the outbreak of the COVID-19, the implementation of quarantine and social distancing measures have spurred the demand for shopping solutions that do not involve physical product testing. Notable brands have one after another push forwarded their virtual presence in engaging consumers throughout their consumer journey. Leveraging technology development such as AI-enabled augmented reality, facial recognition and three dimensional modelling, coupled with the proliferation of social networking platforms, computers and mobile phones have been transformed into a consumer-inviting digital landscape. An influx of social simulation programs have become commonplace such as virtual try-ons and video product demonstrations, which provide online shoppers with an authentic sense of product. Going forward, the beauty tech segment is expected to escalate into more sophisticated application, for instance, some AI-powered application analyse skin condition through selfies and offer real-time skincare solutions including instantly-compounded product for users to apply right away. Some highly advanced application may offer precise and personalised recommendations accommodating to the dynamic purchasing behaviour and needs of different customers.

Overview of AR&AI Beauty and Fashion Tech Market

Fashion

- The fashion segment is primarily comprised of apparel, jewellery and watches and eyewear. While mobile application and computer are ideal medium for merchants applying AR and AI technology in engaging customers to virtually try-on comparatively small sized accessories and items such as eyeglasses and sneakers, it is also increasingly common for apparel companies to introduce digitalized dressing-room where customers may have their outfit entirely appeared on them from various angles, with significantly less effort than traditional try-on. Sizeable market participants have taken further steps in attempting to incorporate AR and AI fashion into consumers day to day life. For instance, Amazon Look Fashion Echo Camera allow consumers to upload photos of every outfit they possess and take pictures. Amazon would then curate their wardrobes and offer consumers suggestions about their outfit everyday. In the long run, the penetration of AR and AI is expected to thrive in view of the increasing adoption by merchants and increasing salience among consumers. It is expected the global market for fashion (including apparel, accessory, eyewear, watches and jewellery) will increase from US$2.1 trillion in 2021 to US$2.7 trillion in 2026, representing a CAGR of approximately 5.4%.

Hair Salon

- Hair salon serves as one of the segments with most potential with fundaments and industry experience accumulated following the proliferation of AR/AI technology applied in the beauty sector. The advancement in mobile AR/ AI applications has conduced the first step of customer engagement when every smartphone owner can become a virtual hairdresser. It is increasingly convenient for consumers to tap and change the hair colour handily and discover which hairstyle suits the most, leveraging well-developed face and hair recognition technology. Applying similarly in professional hair salon, it is no longer uncommon for special modules to be installed on hair booths, where clients are eager to go through the service journey with the aid of AR/ AI technology, from selection, assessment to consequently making the purchase decisions. In addition, intelligent brushes, which analyses condition of hair, serve as another auxiliary tool in elevating customer experience and improve overall quality of service delivered.

Source: Frost & Sullivan

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Overview of AR&AI Beauty and Fashion Tech Market

Dental and Orthodontics

- The dental and orthodontics segment has begun to enlist and acquire computer vision to improve dentists' ability to diagnose and treat issues. Computer vision systems incorporating AR/ AI technology could enable the detection dental decay and oral cancer using techniques like object detection and semantic segmentation. For instance, in cases during dental implant rehabilitation, dynamic navigation system is displayed on a AR glasses for the dentist to locate the previously-planned and virtually displayed implant position. In turn, this allowed for the use of a dedicated software and computer-aided/image-guided procedure to assist in throughout the operation. In the long run, as the accuracy of the procedure being further refined, it is expected an optimisation of results shall bring about a wider penetration and adoption rate. In the long run, the technological breakthrough shall propel the AR/ AI adoption in this segment.

Plastics Surgery

- AR/ AI is a unprecedented value-added technology to the plastics surgery segment, which is applicable on areas such as AR rhinoplasty, lip augmentation, liposuction, facelifts AR and breast implants. As augmented reality mingles three-dimensional computer-generated image and concept with real objects, a sophisticated face recognition and modification tool enable surgeon and patients to view the proper layout of the surgical part during cosmetic and reconstructive surgery. Augmented reality helps in visualizing the planned correction and confirming the final outcome with structured information, while surgeon will be able to superimpose the desired part using a pair of commercially available smart glasses embedded with AR technology. The AR technology is also usually equipped with a open source software, which helps in solving various technical problems during the surgery. Through AR/ AI technology, customers could thereby possess greater confidence and comfort with the post-operation appearance, spurring the overall industry demand.

Source: Frost & Sullivan

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Overview of AR&AI Beauty and Fashion Tech Market

Live Stream and Video Conference

- The live stream and video conference segment is developing expeditiously especially during the outbreak of the COVID-19, while incorporation of AR/ AI technology elevates user experience and is becoming increasingly popular. Key AR features such as to add privacy to video meetings where users can remove backgrounds and to enhance live streaming filters that beautify user appearance, to integrate three-dimensional realistic holograms, are widely adopted in major live streaming and video conferencing applications. Companies like Meta are partnering with video conferencing platforms to deliver solutions. It is enabling the implementation of AR in video conferencing for the sharing and manipulation of 3D virtual holograms in real-time. Coupled with key AI features in video conferencing such as voice-to-text transcription, meeting room analytics, the combining live broadcasting with interactive background video, AI and holograms, corporations and individuals using live stream and video conference applications are now able to rapidly deliver immersive, engaging experiences anywhere, sustaining the demand in this segment.

Furniture

- The furniture segment is assimilating contemporary technology day by day in elevating customer experience through the consumer journey. Manufacturers are leveraging advanced technology to accomplish some of the complex designs and to design some best utility furniture. To the downstream ends, fitting-out companies and furniture retailers are availing web AR services to create virtual product catalogues, empowering their clients to actually check out products online. Nowadays, there are increasing number of AR interior design applications available from which customers scan their living area and the app will guide through customers to choose the best-suited furniture in terms of size, design and material. For instance, the Ikea Place app, established in 2017, allows users to superimpose accurate 3D digital renderings of its products onto their smartphone camera feeds, letting them see how furniture would fit in their homes before committing to a purchase. Based on AI technology, such app may also provide customers with home furnishing tips and recommendations based on the consumers behaviour, context and actual circumstances. As the technology in modelling the image accurately become more mature and advanced, the adoption of AR/ AI technology is expected to propel in the long run.

Source: Frost & Sullivan

F R O S T *&* S U L L I V A N

Overview of AR&AI Beauty and Fashion Tech Market

Key Growth Drivers and Analysis (1/2)

Personalized Solutions

- The demand for personalization solutions of beauty and fashion has been on the rise for creating the right fit for every consumer. In the past, consumers have spent large amount of time during shopping to find the right product or item, but the process may irritate consumers that they either were unable to find the right fit that reduced desire to purchase or has purchased the wrong product that is not suitable. Therefore, along with the development of technology, personalized solutions using AR, AI and machine learning have satisfied consumers' needs, saved consumers' time and increased customer retention rate. Once the technology was launched, consumers began to look for more brands that do personalization, rather than doing the picking products themselves that consist risks for purchasing wrong item. Within the beauty and fashion segment, cosmetics, nails and hair are seeing strongest growth for "custom solutions".

Advancement of Technology

- The development of technology has driven the digitization of beauty and fashion tech market and spurred the accomplishment of personalization of beauty and fashion items. Technologies such as AR, AI and machine learning act as a comprehensive system that assists the realization of virtual try-ons, and the advancement of cloud computing system and big data in the past years has set a cornerstone for beauty and fashion retailers to leverage the data collected from virtual try-ons and further conduct data analysis on consumer behaviours and consumer preference, increasing consumer retention rate. Moreover, more and more beauty and fashion retailers have increased research and development costs on AR/AI to iterate development on such technologies either from in-house built systems or from third party solutions. With increasing investment in the field, it is believed that technology will become more advanced in the upcoming years to satisfy consumer needs.

Rise of Omni-channel Retailing

- More and more beauty and fashion retailers are adopting omni-channel business models to encourage sales by creating a seamless and simple buying experience for consumers regardless of the purchasing channel of online or offline. In order to fulfil demand for consumers in both sales channel, beauty and fashion retailers have incorporated AR and AI try-ons for both online and offline stores. This also indicates that web, mobile and e-commerce customer-brand interactions must match with what costumers experience in offline retail stores. For online try-ons, beauty and fashion retailers have incorporated AR/AI face recognition systems that may easily apply beauty of fashion items on customers virtually on screens. For offline try-ons, apart from the traditional assistance from retail staff, beauty and fashion retailers have comprised InStore AR/AI try-ons. For instance, Sephora has installed a digital mirror that delivered personalized recommendations through AI. Beauty and fashion retailers have also gradually established cloud services and edge computing, either in-house built or with assistance of outsourced software and services, to run big data analysis and machine learning to further customize products and solutions for consumers based on items they have tried on either virtually or in offline stores.

Overview of AR&AI Beauty and Fashion Tech Market

Key Growth Drivers and Analysis (2/2)

Expectation of Fun, Interactive Experiences with Brands

- Consumers nowadays are increasingly embracing digitalized and interactive purchasing experience across online and offline channels while brand owners are looking to accommodate to the dynamic switch of consumer behaviour to offer a next generation entertaining shopping experience. Consumers are increasingly looking for quality and meaningful interact with different brands throughout the consumer journey from product trial, word-of-mouth interactions, purchase, after-sales experience. Good experiences and interactions with the brands bring consumers back for more and attract new consumers through word of mouth and online reviews. However, a disappointing experience may lead to the permanent loss of customers and a damage to the brand's reputation.

Desire for Convenience

- There are increasing number of touchpoints for consumers to reach their desired brand, such as physical stores, brand websites, social media platform and promotion from key influencers. These brands are looking to engage with consumers in real-time, in order to capture attention from these consumers. Instantaneous try-ons, live streaming, and influencer-based marketing have become very popular in the past few years, providing instant and customized access to content, encouraging purchase and customer loyalty.

Sustainability of Products

- In recent years, government around the globe and general public has stressed increasing importance on topics of environmental concerns, sustainability and corporation social responsibility. Consumer behaviour is therefore altered while brand owners may rethink the way they source products, design packaging to reduce the harmful impact on the environment. Digitalisation is hence a solution in view of the prevailing trend of reduction of waste disposal.

Increasing Awareness for Hygiene

- Attributed to the outbreak of the COVID-19, where implementation of travel restrictions, quarantine measures and social distancing has reduced physical visits to brick-and-mortar stores. Consumers are paying more and more attention to public healthcare and wellness. Potential hygiene concerns associated with InStore physical shopping and try-ons have prompted consumers to look for alternative solutions.

Agenda

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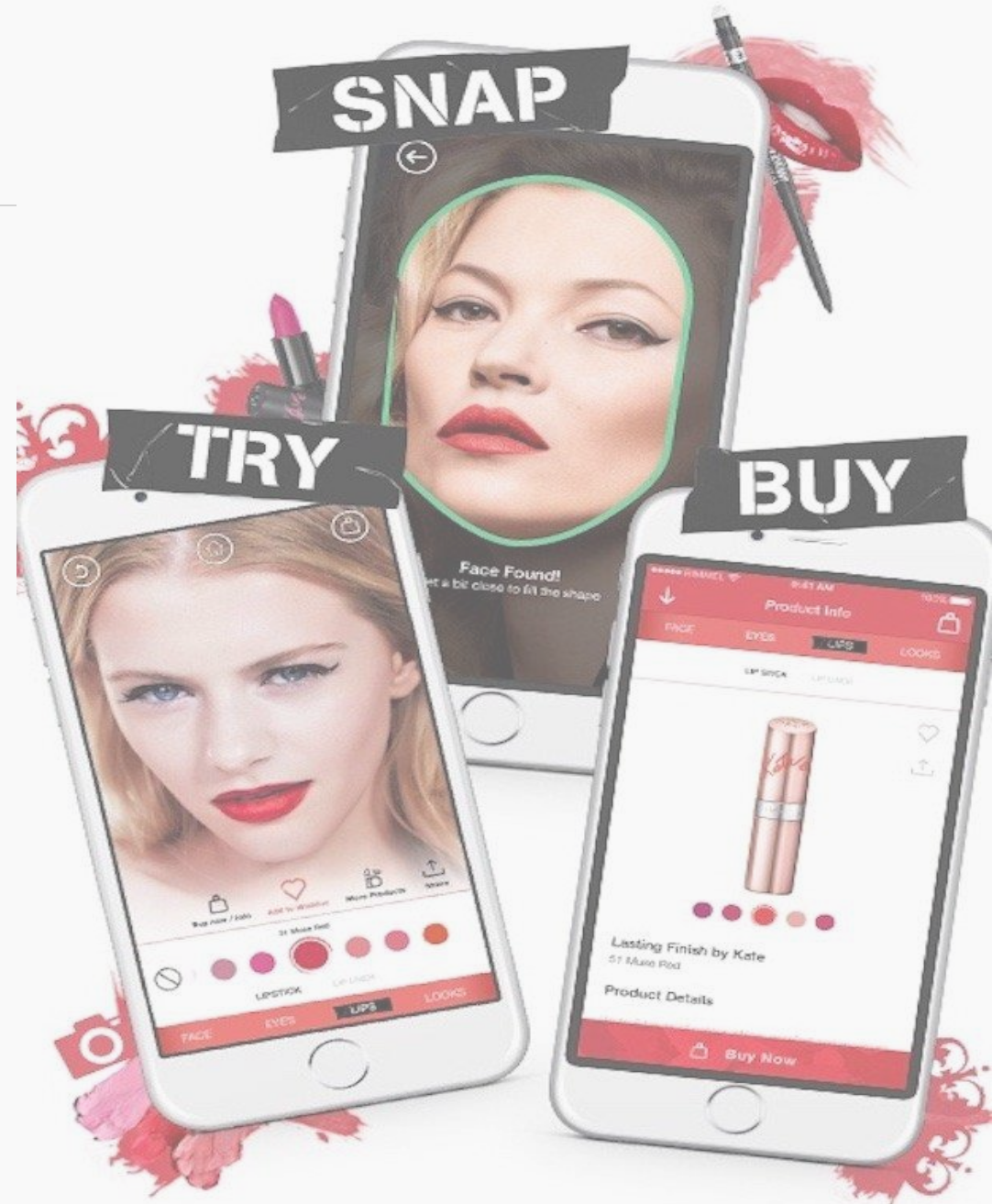
B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Overview of Market Competition and Ranking of Market Players

- The B2B AR&AI Beauty and Fashion Tech market is relatively concentrated with approximately 50 industry players in 2020. The high degree of concentration in the market is primarily attributed to the importance of established relationship with downstream notable beauty or fashion accessory brand owners. Major market players mainly centre on provision of solutions for makeup segment given that customer experience of makeup could be greatly enhanced with virtual try-on feature.

Ranking of B2B AR&AI Beauty and Fashion Tech Solution Providers by Revenue (Global), 2020

Market participant	Estimated revenue in 2020 (Million US$)
Perfect Corp.	31.3
Modiface Inc.	7.5
Revieve	6.2
WANNA	3.3
Holition	3.0
GlamST	1.5

Note:
1. The above table indicates market participants with over US$1 million revenue in calendar year 2020.
2. The revenue of leading players in the B2B Beauty and Fashion Tech Market are compiled from the available information in the public domain, including published annual report of listed companies, track record, client portfolio and other relevant data, and based on the trade interviews and fieldworks conducted.

B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Leading Players Profiling – Perfect Corp.

➢ **Company name**
- Perfect Corp.

➢ **Headquarter location**
- Taiwan

➢ **Foundation**
- 2015

➢ **Company introduction**
- The company is a leading beauty tech solutions provider transforming the industry by marrying the highest level of augmented reality (AR) and artificial intelligence (AI) technology for a re-imagined consumer shopping experience. From small and medium businesses to larger enterprise clients, Perfect Corp. offers innovative beauty SaaS for every business size. Over 400 trusted brand partners turn to our cutting-edge AR and AI technologies for virtual makeup trials, hair colour and accessory try-ons, and instant skincare diagnostics to enhance the beauty shopping journey online and InStore

➢ **Business model**
- Beauty Tech SaaS

➢ **Major services and core competitiveness**
- Virtual Makeup: a virtual makeup try-on experience improves the online consumer shopping experience and is available in various platforms such as Taobao mini-program, Google and YouTube
- AR Video Consultation: a real-time interactive experience is directly on a brand's website or in the YouCam Live app. Users can interact during the live stream to ask questions and get immediate responses and feedback on products
- Personal Diagnostic: a AI technology for fully automated skin tone shade matching and personalized foundation recommendation

PERFECT

B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape
Leading Players Profiling – Modiface Inc.

➤ **Company name**
- Modiface Inc.

➤ **Headquarter location**
- Canada

➤ **Foundation**
- 2007

➤ **Company introduction**
- Established in 2007, Modiface was acquired by L'Oréal in 2018 and is a leading provider of Augmented Reality technology for the beauty industry. ModiFace's patented technology includes live 3D makeup simulation, live anti-aging/skin-care simulation, and hair style and colour simulation. Based on more than a decade of advanced facial recognition research at Stanford University and the University of Toronto, ModiFace's technology currently powers augmented reality experiences for brands including Armani, L'Oréal Professionnel, and Samsung

➤ **Business model**
- Beauty Tech (AR/AI)

➤ **Major services and core competitiveness**
- Beauty AR SDK/ Face AI SDK: to perform beauty try-on simulations on live video, and to track the face and facial features in precise detail
- Custom AR Module: a module to help users create a unique and custom mobile AR experience on different platforms such as iOS, Android, & Windows App
- Web e-commerce AR: enables personalized product previews which increase time-spend, user engagement, and ultimately, conversions

MODIFACE

B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Leading Players Profiling – Revieve

- ➤ **Company name**
  - Revieve

- ➤ **Headquarter location**
  - Finland, Helsinki

- ➤ **Foundation**
  - 2016

- ➤ **Company introduction**
  - Revieve is a provider to brands and retailers across five continents for delivering a digitally-driven, personalized brand-experience leveraging state-of-the-art AI/AR technology. Revieve has transformed the customer-experience for skin care and colour cosmetics through its proprietary technology, the Revieve Health-Beauty-Wellness Platform. With easy-to-use self-diagnostic modules that personalize search, product discovery and shopping experiences, Revieve's digital beauty platform delivers consumers targeted products, services and treatments. Encompassing all facets of the health, beauty and wellness industry, Revieve's trusted powered-by modules include the AI Skincare Advisor, AI Makeup Advisor, AI Suncare Advisor and AI Nutrition Advisor

- ➤ **Business model**
  - Beauty Tech (AR/AI)

- ➤ **Major services and core competitiveness**
  - Revieve's platform: enables enterprises to do commerce across modules for all beauty verticals and across all brand touchpoints.
  - Comprehensive technology solutions related to Skincare: Examples are AI Skincare Advisor, AI Skin Diagnostics, AI Product Recommendations, Virtual Video Consultation and Skin Coach
  - Comprehensive technology solutions related to Makeup: Examples are AI Makeup Advisor, Makeup Virtual Try-on, AI Foundation Matching
  - Comprehensive technology solutions related to other aspects: AI Nutrition and Suncare Advisor

rev:eve

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B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Leading Players Profiling – WANNA

➢ **Company name**
- WANNA

➢ **Headquarter location**
- Lithuania, Vilnius

➢ **Foundation**
- 2017

➢ **Company introduction**
- WANNABY is a mass market mobile AR technology that allows shoppers to 'try on' a product (clothes, shoes, watches, etc.) before purchasing the product. Computer vision and rendering technologies are constantly enhanced for maximum accuracy, resolution and realism, making fashion universally accessible through digital full look experiences. The platform powers two apps: WANNA NAILS for nail polishes and WANNA KICKS for shoes, mainly sneakers

➢ **Business model**
- Fashion Tech (AR/AI)

➢ **Major services and core competitiveness**
- Wanna Kicks: enable users to virtually try-on high quality 3D models such as shoes, mainly sneakers

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B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Leading Players Profiling – Holition

➢ **Company name**
- Holition

➢ **Headquarter location**
- United Kingdom

➢ **Foundation**
- 2009

➢ **Company introduction**
- Holition is an award-winning digital retail agency that shapes the future of consumer experiences in fashion and beauty industries by humanising technology. Part think-tank, part digital studio, Holition is a synthesis of retail experts, scientists, film-makers, artists, mathematicians, UX designers, technologists and other curious minds applying their cross-discipline knowledge to deliver innovation
- Beauty by Holition is a cross-platform virtual try-on and diagnostics tool that provides a new dimension to beauty

➢ **Business model**
- Holition: Creative agency
- Beauty by Holition: Beauty Tech (AR/AI)

➢ **Major services and core competitiveness**

Holition
- Consulting service for beauty brands: to formulate marketing strategies in order to ensure a constant laser-focus on the future direction of retail

Beauty by Holition
- virtual try-on solutions: provides virtual makeup to enhance consumers' beauty experience through a playful dimension

HOLITION

B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Leading Players Profiling – GlamST

➤ **Company name**
- GlamST

➤ **Headquarter location**
- United States

➤ **Foundation**
- 2014

➤ **Company introduction**
- GlamST is an AR Beauty Tech company that develops customized solutions for retailers and brands. Its technology allows users to try on makeup virtually in mobile, web and InStore. GlamST developed more than 100 custom filters to represent each makeup representing true colours, textures and finishes. It was acquired by Ulta Beauty in November 2018

➤ **Business model**
- AR makeup try-on

➤ **Major services and core competitiveness**
- virtual try-on solutions: to try on makeup through AR, representing finishes, colour, and texture of the products in a highly realistic and accurate fashion

Source: Frost & Sullivan

B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Peers Comparison (Overall)

- Perfect Corp. is the only one company to provide comprehensive solutions for all four segments (i.e. Makeup, Skincare, Eyewear and Fashion and Accessories) of B2B Beauty and Fashion market. It is also the largest company (in terms of company scale) in the B2B Beauty and Fashion Tech market.

Market Participant	Perfect Corp.	Modiface Inc.	Revieve	WANNA	Holition	GlamST	Face++ (Megvii 旷视)	Visage Technologies	Banuba	Virtooal Limited
Makeup	✓	✓	✓		✓	✓	✓	✓	✓	✓
Skincare	✓	✓	✓				✓	✓		
Eyewear	✓								✓	✓
Fashion and Accessories	✓			✓				✓	✓	

Note: All lists of market participants in this section (Peers Comparison) are ranked based on their company scale in terms of revenue. The top 10 market participants in the market are listed in the above table.

B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Peers Comparison (Makeup segment)

Market Participant	Perfect Corp.	Modiface Inc.	Holition	GlamST	Virtooal Limited
Business Model	Beauty Tech SaaS	AR for beauty	Creative agency	AR makeup try-on (B2B)	Virtual Try-On for retailers/e-commerce (B2SMB)
Company Type	Private	Private, acquired by L'Oréal Group in March 2018	Private	Private, acquired by Ulta Beauty in November 2018	Private
Number of Brand Clients	Over 400	Serving L'Oréal brands after acquisition Number of L'Oréal brands: 36	Over 10	Serving Ulta Beauty after acquisition	Over 10
Notable Customers	Estée Lauder Group, LVMH Group, Shiseido Group, COTY, Amore Pacific Group, KAO Group, KOSE Group, Sephora	L'Oréal Group (e.g. Biotherm, La Roche-Posay)	Bourjois, Max Factor, Charlotte Tilbury, KIKO Milano, CoverGirl, Rimmel	Ulta Beauty's brands	N/A

Note: The top 5 market participants in makeup segment are listed in the above table.

B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Peers Comparison (Skincare segment)

Market Participant	Perfect Corp.	Revieve	Haut.ai	yiyuan.ai (宜远智能)	lululab
Business Model	SaaS Beauty Tech	SaaS Skincare	AI skincare solutions	AI skincare API and skin diagnostics devices	Hardware device maker
Company Type	Private	Private	Private	Private	Private
Number of Brand Clients	Over 400	Over 10	Less than 10	Less than 10	Less than 10
Notable Customers	Estee Lauder, J&J Neutrogena, Clinique, KOSE Group, NuSkin, Pierre Fabre, Amway	Ulta Beauty, No7, Garancia Paris, Pierre Fabre, A.S. Watson Group, Beautycalia	N/A	N/A	N/A
Platform	Android, iOS, Web, InStore, WeChat, Taobao	Web, Android, iOS	Web	Proprietary HW Device	Proprietary HW Device

Note: The top 5 market participants in skincare segment are listed in the above table.

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B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Peers Comparison (Eyewear segment)

Market Participant	Perfect Corp.	Fittingbox	Ditto	Virtooal Limited	Visage Technologies
Business Model	SaaS Beauty Tech	Digital Eyewear	AR eyewear try on	Virtual Try-On for retailers/e-commerce	Embedded System SDK license
Company Type	Private	Private	Private	Private	Private
SDK Loading	5~8 sec	15~30 sec	15 sec (Not for live)	15~30 sec	> 60 sec
Video Resolution	720p	480p	480p	480p	480p
Platform	Android, iOS, Web, InStore, WeChat, Taobao	Web, Android, iOS	Web, Android, iOS	Shopify, Web	Windows, MacOS, iOS, Android, Linux (Ubuntu, Red Hat), Xilinx Zynq, HTML5, Flash, Unity, Mashape

Note: The top 5 market participants in eyewear segment are listed in the above table.

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B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Peers Comparison (Fashion and Accessories segment)

Market Participant	Perfect Corp.	WANNA	TRYON Technology	Tangiblee	KiKsAR Technologies
Business Model	SaaS Beauty Tech	AR solutions for fashion industry	AR solutions for jewellery industry	Photo AR for furniture, ring and watch	AR solutions for fashion industry
Company Type	Private	Private	Private	Private	Private
Specialist	Bracelet, Ring, Earring, Nail, Necklace and Watch	AR, Luxury, Nail, Shoe and Watch	Bracelet, Ring and Watch	Ring and Watch	Apparel, Eyewear and Jewellery
Platform	Android, iOS, Web, InStore, WeChat, Taobao	iOS, Android	Only demos	Only photo try-on on Web	Web, several VTO Plugins for eCommerce sites (Shopify, WIX.com)

Note: The top 5 market participants in fashion and accessories segment are listed in the above table.

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B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Peers Comparison on Functionality (Beauty Tech)

Functionality	Market Participant	Perfect Corp.	Modiface Inc.	Ulta Beauty	Virtooal Limited	Ditto	Fittingbox
Live Makeup	Number of Features	14 different features provided	13 features while face paint feature is not available	N/A	N/A	N/A	N/A
Skincare	Camera Type	Front camera	N/A	Front camera	N/A	N/A	N/A
	Detected Skin Concerns	14 concerns with Spots, Wrinkles, Moisture, Redness, Oiliness, Acne, Texture, Dark Circles, Eyebag, Skin Firmness, Droopy Upper Eyelid, Droopy lower Eyelid, Radiance, Visible Pores P.S. Perfect's acne support 180 degree face detection (center, left and right)	N/A	4 concerns with spots, lines, breakouts, redness	N/A	N/A	N/A
	Analysis Speed	Fast with 2 seconds only	N/A	Slow with 10 seconds	N/A	N/A	N/A
	Detection Accuracy	High	N/A	Low	N/A	N/A	N/A
Eyewear	VTO Mode	Live & Photo	N/A	N/A	Live & Photo	Photo only	Live & Photo
	Lens Reflection	Yes	N/A	N/A	Yes	Yes	Yes
	Frame Reflection	Yes	N/A	N/A	No	No	Yes
	Fitting Method	Use facial feature points to simulate eyewear fitting, also with auto-pupillary distance (PD) technology for size fitting	N/A	N/A	Use facial feature points to simulate eyewear fitting	Hold plastic card (e.g. credit card) on forehead to calculate an simulate relative eyewear size and fitting	Use facial feature points or PD to simulate eyewear fitting
	Self-service Eyewear Editor Tool	Yes	N/A	N/A	Yes	No	No

Note:
1.The leading Beauty Tech market participants (in terms of product functionality) are listed in the above table.
2. The information is compiled from the data available in the public domain, including company websites and brochure.

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B2B AR&AI Beauty and Fashion Tech Market Competitive Landscape

Peers Comparison on Functionality (Fashion Tech)

| Market Participant	Perfect Corp.	WANNA	Banuba	Ditto	Forma	Vyking	Zeekit
Company Type	Private	Private	Private	Private	Private	Private	Subsidiary of Walmart
Major Fashion Segment served	Eyewear, Jewellery, Watches	Footwear, Watches	Eyewear, Jewellery	Eyewear	Bodywear	Footwear	Bodywear
Major Customer	Gucci	Gucci, Lamoda, Goat Reebok, Farfetch, Snapchat, Allbirds, Oasics, Puma	Gucci, BluePixel, Teatime, Mobilelix	Ray-Ban, Persol, Tag Heuer, Vera Wang, Chloé	Amsale, Canada Goose, Gap, Birdy grey	Undisclosed	Farfetch
Main Feature	• 3D model and physically based rendering supports high resolution textures, material reflections, and simulated motion physics with rigid body dynamics • AI-powered automatic pupillary distance detection	• Integrate virtual try-on and 3D modelling into merchants application and website	• Virtual eyeglass try-on based on interpupillary distance, jewelry and accessories try-on, with consultancy, customization and lifetime support • In-store AR mirror	• Virtual try-on of eyewear • Pupillary distance tool to measure facial traits • Digital lensometer to scan customer's glass • An instant facial scan that results in customized sizing recommendations	• Online in-store try-on by uploading customer's self photo	• Assisting merchants to transform 3D model of their products to produce variety and dynamic virtual try-on experience for customers	• A virtual fitting-room for merchants to provide to end-consumers to collect and try the products through online website • Instantly switch model on each item displayed • Instantly switch item on each model displayed
Core Competitiveness	• AgileFace® Tracking AI Technology gives an realistic AR try-on experience • Fully integrating into e-commerce platform with touchpoints including desktop and mobile web browsers • AgileHand enables instantaneous virtual try-on experiences, without the need for physical objects to calibrate the camera	• Proprietary high-end technology, powered by neural networks and sophisticated 3D geometry algorithms, 3D assets to create smooth and realistic visuals	• Face AR SDK with features such as face filters, green screen, virtual makeup, beautification and avatar • Wide range of service offerings such as AR photo booth, video conferencing and AR e-commerce	• Leveraging technology to measures a user's face by homing in on pupils, ears, cheekbones, ears and other facial landmarks, and then came back with images of dozens of different pairs of glasses that might be a good fit	• Focuses on increasing customer engagement time and purchase conversion for merchants	• Specialized AR try-on Technology for footwear for Application and on web	• To map a person's image into thousands of segments, taking into account the body dimensions and the fabric of the garment

Note:
1. The leading Fashion Tech market participants (in terms of product functionality) are listed in the above table.
2. The information is compiled from the data available in the public domain, including company websites and brochure.

Agenda
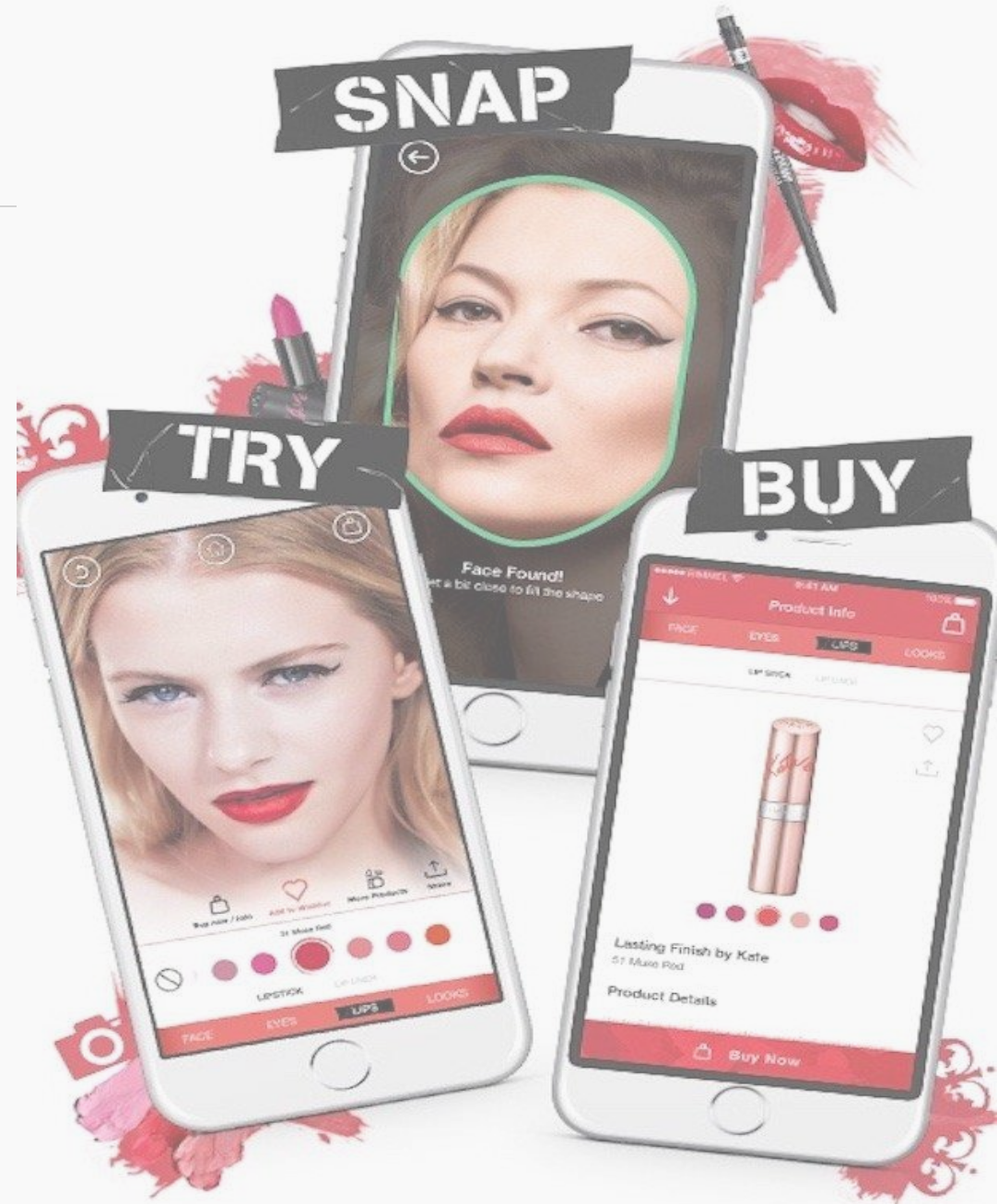
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Limitations

■ **Source of Information**

➤ Interviews with industry experts and competitors will be conducted on a best-effort basis to collect information in aiding in-depth analysis for this report.

➤ Frost & Sullivan will not be responsible for any information gaps in the circumstances that Interviewees refused to disclose confidential data or figures.
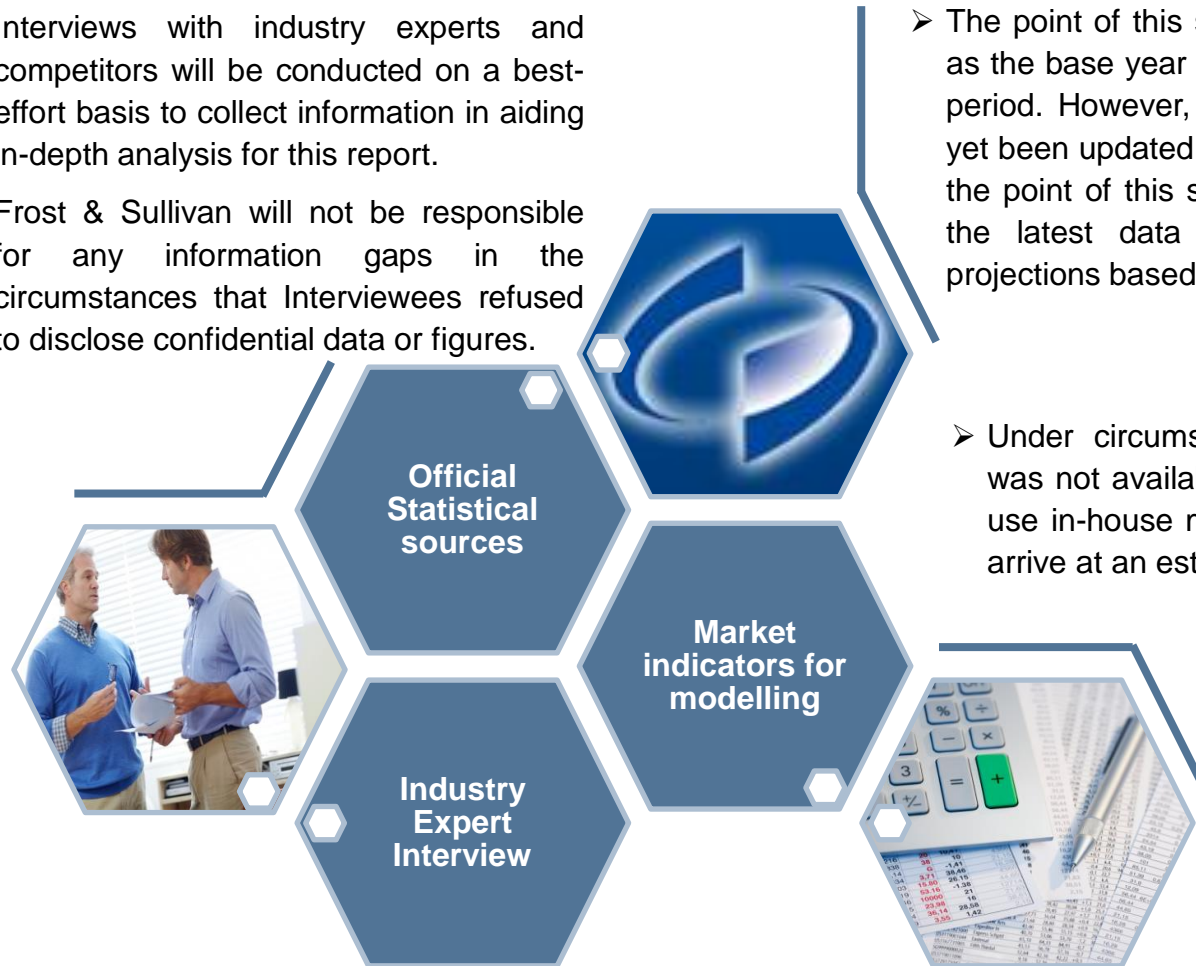
➤ The point of this study is set in 2021. It took 2020 as the base year and 2021 to 2025 as the forecast period. However, in the case where data has not yet been updated or published on public sources at the point of this study, Frost & Sullivan would use the latest data available or make preliminary projections based on historical trends.

➤ Under circumstances where information was not available, Frost & Sullivan would use in-house modelling and simulation to arrive at an estimate.

➤ Sources of information are stated at the bottom on each page for reference.

Official Statistical sources

Market indicators for modelling

Industry Expert Interview

Frost & Sullivan's Methodology

- Frost & Sullivan is an independent global consulting firm, which was founded in 1961 in New York. It offers industry research and market strategies and provides growth consulting and corporate training. Its industry coverage in global market includes automotive and transportation, chemicals, materials and food, commercial aviation, consumer products, energy and power systems, environment and building technologies, healthcare, industrial automation and electronics, industrial and machinery, and technology, media and telecom.

- This study has been undertaken through extensive primary and secondary research including interviews with industry experts and market participants, and analysis of official public sources of data, figures, information and reports as well as Frost & Sullivan's independent database and research reports.

- Projected market sizes in this report are estimated through in-depth analysis of the historical macro-economic factors such as the country's economic growth and per capita disposable income, market drivers, future trends and market concentration.

- Bottom-up and top-down methods are applied to cross check and fine tune the obtained figures to arrive at the closest estimate.

- In preparation of the forecast data, Frost & Sullivan assumed that there will be a gradual resumption of economic performance globally during the forecast period, as supported by the (i) recovery of global GDP with a projected annual growth of approximately 5.9% in 2021 and 4.9% in 2022, according to the International Monetary Fund, (ii) commencement of COVID-19 vaccination program since 2021 globally that supports the recovery and normalisation of economic activities thereafter.

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Thank You!