

A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the  
NOVA – School of Business and Economics.

Evaluating NOS SGPS: A Network of Opportunities -  
Can 5G provide NOS with a competitive advantage?

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## Abstract:

This paper is dedicated to exploring the potential competitive edge that NOS could secure by attaining a leading position in the realm of 5G technology compared to its competitors. Focused on the telecommunications sector, the study employs detailed analysis, scenario assessments, and market evaluations to gauge the multifaceted advantages NOS might gain through its strategic advancements in 5G. Findings indicate that under a positive scenario, NOS's market valuation could exhibit a premium exceeding 8% when compared to the base scenario, signifying the profound impact of 5G leadership on the company's market performance and competitive advantage.

Keywords: Equity Research, NOS, Telecommunications, 5G

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### Investment Summary

The analysis recommends a BUY for NOS.LS, supported by a comprehensive Discounted Cash Flow model featuring detailed operational forecasts, implying a target price of €4.08, equivalent to a potential upside of 19.9%. Further consideration and reflection of this recommendation is supported by alternative valuation methods, which validate the recommendation provided, albeit suggesting a wider valuation range, €3.50 - €4.39.

### Competitive Market

The Portuguese telecom market has remained stable over the last decade and has a consensual low growth potential for the years to come. This is a result of its competitive, inelastic, and saturated nature, with infrequent changes in market share. Moreover, the consolidation of NOWO and Vodafone, poses a threat to NOS, introducing uncertainty as the company endeavors to maintain its market position within some of its already saturated core segments. Nonetheless, like its peers, NOS is continuously looking for new opportunities to leverage its platform.

### Technological Innovation

A growth driver for NOS is the deployment of 5G technology, after which NOS has recorded an increase in some of its core segments. The model also considers the development and investment in 6G, set to deploy in 2030, as a catalyst for renewed growth in key segments. NOS has also taken steps to adapt and integrate new customer preferences into its service offer, such as the integration of OTT streaming services and the creation of platforms like the UMA TV, which promise to keep NOS relevant.

### Macroeconomic Conditions & ESG

The combination of elevated interest rates and inflation, along with uncertain consumer confidence, exerts significant influence. This is particularly noteworthy in the context of the inelasticity of consumers, potentially leading to a short-term decrease in margins for telecom companies. Moreover, factors such as shifting demographic and preferences are making the market more dynamic. Also relevant is NOS's commitment to ESG which promises to enhance its relations with stakeholders.

**Recommendation:**

**BUY**

**Price Target FY24:**

**4.08 €**

**Price (as of 04-Dec-23)**

**3.40 €**

*Implied Upside:*

*19.9%*

52-week range (€)

€3.21 - €4.46

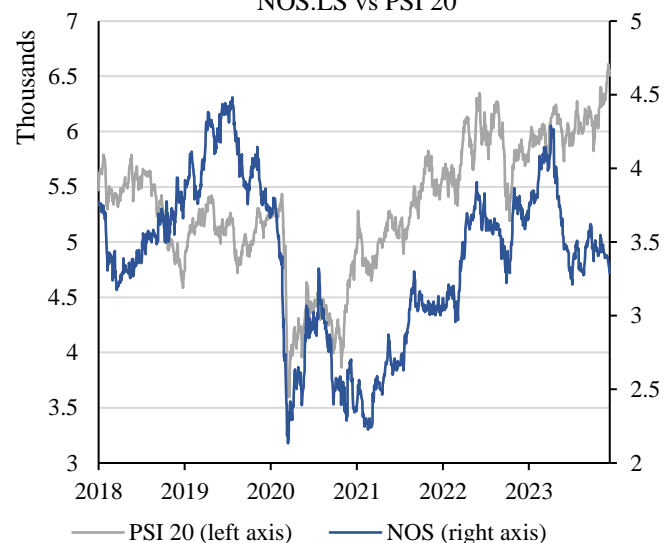
Market Cap (€m)

1.672B

Outstanding Shares (m)

511.4

Share Performance (EUR)  
NOS.LS vs PSI 20



(in € millions)	2021	2022	2023E	2024E
Total Revenues	1,430.3	1,521.0	1,588.4	1,606.0
%YoY	4.6%	6.3%	4.4%	1.1%
Total Costs	(812.3)	(869.9)	(876.6)	(913.8)
% of Revenues	56.8%	57.2%	55.2%	56.9%
EBITDA	618.0	651.1	711.8	692.2
EBITDA Margin %	43.2%	42.8%	44.8%	43.1%
D&A	419.5	480.9	468.7	461.7
EBIT	155.6	257.1	246.5	230.0
NOPAT	143.8	224.4	231.3	192.8
% of Revenues	10.1%	14.8%	14.6%	12.0%
CapEx	458.5	625.8	476.0	469.1

Source: Bloomberg (NOS.LS)

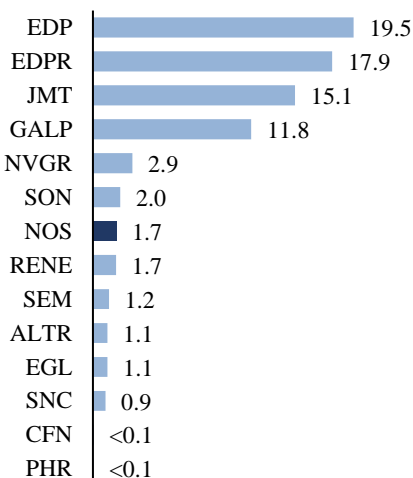
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**Figure 1.**

Market Cap. of PSI20 companies (EUR, in billions)



Source: Euronext Live

**Figure 2.**

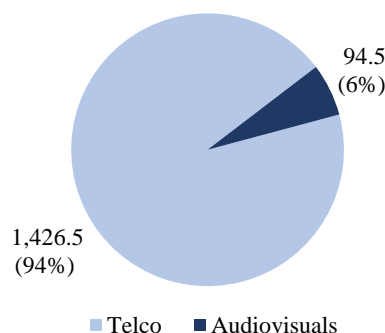
Board of Directors

Position	Name	Tenure
CEO	Miguel Almeida	10
CFO	João Costa	10
CTIO	Jorge Garça	8
Ex. Member	Manuel Eanes	10
Ex. Member	Luís Nascimento	6
Ex. Member	Daniel Beato	3
Ex. Member	Filipa Carvalho	3

Source: Company Website (nos.pt)

**Figure 3.**

Revenue Distribution by Segment (EUR, in millions)



Source: NOS Management Report

## COMPANY OVERVIEW

### Company Description

NOS SGPS is a prominent Portuguese telecommunications and entertainment group known for providing fixed and mobile solutions for television, broadband, voice data and IT, while also being the leader in cinematographic exhibitions in Portugal. The company has a market cap of €1.74 bn, and revenues of €1.58 bn (TTM), making it one of the biggest companies in Portugal and the 7<sup>th</sup> largest in the PSI 20 Index<sup>1</sup> (Figure 1).

Formerly known as “ZON Optimus”, the firm resulted from the merger of two of the country's largest communications companies at the time, ZON Multimédia and OPTIMUS Telecomunicações. The merger was announced in December 2012 and in August 2013, ZON OPTIMUS became an official company, significantly altering the landscape of the Portuguese telecommunications market as the resulting entity offered a more seamless and integrated customer experience (Brito, José, and Mesquita 2014). In May 2014, ZON OPTIMUS rebranded itself as NOS, marking a new chapter in the company's history.

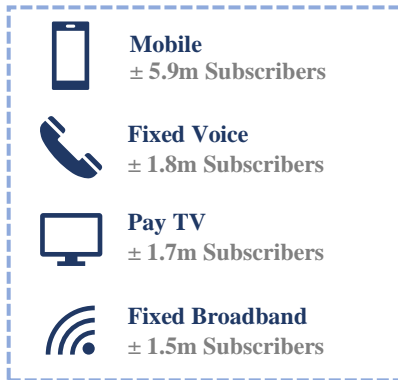
The current board of directors (Figure 2) is entirely comprised of members that played a role in the merger, either at the current position or in other leadership role. Since then, NOS has been developed its core operations in Continental Portugal, Azores, and Madeira, being also present in Angola and Mozambique. Currently, the NOS Group, hereby referred to as “NOS”, comprises 27 entities (NOS Comunicações, NOS Wholesale, etc.), 3 associated companies (Sport TB, Big Picture Films, etc.), and 8 jointly controlled companies (ZAP Media, Dreamia, etc.).<sup>2</sup>

In 2022, NOS made €1,521.0 m in revenues across two business segments: Telecom Services (Telco) and Media & Entertainment (Audiovisuals), Figure 3 presents a breakdown of NOS revenues by business segment in 2022. The company also holds non-core positions in Joint-Ventures with a combined revenue of €566.0 m.

<sup>1</sup> According to data retrieved from Euronext Live (live.euronext.com)

<sup>2</sup> A complete list is available in the “3Q 2023 Consolidated Management Report”, pg. 99-100

**Figure 4.**  
Telecom Service Offer and Individualized Subscriber Numbers



## Telecommunications Business

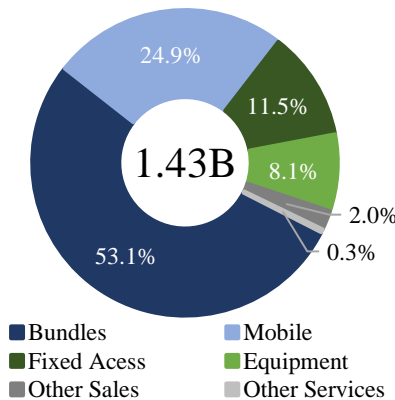
Diving into the telecommunications business, it serves all market segments providing fixed and mobile solutions for television, broadband, voice data and IT to Residential, Private, Corporate and Wholesale customers. As of Q3 2023, NOS had 11.0 million Revenue Generating Units (RGUs), 15.4% of which are defined as Business RGUs and 84.6% as Consumer RGUs.<sup>3</sup> The four main services provided by NOS in the Portuguese Telecom market are Mobile, Fixed Broadband, Fixed Voice and Pay TV.

Mobile services encompass cellular communication, allowing users to make calls, send texts, and access the internet on their mobile devices. The Fixed Broadband service delivers high-speed internet access to homes and businesses via wired connections. More commonly known as home phone, Fixed Voice is a service which provides traditional telephone connections through physical lines or cables. Pay TV is a service that offers a wide range of television channels and content for a subscription fee, including premium channels and on-demand movies, not available through free-to-air broadcasts.

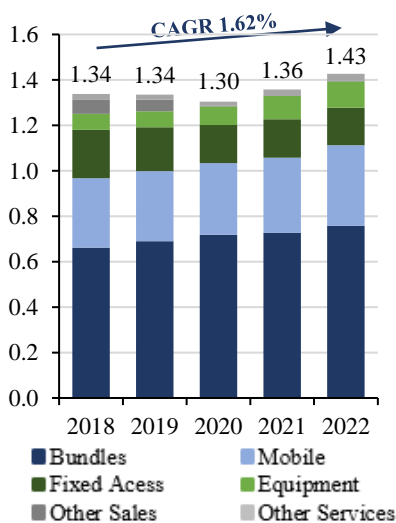
To provide a better and more convenient customer experience, NOS also provides the aforementioned services in several different bundles that combine those services into a single package, simplifying the billing process, often reducing individual service costs, and offering customers the flexibility to choose the services that best suit their needs. The most common bundles being offered in the market include Double Play (2P), Triple Play (3P), Quadruple Play (4P) and Quintuple Play (5P).

A 2P telecommunication package is the simplest bundle on the market and it only offers a mix of two core services, often a combination of either Pay TV and Fixed Broadband or Pay TV and Fixed Voice. As it is the most basic package, it tends to be the most budget-friendly option. The 3P bundles include three different services, being the three products offered consistently across all the telecommunication players. This package combines Fixed Broadband, Fixed Voice, and Pay TV into one offering. A Quadruple Play

**Figure 5.**  
Telco Revenue Breakdown FY 2022



**Figure 6.**  
Telco Revenue Breakdown 2018-22 (EUR, in billions)

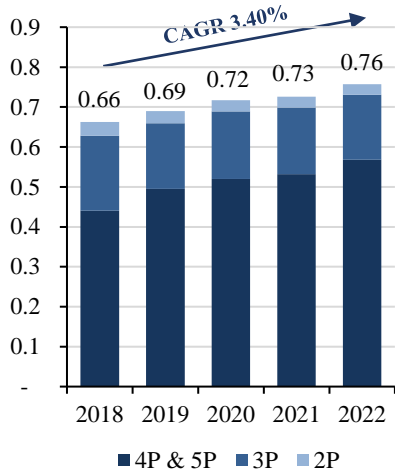


Source: NOS Management Report

<sup>3</sup> According to the “3Q 2023 Aggregate Indicators” published by NOS in its website (nos.pt)

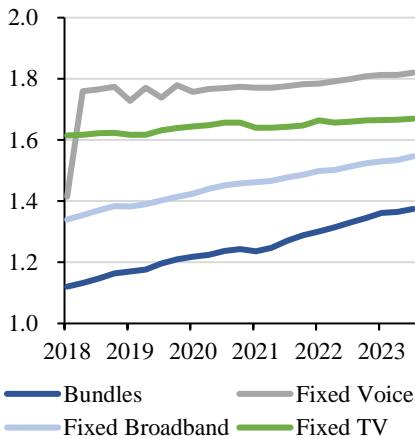
**Figure 7.**

Bundles Revenue Breakdown 2018-22 (EUR, in billions)



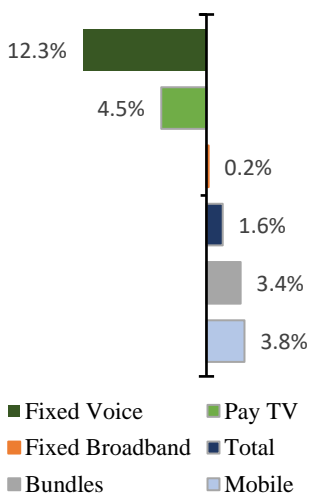
**Figure 8.**

Number of Subscribers per Segment (in millions)



**Figure 9.**

CAGR (%) 2018-22, by Telecom Service



Source: NOS Management Report

bundle expands on the 3P package by adding Mobile services to the previous mix of Fixed Broadband, Fixed Voice, and Pay TV. Usually, the Mobile services included in these packages come with a set of free SMS and calls, as well as mobile data. Finally, the 5P telecommunication packages are the most comprehensive ones available in the market, adding Mobile Broadband (such as a portable hotspot) to the aforementioned services.

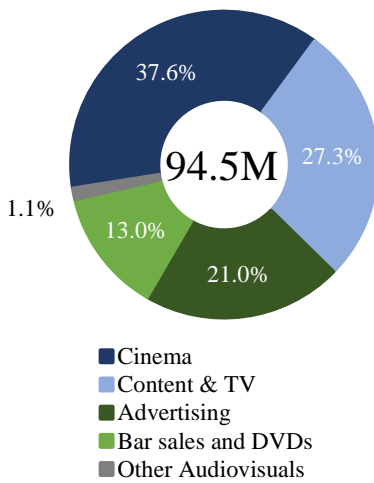
Among all the existing bundles, NOS sells the 2P, 2P + Mobile, 3P and 4P packages. Additionally, NOS also provides a special package tailored for sports enthusiasts, which extends the 3P and 4P bundles by offering different sports channel options that are not included in the standard packages. Furthermore, for its business segment, NOS offers an extended portfolio of telecommunications products and services which are tailored to the specific needs of each client, including Information and Communication Technology (ICT), Internet of Things (IoT), and Cloud Solutions. Additionally, NOS's cloud solutions enable businesses to leverage scalable and cost-effective cloud infrastructure for data storage.

In addition to the previously mentioned core services, NOS has also developed NOS Alarms and Playce. The NOS alarm system captures real-time videos, sends alerts in case of incidents or break-ins, notifies the police promptly whenever deemed necessary, and allows control of the home/business via the NOS Securitas app. Playce is an advertising format created for corporations which plays their ads before scheduled or manually recorded programs on NOS, MEO, and Vodafone boxes. Not only does Playce allow corporations to reach viewers of recorded content through unskippable ads, it also offers the flexibility to select the audience, timing, and location for their advertising, enabling targeted, relevant campaigns. These ventures not only showcase NOS's diversification but also demonstrate its commitment to delivering comprehensive solutions that cater to both security and advertising needs in the market.

Inside the telecom business, the Mobile and Bundle Services have been the main growth driver of NOS Revenues, with a Compound Annual Growth Rate (CAGR) 18-22 of 3.8% and 3.4% respectively. On the other hand, Fixed Voice, and Pay TV stand out with a CAGR of -12.3% and -4.5%.

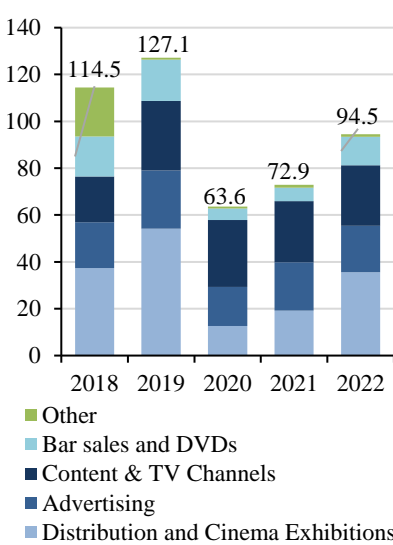
**Figure 10.**

Audiovisuals Rev. Breakdown  
FY 2022



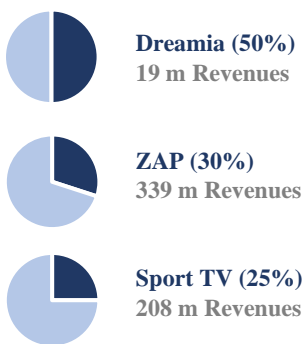
**Figure 11.**

Audiovisuals Rev. Breakdown  
FY 2022



**Figure 12.**

Main Joint Ventures, Revenue  
(2022) and Position Held (%)



Source: NOS Management Report

## Media and Entertainment Business

The Media and Entertainment Business, represents 6.2% of the total revenues (FY 2022). NOS holds a prominent position as a leader in the national cinema exhibition industry, with a 65.1% market share by admissions (ICA 2023). It also stands out for its showcase of alternative content in theatres, encompassing opera, ballet, theatre, football, concerts, and other live or recorded events. With 214 screens countrywide as of 2022, NOS Cinemas employs technologies like IMAX, 4DX, XVision, and ATMOS, enhancing the cinematic experience for its customers. Lastly, NOS Audiovisuals is also an important player in the distribution of audiovisual content, operating not only in Portugal but also extending its influence on other Portuguese-speaking regions, namely to Angola and Mozambique. By acquiring and managing their rights, this segment facilitates the distribution of films and series from independent producers and major studios to the audiences through various channels, including cinema, audiovisual platforms, and television.

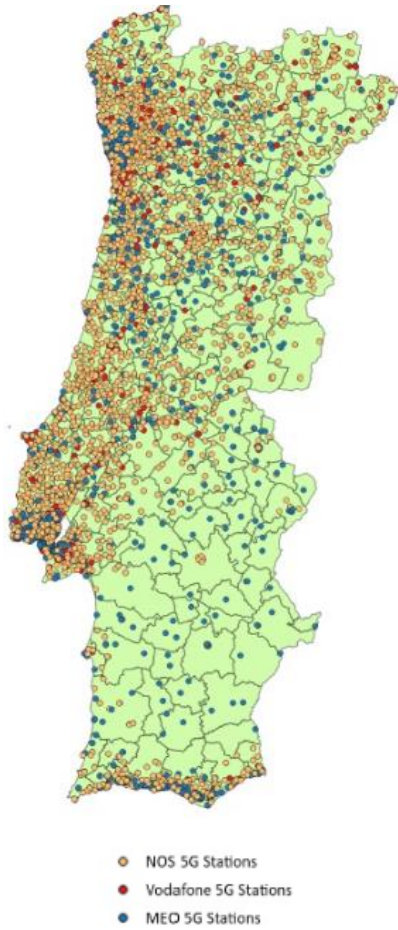
## Joint-Ventures

Of the 8 jointly owned ventures, 3 are particularly relevant. Dreamia is a joint venture between NOS (50%) and AMC Networks International Iberia, that produces children's television channels, shows and films, primarily operating in Portugal, Angola, Mozambique, and Cape Verde. Some of Dreamia channels include Biggs, Panda and Hollywood. ZAP is partially owned by NOS (30%) and by SOCIP<sup>4</sup> (controlled by Isabel dos Santos). ZAP provides a satellite-based subscription television service that covers countries from sub-Saharan Africa to southern Angola. Sport TV is the leading Portuguese platform for premium sports content. The company is equally owned by NOS, Olivedesportos, Vodafone, and MEO and holds broadcasting rights for coverage of sports competitions, and currently has 7 high-definition channels in Portugal, and an international channel, Sport.TV Africa.

The proceeds are registered under the Equity Method and have a residual impact in the accounts of NOS (under €2.5 m per year) and high historical

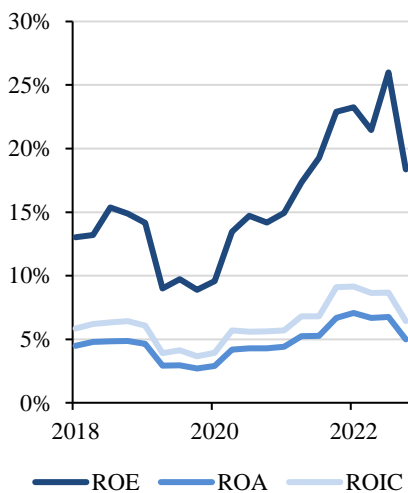
<sup>4</sup> Sociedade de Investimentos e Participações

**Figure 13.**  
5G Stations by Operator



Source: ANACOM

**Figure 14.**  
Profitability return ratios (in %)



Source: Company Website (nos.pt)

earnings volatility. However, they represent a strategic step in expanding services into Africa and securing the position as a leader provider in Portugal.

### Strategy & Innovation

NOS long run financial targets are supported by 3 main pillars of NOS innovation strategy. These pillars are verified by several awards and distinctions that NOS has received over the last years.

Primarily, NOS aims to assert its dominance as the market leader in 5G, investments in this direction have propelled NOS to cover 87% of the population. The company also established the 5G Hub, a catalyst for innovation, including the creation of several solutions resulting in initiatives such like NOS Apps, and the awarded Total Wi-Fi solution. This is a testimony to NOS strategy to stay updated on any technological advancements to retain and attract new customers. More on this topic and how it correlates with its peers is analysed in the Industry Analysis section.

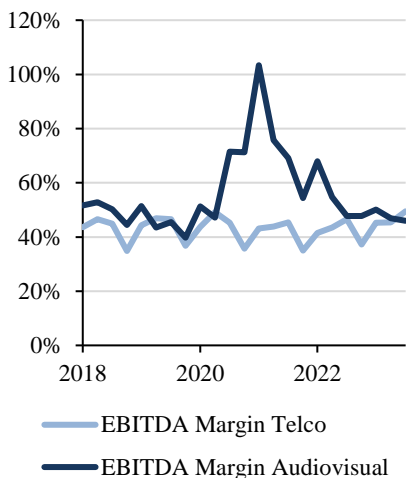
NOS has also strategically fostered the integration of product offerings, including alarms, the UMA TV platform, subscription-based content, and electronic invoices (adopted by 78% of customers). According to the management, the strategy intends to create an ecosystem, dynamizing the inclusion of advertising and OTT services, which have seen an increase in demand over the last few years. This includes the settlement of several relevant partnerships and agreements. More on this topic is discussed in the Industry Analysis and Valuation, to reflect on its effects more granularly on key operational metrics.

Finally, NOS is also dedicated to advancing sustainability initiatives and improving its ESG score across several dimensions. Examples include the establishment of a second-hand marketplace for mobile phones, emissions reduction efforts, and programs focused on employee valorisation. This topic is extensively discussed on the ESG section of this report.

### Financial Analysis

During the 1Q of 2020, NOS faced several financial challenges mainly because of the pandemic. As seen in Figure 14, key indicators such as ROE, ROA, and ROIC decreased respectively from 14%, 5% and 6% to 9%, 3%

**Figure 15.**  
EBITDA margin across segments



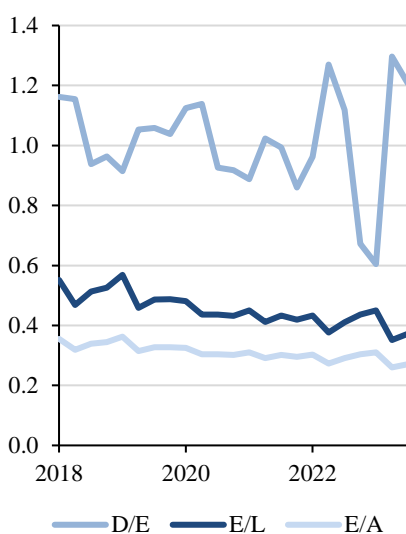
Source: Company Website (nos.pt)

and 4%. Additionally, there was a decrease in profitability margins. Particularly, the net income margin achieved a value of -3%.

Indeed, the results of this period revealed an overall decrease in the firm's total revenues, especially in the audiovisual sector where there was a 33% drop, partially explained by the enforced closure of cinemas due to pandemic-related restrictions.

From the 4Q of 2020 until the 2Q of 2023, the firm was generally able not only to recover from the effects of the virus but also to continue improving its profitability. In fact, in the 2Q of 2023, ROE equalled 26%, marking the highest value attained since 2018. During this period, shareholders received an ordinary dividend payment of 27.8c per share and an extraordinary dividend of 15.2c associated with the sale of a tower in 2022.

**Figure 16.**  
Capital Structure Ratios

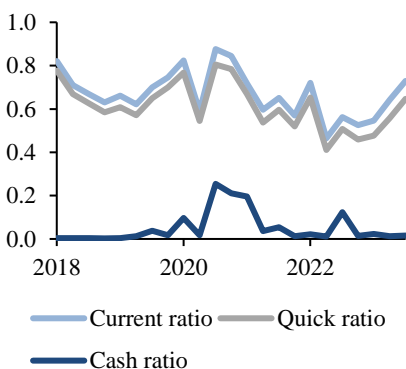


Source: Company Website (nos.pt)

Figure 15 presents the EBITDA Margin per segment. Unlike most quarters, in 3Q of 2023 the telecom segment presents a higher margin of 49.5% versus 46.0% for the audio-visual segment, resulting in a total EBITDA margin of 49.2%. The historical analysis suggests a very slight improvement in margins, with a clear seasonality effect that improves margins in the first half of the year due to inflationary price updates and other fluctuations of the business model (feudalization contracts, wages, etc.).

NOS has notably increased its capital expenditures, reaching 71% of revenues in the 4Q of 2021 related to the investment in the 5G network and respective licenses. According to the management, this investment phase is expected to have been finalized and only maintenance-level capital expenditures are foreseeable yet. However, NOS has significantly increased its debt levels as a result, reaching a high Book Value D/E ratios of 1.2 in Q3 2023. The management commented on the increase by compromising itself to keep the leverage ratio below 2.4x EBITDA (2.0x when excluding leasings), demonstrating a belief in the company capability to keep sustainable debt levels, Figure 16 shows the variation in this metric.

**Figure 17.**  
Liquidity Ratios

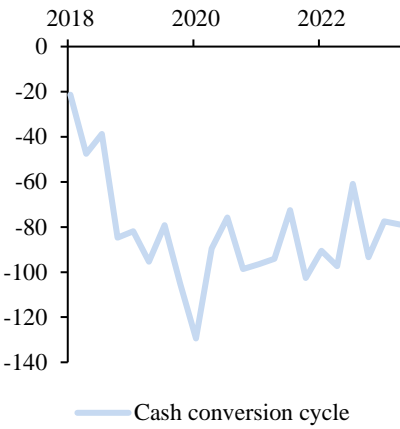


Source: Company Website (nos.pt)

The quarterly current ratio remained below one (Figure 17). Even though an initial interpretation might suggest potential issues in meeting short-term obligations, it is relevant to note that the capital-intensive nature of the industry in which NOS operates hinders an improvement of these ratios.

**Figure 18.**

Cash Conversion Cycle (in days)



Source: Company Website (nos.pt)

In the 2Q of 2023, the solvency ratio was 0.35, the lowest value since 2018, possibly due to an increase in dividend payment, which equalled €220 m in the first half of 2023. Nonetheless, even for an industry such as telecom, finding an equilibrium between liquidity and solvency or, in other words, between investment that allows for growth and liquidity essential to maintain daily operations, is a key factor for sustainable growth.

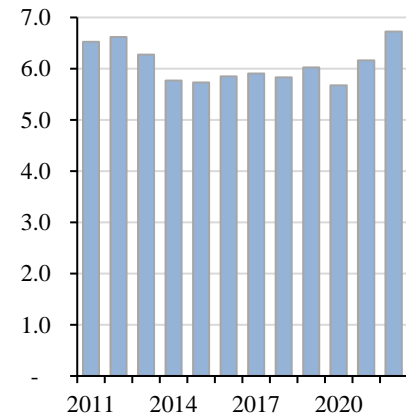
Historical data illustrates a seasonal pattern in the cash conversion cycle, with increases observed in the first quarter and decreases in the fourth quarter. From 2018 until the first quarter of 2020, there was a negative trend in this metric, which has since reversed, suggesting a potential return of this measure to its initial value of approximately -21 days (Figure 18). NOS consistently maintained a negative cash conversion cycle, highlighting its ability to collect cash from its clients and transform its inventory into cash at a higher pace than it needs to pay its suppliers.

## INDUSTRY OVERVIEW

Moving into the dynamics of the markets in which NOS operates, Portugal's telecom industry has witnessed significant transformation and growth, driven by technological advancements and evolving consumer behaviours. While NOS primarily operates in the telecom sector, it's worth noting that the company holds a dominant position in the Portuguese cinema industry. Therefore, this analysis will encompass both these sectors, providing a comprehensive understanding of NOS and its diverse market influence.

**Figure 19.**

Global Revenue Telco in Portugal (EUR, in millions)

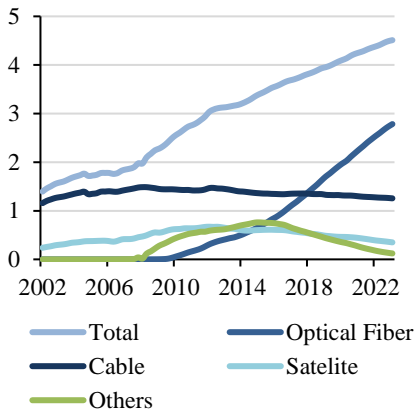


Source: ANACOM

### Telecom Industry

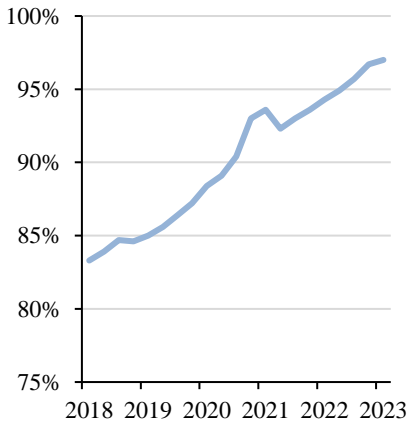
The telecommunications industry in Portugal has evolved into a dynamic and crucial component of the nation's socioeconomic landscape. In 2022, according to ANACOM (2023h), this sector generated a revenue of over €6.7 billion (Figure 19), the majority of which derived from the bundled services and the individualized mobile services. Over the past few decades, Portugal has undergone a telecommunications revolution, characterized by advancements in technology, robust competition, and a commitment to meeting the diverse needs of consumers and businesses alike.

**Figure 20.**  
Pay TV Services Subscribers  
(in millions)



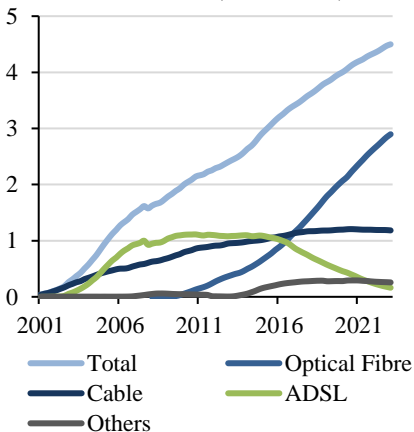
Source: ANACOM

**Figure 21.**  
Pay TV Penetration rate per 100  
households (%)



Source: ANACOM

**Figure 22.**  
Fixed Broadband Services  
Subscribers (in millions)



Source: ANACOM

Digging deeper into the telecom landscape of Portugal entails an examination of the range of services offered, the regulatory frameworks in place, and the emerging trends that shape the industry's ever-changing scenery. From the rollout of high-speed broadband to the advent of 5G networks and beyond, the Portuguese telecom industry continues to pave the way for a digitally connected future. The following data was retrieved from the market regulator, ANACOM.

### Pay TV

In Portugal, unlike most countries, television by subscription is the telecommunications service that is most commonly bundled in packages, rather than internet access. Additionally, consumers favour offers that include access to a wide range of channels, typically numbering between 120 to 160 (Luz 2023). Key drivers in this sector include content diversity, competitive pricing, and the shift towards over-the-top (OTT) platforms, which is increasingly becoming a major threat to the market.

Nonetheless, this service has maintained a consistent growth trajectory since 2002 when the total number of Pay TV subscribers stood at just under 1.4 million. Over the course of 21 years, it has surged to exceed 4.5 million subscribers (Figure 20) and reached 97% of households in 2023 (Figure 21).

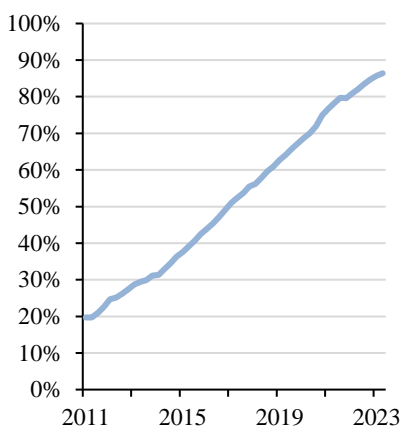
Since 2008, one of the primary catalysts for this growth has been the rapid adoption of optical fibre (Fiber to the Home – FttH) technology. This surge was attributed not only to the acquisition of new customers but also to existing customers transitioning from other networks to optical fibre, outpacing the growth rates of other technologies as they gradually phase out. As can be seen in Figure 20, FttH has solidified its position as the dominant access method for Pay TV services since 2018. By the close of the first quarter of 2023, it commands the lion's share, accounting for 61.7% of the total subscriber base. Meanwhile, Cable TV (27.8%), Satellite TV (7.8%), and ADSL (2.7%) maintain notable, albeit smaller, roles within the market.

### Fixed Broadband

The fixed broadband industry in Portugal has witnessed remarkable growth over the years. The number of fixed broadband subscribers has steadily risen

**Figure 23.**

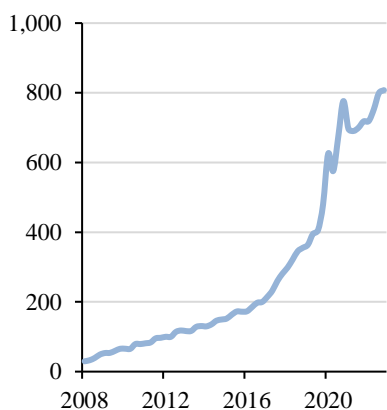
Fixed Broadband Penetration rate per 100 households (%)



Source: ANACOM

**Figure 24.**

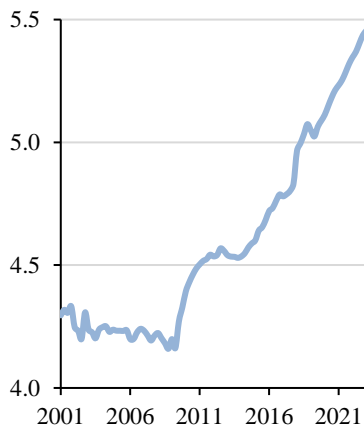
Fixed Broadband Traffic per Access per quarter (in thousands of GBs)



Source: ANACOM

**Figure 25.**

Fixed Voice Services Accesses (in millions)



Source: ANACOM

to 4.5 million (Figure 22), reflecting the increasing demand for high-speed internet access. Portugal boasts a high fixed broadband penetration rate, extending its coverage across both urban and rural areas, effectively reaching over 86% of all households in the country (Figure 23). This growth can be attributed to continuous infrastructure development and government initiatives aimed at bridging the digital divide. Overall, fixed broadband penetration is predicted to expand in the following years as a result of the growth of national broadband coverage.

There was also a significant and steady increase in fixed broadband traffic over the years, driven not only by the increasing number of accesses but also by the increase in usage intensity. Furthermore, the average traffic per access drastically intensified during the pandemic, as can be seen in Figure 24. However, starting from the third quarter of 2021, the pandemic's influence on the average data usage per connection decreased, and it is possible to see a gradual return to the growth patterns observed before the pandemic.

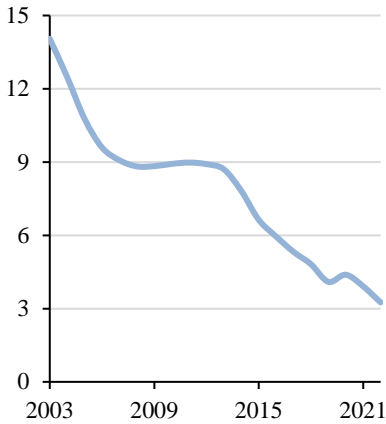
In terms of broadband speed, 89% of fixed broadband accesses were classified as ultra-fast broadband, offering download speeds greater than or equal to 100 Mbps. Portugal ranked fourth in the EU in July 2022 for the proportion of accesses with download speeds exceeding 100 Mbps. The growth in ultra-fast broadband access was primarily driven by the development of optical fibre networks (FttH).

### Fixed Voice

Fixed telephone services have reached nearly every household in Portugal, with approximately 96.8% of households having access to this service. This demonstrates the widespread availability of fixed telephony in both urban and rural areas. The number of Fixed Voice Accesses remained somewhat stable until the introduction of bundled services and unlimited data offers in 2008. This introduction played a significant role in driving a positive growth trend for this service, which totalled around 5.4 million accesses in the first quarter of 2023 (Figure 25).

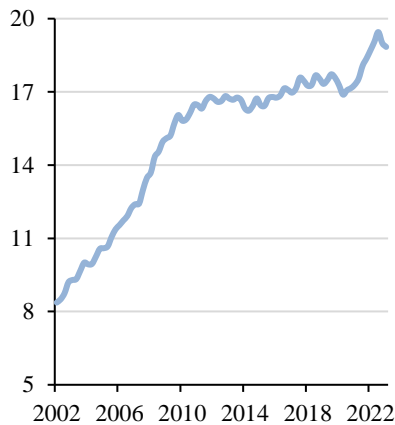
Even though the total access to this service is still showcasing positive trends, the fixed voice traffic reveals significant declines over the last two decades. Starting from 2013, there was a consistent decline in traffic generated from

**Figure 26.**  
Fixed Voice Traffic  
(in billions of minutes)



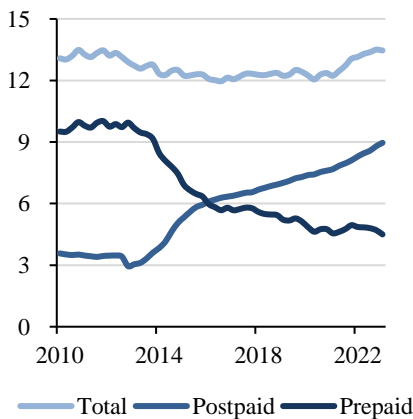
Source: ANACOM

**Figure 27.**  
Mobile Services Accesses  
(in millions)



Source: ANACOM

**Figure 28.**  
Mobile Services Accesses  
actually used (in millions)



Source: ANACOM

the fixed network (Figure 26). This was due to the increased adoption of 4/5P bundles (which include mobile services) and the growing prevalence of new communication methods through the Internet. The pandemic also had its impact on fixed telephone services, briefly disrupting this downward trend, however, as pandemic-related restrictions were gradually lifted, the traffic reverted to its declining path.

In summary, Portugal's fixed telephone services have achieved widespread accessibility but face a notable decline in fixed voice traffic due to evolving consumer preferences.

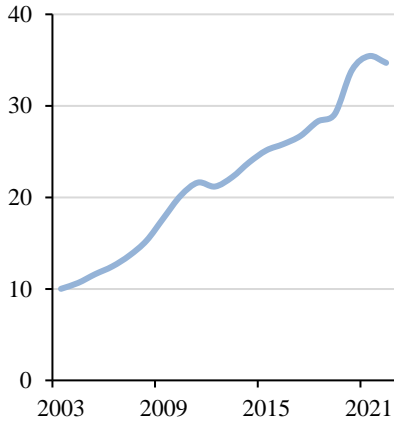
### Mobile Services

Portugal has a high mobile service penetration rate, with 180.8 mobile service subscriptions per 100 inhabitants, totalling 18.8 million accesses (Figure 27). Excluding data-only connections (M2M), this rate stands at 129.2 subscriptions per 100 inhabitants, meaning that there are 13.5 million mobile accesses being used. Mobile subscription penetration in Portugal is expected to increase in the next years sustained by a continuous increase in smartphone & M2M/IoT subscriptions as well as in multi-SIM ownerships.

Over the past 10 years, the number of mobile services with actual use has remained somewhat stable, presenting a CAGR of 0.68%. Until 2013, the prepaid plans played a major role in growing these mobile services subscriptions, representing over 76% of the total subscriptions (Figure 28). However, with the introduction of 4/5P bundles, it is possible to observe a reverse trend, as postpaid plans are now responsible for the continuous growth of this service, representing more than two-thirds of all active connections.

Mobile Voice traffic has exhibited consistent growth rates over the past few decades, with a CAGR of 6.8% from 2003 to 2022. Similar to Fixed Voice, Mobile Voice traffic saw a significant upswing during the pandemic, recording a 16.4% increase in 2020. However, as the pandemic's impact on Mobile Voice traffic diminished by mid-2021, there was a noticeable decrease in total traffic in 2022, amounting to a decline of 2.1% (Figure 29).

**Figure 29.**  
Mobile Voice Traffic  
(in billions of minutes)



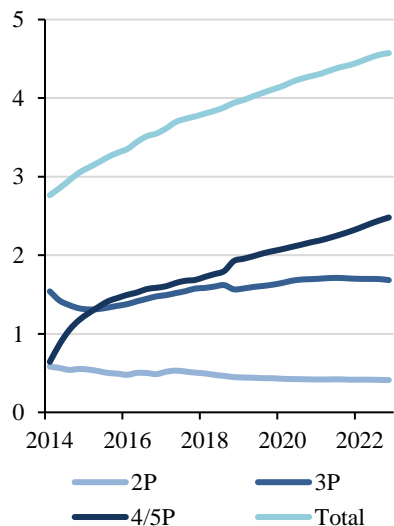
Source: ANACOM

Mobile broadband services counted a total of 9.9 million users in the initial quarter of 2023, translating to a penetration rate of 95.3 connections per 100 inhabitants. Unlike voice traffic, the pandemic had an adverse effect on mobile broadband, with reduced demand as people stayed home. However, from the first quarter of 2021 onwards, mobile broadband has witnessed substantial growth, possibly attributed to the easing of pandemic restrictions and the government's "Digital School Program", which involves equipping students with digital tools like hotspots and SIM cards.

Mobile broadband Internet traffic has seen exponential growth, fuelled by an expanding user community and heightened usage levels. In the first quarter of 2023, the average monthly data consumption per mobile broadband user reached 8.8 GB, showcasing a substantial 249% surge compared to only four years ago.

The current investments of telecom firms in 5G network enlargement are likely to create a golden occasion for both customers and businesses to leverage 5G services, as well as for operators to obtain higher ARPS due to 5G plans. As of the end of the first quarter of 2023, it is estimated that 16.3% of mobile internet users had adopted the 5G services, amounting to 1.6 million users and a penetration rate of 15.6 users per 100 inhabitants. Additionally, it is also assessed that 5G traffic accounted for approximately 7.9% of the overall mobile data traffic.

**Figure 30.**  
Bundled Services Subscribers  
(in millions)



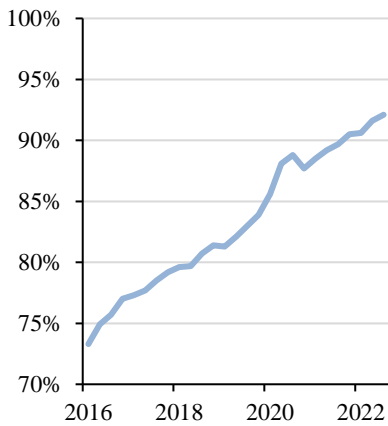
Source: ANACOM

### Bundled Services

Rather than buying these services individually, consumers have the opportunity to attain all of the aforementioned services in bundles. For that reason, some individualized services' subscribers have been showcasing slower growth, as the number of bundled services subscribers has been increasing steadily, showing positive growth rates every quarter for the past 10 years. As of the end of the first quarter of 2023, it reached a total amount of 4.57 million subscribers (Figure 30), achieving an estimated residential penetration of service bundles of 92.1 per 100 households (Figure 31). Over the past years, this growth is mainly attributable to the 4/5P bundles, as more people transition from the old and smaller packages to a full plan including all the services. The 2P bundle subscriptions have been decreasing almost

**Figure 31.**

Bundled Services Penetration rate per 100 households (%)



Source: ANACOM

every quarter for the last decade, while the 3P bundle subscriptions have remained somewhat stable until the first quarter of 2022, when it started a downward trend. With that being said, the 4/5P packages were the most widely adopted, boasting 2.48 million subscribers (half of all bundle subscribers).

In the first quarter of 2023, bundled services generated revenues totalling €494 m, which accounted for slightly over half of the total retail revenues, at 51.9%. Following closely were retail revenues directly attributed to mobile services, making up 33.9% of the total.

Delving further into the breakdown of bundled services revenues, the 4/5P packages stood out, representing two-thirds of the total bundled services revenues. In specific terms, these packages were responsible for 34.6% of the overall revenues in the industry.

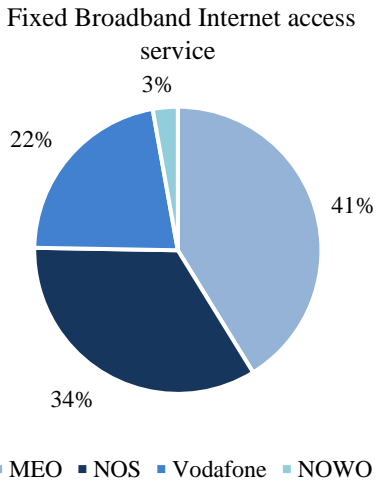
Regarding mobile services, as of the first quarter of 2023, single-play offers constituted 69.7% of the total accesses, with the remaining 30.3% being bundled with fixed services. Although the number of mobile accesses not integrated into bundled services remains notably high, there is a clear decline as more consumers opt for integrated services within bundled offers.

### Competitors

Within the Telecom industry in Portugal, Altice, previously known as Portugal Telecom (PT), is one of the major players and, consequently, a significant competitor for NOS. It is a multinational cable, telecommunications, fibre, content, and media firm that operates in Western Europe, the US, and Overseas Territories. Currently, Altice Group is facing significant pressure from its investors to reduce its large debt which surpasses €55 bn. Nonetheless, during the first six months of 2023, its total revenues increased 6% compared to the same period in the previous year, which was partially the consequence of a positive performance within segments among which residential mobile services, residential equipment, business services and media.

In the past, PT was the only national telecommunication operator, responsible for the first experimental emission of cable TV in the country.

**Figure 32.**



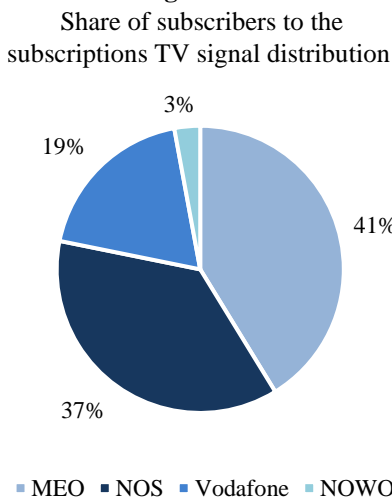
Source: ANACOM

However, in the mid-90s, the liberalization of the telecom market in Portugal resulted in the ending of the monopoly, creating space for competitors. Currently, it has several brands, among which Sapo, MEO, Unitel and Altice Labs. Moreover, in the first half of 2023, it attained the highest share of subscribers among all types of offers: 2P (45.1%), 3P (39.3%) and 4/5P (42%).

Another worth mentioning NOS’s competitor is Vodafone Group, a British multinational telecommunications firm present in Europe and Africa. Its retail and service operations are divided into three business lines: Europe Consumer, Vodafone Business and Africa Consumer.

In February of 2022, Vodafone Portugal, due to a cyberattack, suffered a network outage which impacted the data network as there was a loss of some TV services, enterprise business operations, as well as voice and data services. The firm stated that the direct costs associated with the attack were not highly significant (approximately €5 m).

**Figure 33.**

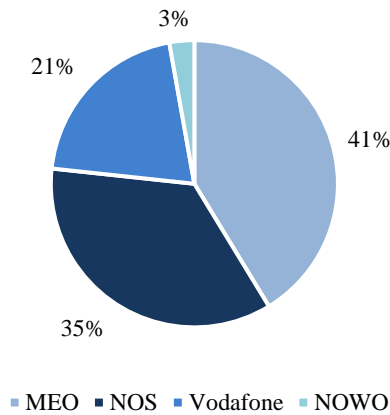


Source: ANACOM

Although with a considerably lower market share than NOS, NOWO is typically considered as the fourth largest telecom firm in Portugal. It was established in 2016 after a rebranding of Cabovisão which was created in 1993. This rebranding resulted not only in a change in the brand image but also in the packages' prices and quality.

In September of 2022, Vodafone Portugal announced a deal for the purchase of NOWO and revealed its expectation that the transaction would be concluded during the first semester of 2023, which didn’t occur. In fact, the case is still being processed by the Authority of Competition (Adc). A comprehensive inquiry is being conducted by the latter as the existing elements signal that the joining of both firms might create obstacles to the telecom competition. One issue raised was that the acquisition of NOWO might take out of the market the firm with the lowest prices. Nonetheless, Vodafone Portugal released its beliefs that the concerns regarding the purchase of NOWO are unfounded and that the acquisition will take place in the second semester of 2023.

**Figure 34.**  
Share of bundle subscribers



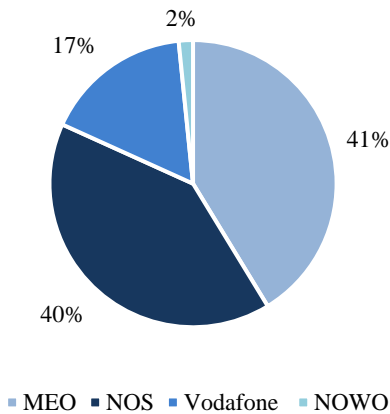
Source: ANACOM

Regarding the 4G network’s quality, NOS, on average, provides the fastest internet but is followed closely by Altice Portugal and Vodafone Portugal. Nonetheless, Vodafone is considered the fastest in uploading.

As seen in Figure 32, concerning the fixed broadband Internet access service markets, in the first quarter of 2023. MEO’s share of subscribers was the highest and consisted of 41%, followed by NOS, 33.9%. Still, within this period, this firm was the operator with the highest share of active mobile accesses with actual use, 38.6%, followed by NOS, 29.3%. The Herfindahl-Hirschman index, which measures the level of concentration, followed the ongoing negative trend that began in 2014, although it remained considerably high. As for shares of subscribers to the subscription of TV signal distribution services in the same period, MEO remained once again in first place (41.2%) (Figure 33).

Replacing MEO as the typical number one firm in the sector, NOS, in the first quarter of 2023, conquered the highest share of mobile broadband Internet traffic (36.3%), leaving Vodafone and Altice Portugal in second and third place with 35% and 27.8% respectively.

**Figure 35.**  
Share of revenues from bundled services



Source: ANACOM

As of the first semester of 2023, as suggested by Figure 34 MEO achieved 41.3% regarding market share of bundle subscribers, while NOS positioned itself as the second firm with the highest percentage, equalling 35.4%. Both MEO and Vodafone Portugal accomplished an increase in these values when compared with the same period in the previous year. The opposite happened for NOS and NOWO, although only the latter suffered, in net terms, a decrease in bundle subscribers. Still, in the first half of 2023, MEO realized the highest share of revenues resulting from bundled services (41.2%), and NOS the second highest (40.4%) (Figure 35). Concerning the same period in the previous year, NOS increased its share of revenues, Altice Portugal didn’t change, while NOWO and Vodafone suffered a decrease. Following the Herfindahl-Hirschman index, within the first half of 2023, concentration in the telecom industry didn’t suffer a significant change after the start of 2018 and remains high. The type of offer 4/5P presented the highest level of concentration although with a decreasing trend.

Overall, NOS seems to position itself as the second-strongest telecom firm in Portugal. Nonetheless, it is important to notice that within this fast-changing world, there is no such thing as a safe position and, consequently, to maintain or improve in the ranking, continuous innovation is mandatory as well as being aware and anticipating the next moves of competitors. Altogether, Portugal possesses a competitive telecommunication market that allows consumers to benefit from a larger variety and increased quality of products and services.

### Porter’s Five Forces Analysis

To provide a comprehensive overview of the competitive landscape within the Telecom Industry, a Porter's Five Forces analysis was conducted. By examining the forces of rivalry among existing players, the bargaining power of buyers and suppliers, threats of substitutes, and barriers to entry, this analysis aims to clarify the underlying market dynamics shaping the industry.

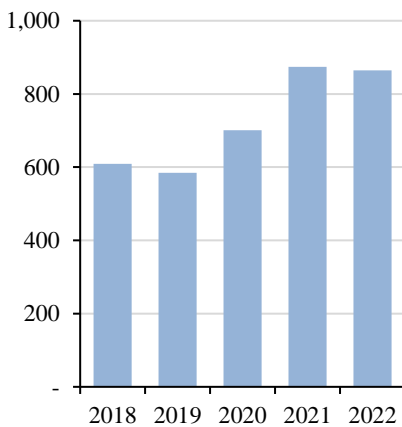
For a newcomer to establish its presence within the Telecom industry, substantial capital investments are required. In fact, in 2022, over €850 m were invested in this industry according to ANACOM (2023h). Additionally, gaining access to licenses and permits that are mandatory to operate represents complex proceedings that can take a significant amount of time to execute. Even after a firm can obtain those licenses and enough credit to invest in capital, the giant established firms highly benefit from economies of scale, translating into difficulties in meeting the offers of competition.

Firms within this sector possess a significant variety of suppliers to choose from, reducing the dependency on a small number of firms. The fact that suppliers exist in large numbers motivates competition and therefore creates better opportunities for Telecom firms to pick their providers. Nonetheless, due to the nature of the industry, Telecom equipment is essential to its performance, meaning that any disruption in the supply can cause critical consequences.

For the consumers of this industry, information regarding offers from competitor firms is easily accessible. For residential buyers, the switching costs are moderate as, although the process is relatively easy, the automatic monthly payment creates in some private consumers an irrational behaviour

**Figure 36.**

Telecom Industry Investment in Portugal (EUR, in millions)



Source: ANACOM

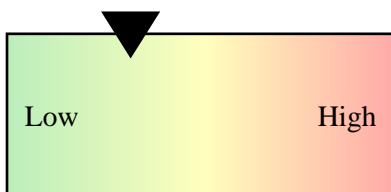
**Figure 37.**

Threat of new entrants



**Figure 38.**

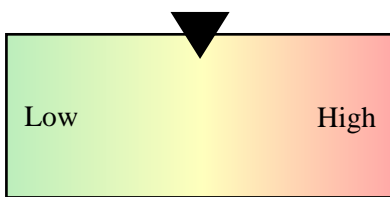
Bargaining power of suppliers



**Figure 39.**  
Bargaining power of buyers



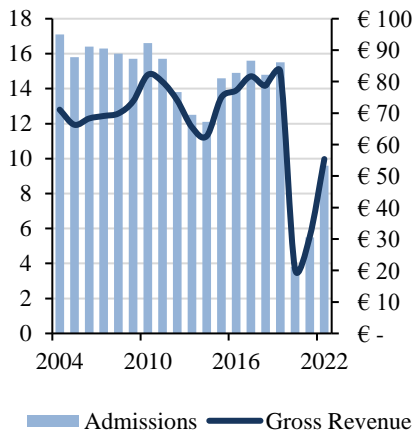
**Figure 40.**  
Threat of new substitutes



**Figure 41.**  
Competitive rivalry



**Figure 42.**  
Admissions and Gross Revenue  
Evolution (in millions)



Source: ICA

of delaying switching from one operator to another, even if they are aware of the benefits. Additionally, telecom companies often require a two-year contract, further influencing consumers' decisions. Regarding small enterprises, they tend to look out for ways to minimize costs, and so have lower switching costs. As for the corporate buyers, given that they have personalized services and products, switching costs are high.

While there are no direct substitutes for traditional telecom services like mobile and fixed-line connections, the growing availability and adoption of OTT services, such as Voice over IP (VoIP), messaging apps, and streaming platforms have introduced moderate to high substitution threats. Consumers can use these OTT services for communication, which can reduce the reliance on traditional telecom services.

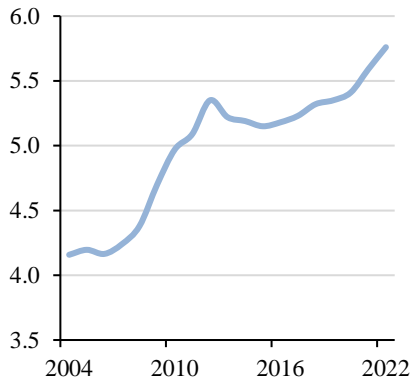
The competition within this sector is high among the few major players and often creates pricing wars to attract and retain consumers and the need for continuous technological investment.

All in all, given the abovementioned reasons, the Telecom Industry presents high barriers to entry, low to moderate bargaining power of suppliers, high bargaining power of buyers, a moderate threat of substitutes and intense competition among existing players. Thus, companies operating within this sector are advised to prioritize enhancing customer value, innovating, and differentiating themselves from their competitors in order to ensure a robust competitive position and be able to achieve a sustainable competitive advantage.

### Cinema Industry

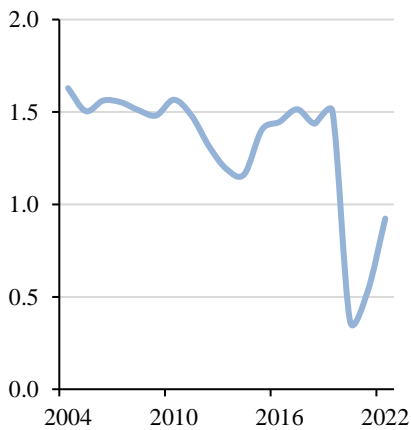
The Cinema industry in Portugal has been a prominent part of the country's cultural and entertainment landscape for decades. This industry encompasses the production, distribution, and exhibition of films, serving as a source of entertainment and cultural expression. Over the years, the industry has experienced various trends, challenges, and opportunities that have shaped its current landscape. The following data was retrieved from Instituto do Cinema e do Audiovisual (ICA).

**Figure 43.**  
Average Ticket Price  
(EUR)



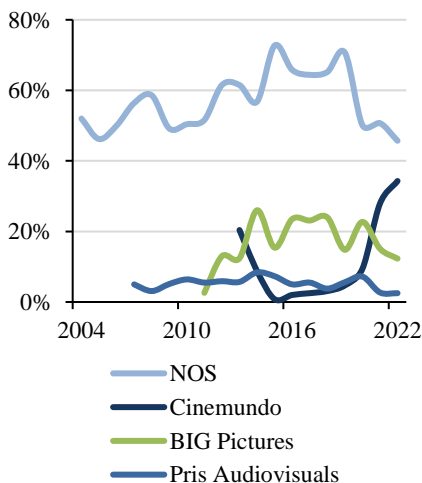
Source: ICA

**Figure 44.**  
Average Admissions  
per capita



Source: ICA

**Figure 45.**  
Distributors' Market Share Evolution  
Top 4 players (%)



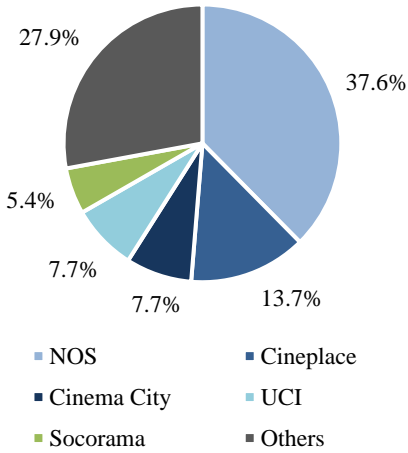
Source: ICA

The Portuguese Cinema industry has maintained a relatively steady course over the past few decades, demonstrating a CAGR of 1.05% from 2004 to 2019. Remarkably, the peak of this industry was reached in 2004, recording an all-time high in total admissions, which stood at 17.1 million (Figure 42). Following that point, the industry witnessed a modest decline until 2013, at which point this trend reversed, giving way to a new upward trajectory that persisted until the onset of the pandemic. In the context of this subdued growth, it becomes evident that the principal factor driving expansion in the industry has been the progressive increase in ticket prices (Figure 43). Over the aforementioned period, ticket prices have risen by more than 28%, playing a critical role in boosting industry revenues and offsetting the decline in the number of admissions (Figure 44). In 2020, the cinema industry experienced a significant downturn due to the closure of cinemas amid the pandemic and the subsequent imposition of restrictions. Nevertheless, the sector has since displayed a commendable recovery and is poised to continue its upward trajectory towards pre-pandemic levels.

In the realm of cinema distributors, Portugal is home to several major players. Among them, three prominent competitors, NOS, Cinemundo, and BIG Pictures 2 Films, have dominated the market, holding more than 90% of the total admissions over the past 10 years. In particular, NOS has emerged as a historical market leader, consistently occupying a prominent position in this industry. As different players have entered and exited the scene over the last two decades, NOS has demonstrated resilience, consistently securing the top spot and often commanding over 50% of the market (Figure 45).

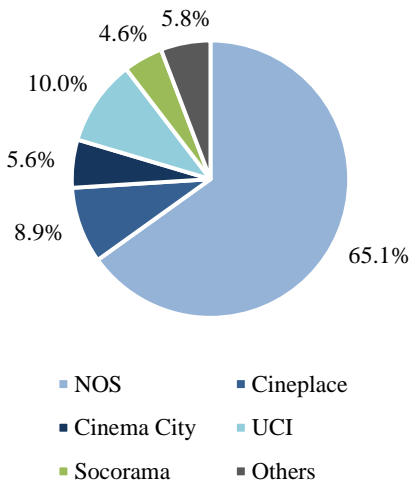
However, the onset of the pandemic in 2020 brought about a notable shift. NOS, while maintaining its top 1 status, saw a decrease in market share from 70.7% to 50.1%. Furthermore, in 2021, Cinemundo took over the distribution of the Warner Bros catalogue in Portugal, a responsibility that was previously held by NOS creating an opportunity for the competitor to seize a significant portion of the market (Marques 2021). Cinemundo's rapid ascent during the past couple of years, linked with a decrease in market share for BIG Pictures, marked a unique phase in the industry's trajectory.

**Figure 46.**  
Screens by Exhibitors  
(2022)



Source: ICA

**Figure 47.**  
Admissions by Exhibitors  
(2022)



Source: ICA

As of 2022, NOS continues to lead the pack with a 45.7% market share, facing closer than ever competition from Cinemundo, which holds 34.3%. The industry's response to the pandemic and the subsequent redistribution of market shares highlights the resilience and adaptability required for sustained leadership in this dynamic sector.

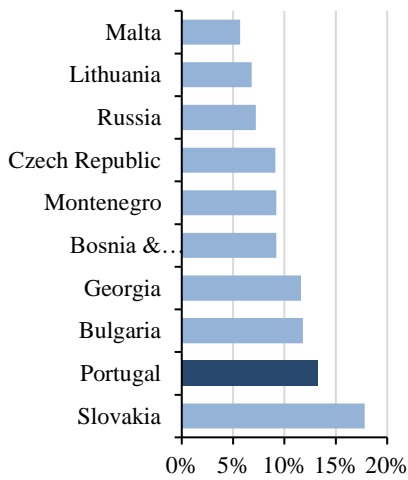
In terms of cinema exhibitors, NOS has also established itself as a market leader, managing an expansive network of over 200 screens throughout the country. This substantial presence translates to a significant 37.6% share of the total screens in Portugal (Figure 46). Notably, NOS engages in the distribution of both Portuguese and international films, providing a comprehensive cinematic experience to the audience. Alongside NOS, other major contributors to the cinema landscape include Cineplace, Cinema City, UCI Cinemas, and Socorama, collectively enhancing the diversity of film offerings available in Portugal. It's worth highlighting that NOS's screen count surpasses that of the remaining top five competitors combined, underscoring its dominant position in the market. Furthermore, while representing just above one-third of the total screens in Portugal, according to ICA, NOS commanded an impressive 65.1% market share in admissions for the year 2022 (Figure 47).

When examining a more recent timeframe, Portugal has showed significant growth in its audiovisual market, ranking among the top 10 in Europe with an average recorded growth of 13.2% from 2015 to 2019 (Figure 48). The introduction of a cash rebate incentive system in 2018 has further fuelled production activity. However, Portugal's cinema and audiovisual sector faces challenges, such as a limited domestic market, weak ties with global Portuguese-speaking markets, and low market share for Portuguese films.

Overseas, Portugal lags in both the number of exports to other European markets and the corresponding admissions, ranking last in both metrics according to data from the European Audiovisual Observatory. The COVID-19 pandemic has exacerbated industry challenges, but ICA has played a crucial role by providing substantial support during the pandemic, allocating €5.2 m in additional funds and distributing an extra €4.3 m to programs addressing pandemic-related challenges (Olsberg•SPI 2022).

**Figure 48.**

Audiovisual Markets average annual growth: 2015-2019 (%)



Source: EAO (2021)

Despite pandemic setbacks, Portugal possesses a strong talent pool and an attractive production landscape. In the midst of these challenges, there is potential for further investment in local filmmakers, actors, and production crews. This not only promotes homegrown talent but also increases the international visibility of Portuguese cinema. Additionally, the allure of Portugal's picturesque landscapes and historic sites has made it an attractive location for international film productions. The strategic development of film tourism can not only enhance the local economy but also contribute to the overall growth and resilience of the industry. Overcoming the identified challenges, coupled with strategic investments, presents significant opportunities for further sectoral development and growth.

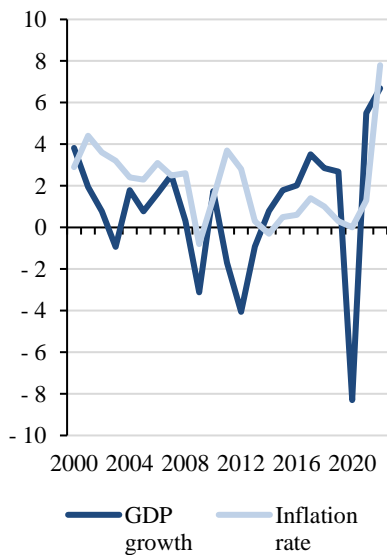
## MACROECONOMIC OVERVIEW

### Portugal's Macroeconomic Outlook

Transitioning into the Portuguese panorama, the following macroeconomic analysis uses data exported from Pordata.

**Figure 49.**

GDP growth and inflation rate



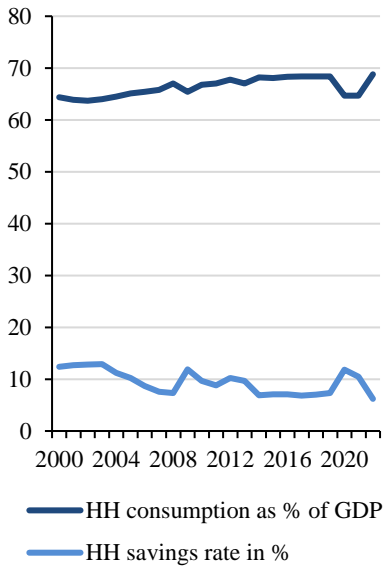
Source: Pordata

Throughout the last two decades, GDP in Portugal has been increasing almost every year, as illustrated in Figure 49. Nonetheless, relevant exceptions include the 2008 crisis, which resulted in negative growth in 2009, and the start of the pandemic in 2020. The latter represented the highest drop within the considered range. The fall of GDP in 2020 in Portugal was higher compared to the average in the eurozone contributing for that the higher weights of sectors that were significantly affected by the pandemic, as those associated with tourism. In 2021 and 2022 GDP grew, in real terms, respectively, 5.7% and 6.8%, revealing a consistent recovery from the virus. In 2022 GDP achieved a value of €242.3 bn.

Inflation remained relatively stable from 2013 to 2021, as shown in Figure 49. In 2022 it achieved its highest value of the last 2 decades: 7.8%, which was strongly influenced by the war in Ukraine. Even though Portugal shares limited contact with Ukraine and Russia, it was affected by constraints in the logistics chain, commodity prices, longer-lasting supply disruptions, souring confidence, and lower world demand for Portugal's exports. In Europe, a noticeable increase in prices due to the war concerned energy prices. Given the demand inelasticity of the energy sector, energy firms were not required

**Figure 50.**

HH consumption and savings rate



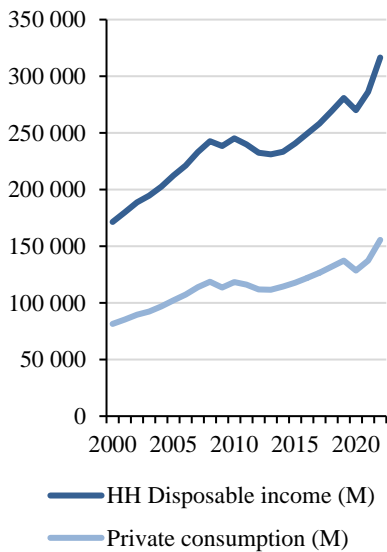
Source: Pordata

to see the consequences of inflation reflected in their margins. Ultimately, this results in consumers in this sector suffering the entire burden of the price increase. Concerning the telecommunications sector, its demand is considered to have a medium elasticity. Indeed, even though consumers increasingly view services offered by operators as commodities, such as water, they will switch to the operator that offers the most competitive prices (Deloitte 2023). Thus, telcos, unlike energy firms, partially take the burden of inflation to avoid significant losses in market share. So, inflation increases at a higher pace than the prices of telco services (Arthur D. Little 2023). However, in 2024, Vodafone, MEO and NOS announced prices will increase according to inflation (Rosa 2023). The impact of this decision will be analysed further within the report.

Household (HH) consumption in the economic territory as a percentage of GDP has not experienced significant fluctuations for the last 20 years. Nonetheless, during the years that were most affected by the pandemic, 2020 and 2021, there was a noticeable decrease. In 2022, this value recovered and achieved its highest in the last 20 years: 68.8. When analysing the savings rate by families, historical data is coherent with the decrease in consumption as it reveals an increase during 2020 and 2021 and, as life returned to normal, savings rates started to decrease in 2021 (Figure 50).

**Figure 51.**

Private consumption and HH Disposable income (EUR, in millions)



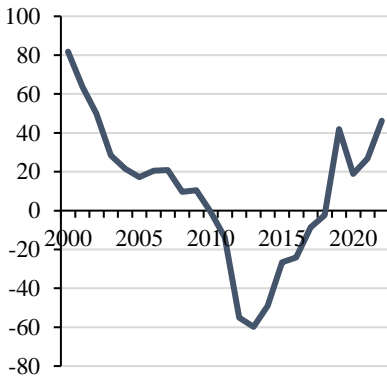
Source: Pordata

As represented in Figure 51, during the pandemic, private consumption suffered a significant reduction, as is usual to occur during crises, of approximately 6.5%. Still, unlike what commonly happens, this decrease is not associated with a decrease in disposable income. For the last 2 decades, the trend has been for HH gross disposable income to increase and public measures during COVID-19 allowed to mitigate the negative effects, and HH disposable income decreased only approximately 1.3%. This difference found between the crises of the pandemic and previous crises can be explained by the evolution of the labour market (e.g., the possibility of working from home) and public measures established to protect employment.

Both the pandemic and the war between Russia and Ukraine contributed to slowing the efforts that the country had made so far to improve its economy

**Figure 52.**

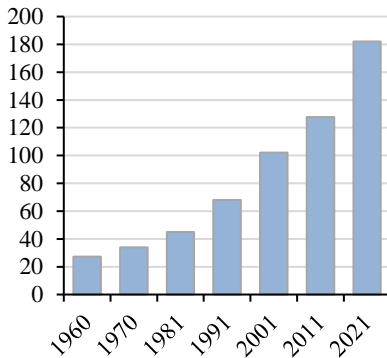
Net increase in population  
(in thousands)



Source: Pordata

**Figure 53.**

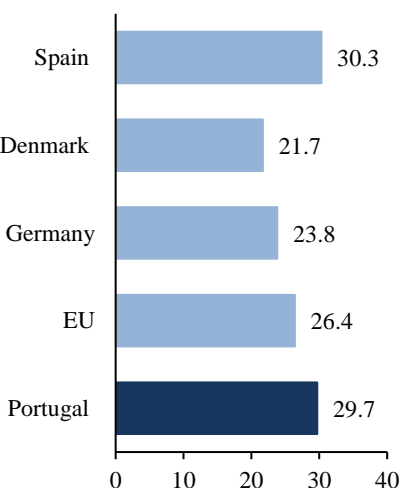
Ageing Index



Source: Pordata

**Figure 54.**

Average age young adults leave their  
parental home



Source: Eurostat

and resulted in behavioural changes for consumers and negative cross-cutting effects. High levels of inflation caused a decrease in purchasing power in 2022 and Debt to GDP ratio achieved values even lower than in the pre-pandemic period. Government entities established policies aiming to resist inflation and relieve concerns for firms and families. ECB initiated a program to increase interest rates to alleviate increases in prices although it also results in an increased cost of debt.

### Ageing Population

Regarding demographics, Portugal lacks a fertility rate that can ensure the replacement of generations (United Nations Population Fund 2023). Additionally, life expectancy is increasing with an improvement in the conditions of living which explains the increase in population since 2019 (Figure 52). Within an ageing country scenario, evidenced in Figure 53 with the increasing trend in the Ageing index, Portugal was part of numerous conferences regarding pensions and ageing that were conducted under the context of the EU. The country has responded to this demographic challenge by instituting several adjustments to its pension system.

### Housing Bubble

Another concern related to Portugal is the prediction by several experts that it is going to be the first European country to experience a housing bubble collapse, close to 2023. Almost all the mortgages in Portugal include variable rates, unlike what happens around other parts of Europe. The rise of both inflation and energy prices contributes to augmenting the pressure on savings. As the housing crisis continues, the younger generations need to defer moving out of their parents' homes, which has consequences for several sectors of the economy, including Telecom. In this latter, an important concern regards the fact that while a young adult remains living with their parents, they might share TV services which consequently results in a potential reduction in the number of subscribers for these services. This creates a need for firms within this industry to adapt their business model to address changing consumption patterns and demographics. Figure 54 represents the average age at which young adults abandon their parental household.

### The trend of Hybrid Work and Digital Nomads

Offering a very safe, open, and peaceful environment with relatively low costs of living, Portugal has emerged as a hotspot for digital nomads (Figure 55). Indeed, these remote workers, equipped with laptops and digital skills, find Portugal's diverse and dynamic environment conducive to both productivity and personal enjoyment (Portugal News 2023).

In line with the remote working trend, COVID-19 also led to new working practices, popularizing hybrid working, which seems to be here to stay. Indeed, many companies have already introduced flexible work arrangements, allowing employees to split their time between office and remote work.

This shift has implications not only for individual career choices but also contributes to the evolving landscape of the telecommunications industry, as better and faster connectivity becomes increasingly crucial.

## COMPANY VALUATION

### Revenues Forecast

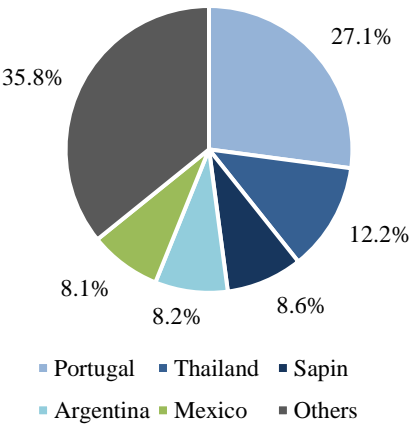
Considering the macroeconomic and market dynamic factors mentioned earlier, a thorough analysis was conducted to project NOS revenues. This analysis incorporated historical data, management estimates, and strategic changes in the company's operations, and seeks to provide a in depth reflection of the assumptions made for the forecasted period.

### Revenues Forecast - Telco

Over the past decade, bundling has emerged as a prominent trend in the industry. Customers increasingly opt for 2P, 3P, 4P, or 5P bundles instead of selecting individual services. There are three driving forces behind this phenomenon (Vdovjak 2021). First, it arises from the growing convergence and integration of services, particularly of broadband and mobile service lines, making it less likely for customers to choose services individually. Secondly, multiplay package prices are typically lower than the combined costs of the individual services. Lastly, bundling offers the convenience of streamlined configuration and billing. This strongly suggests that both

**Figure 55.**

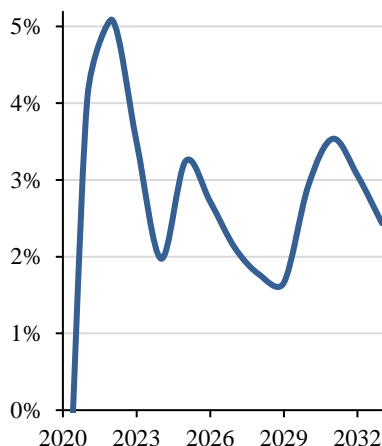
Favourite destination for digital nomads



Source: Portugal News

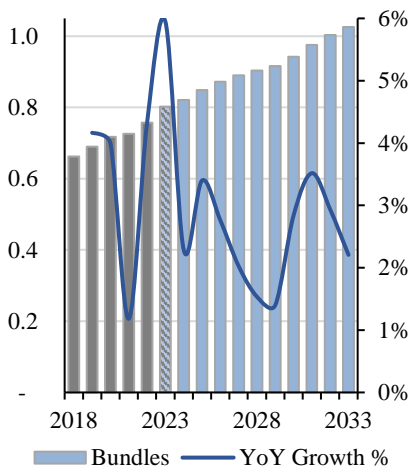
**Figure 56.**

Annual Growth Rate for Total Telco Revenue



**Figure 57.**

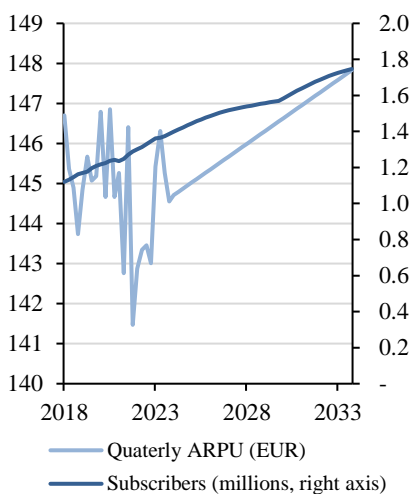
Bundles Forecasted Revenue (EUR, in billions)



existing and new users have shifted towards bundled service offerings. Bundles are also tapping into OTT services (Amdoc Media 2020), exemplified by the soaring popularity of steaming services and their inclusion within bundles (Amirtham 2022) putting significant pressure on traditional bundled offerings. Similarly, Subscription Video-On-Demand (SVOD) services like Netflix, Amazon Prime, Disney+, Hulu, and others are favoured over traditional pay TV by younger generations. Even though there are still more pay TV subscribers than SVOD subscribers, the latter is expected to continue growing. According to Ovum, OTT TV content is expanding its reach and should be considered an integral part of bundles. (Vdovjak 2021).

**Figure 58.**

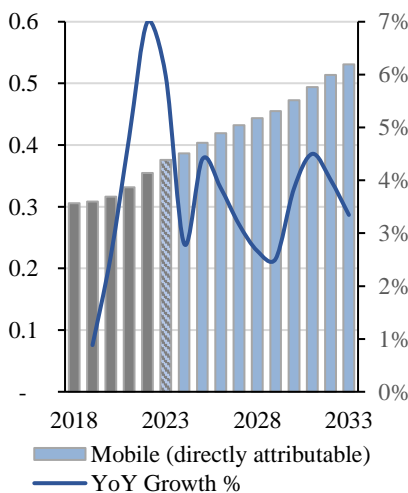
Evolution of ARPU and Number of Subscribers - Bundles



Mobile Network Operators (MNOs) possess a distinct advantage when it comes to attracting streaming service providers. They already have established billing systems in place and utilize pre-existing marketing channels to effectively target their audiences. Furthermore, telecom companies offer the essential infrastructure, including devices and connectivity, through which consumers access and enjoy content. Additionally, they provide a form of indirect advertising for streaming services, essentially serving as a promotional platform for these services. In return, streaming services offer added value to operators' customers. It's worth noting that when entering into contracts with streaming services, operators often seek exclusivity, aiming to be the sole providers in the market for a particular popular streaming service.

**Figure 59.**

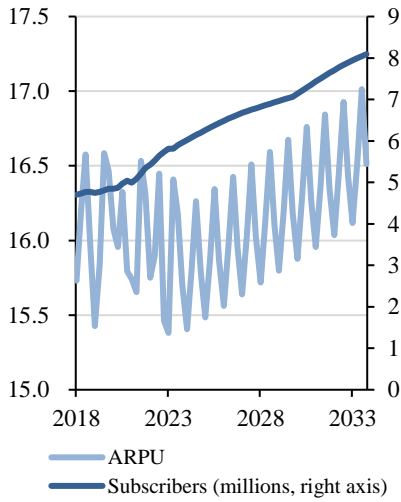
Mobile Forecasted Revenue (EUR, in billions)



Historically, the **bundle** service lines have exhibited a CAGR of 3.4%. However, it's important to highlight that NOS has only recently integrated OTT services into its offerings, including Netflix (2021), Prime Video (2021), Disney+ (2022), and Panda+ (2022). Therefore, in addition to the historical revenue, it is assumed that the service line will gradually increase its Average Revenue Per User (ARPU) aligning with the pricing models of OTT services, typically ranging from 5-10€ per month, and research that suggests that only 64% of customers are interested in this kind of add-on. All in all, OTT services integration is expected to gradually increase ARPU per subscriber by 4.82€ over the forecasted period (Nielsen 2022).

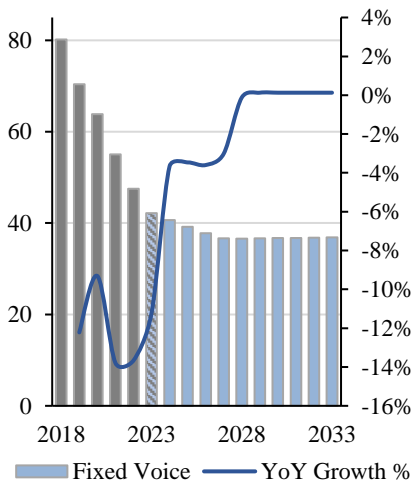
**Figure 60.**

Evolution of ARPU and Number of Subscribers - Mobile



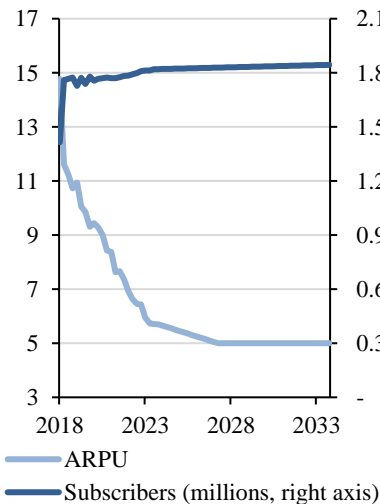
**Figure 61.**

Fixed Voice Forecasted Revenue (EUR, in millions)



**Figure 62.**

Evolution of ARPU and Number of Subscribers – Fixed Voice



The number of users is also expected to rise, linked to the introduction of 5G and 6G technology (Yeh et al. 2022). This growth aligns with the trends observed in Q2 2023 and Q3 2023 and industry benchmarks (Industry Research 2023), with an initial growth rate of 3.52% (YoY). As the user base expands, the growth is expected to gradually slow down until 2030, coinciding with the anticipated commercialization of 6G. At that point, the user base is projected to increase at similar levels as experienced during the 5G rollout. Ultimately the CAGR over the forecasted period is 2.33%.

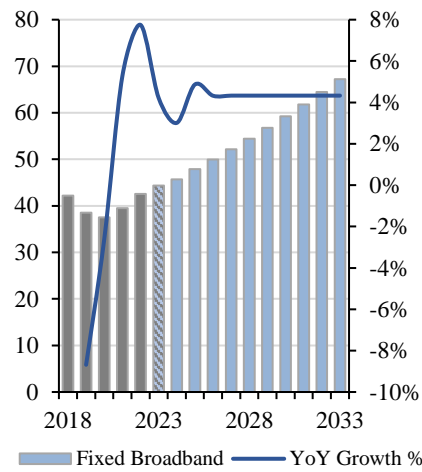
Even with European penetration rates suggesting levels approaching saturation (M. Dahlke, Alex 2019) and (GSMA 2023) the Portuguese market stands out with high expected growth in the **mobile** segment. While smartphones and mobile devices continue to proliferate, several factors, including improved mobile internet accessibility (5G, 6G), robust app ecosystems, and the popularity of streaming services, have collectively driven demand in the mobile service line. Remarkably, this segment has emerged as the fastest-growing area for NOS, benefitting from the company's strategic positioning to capitalize on market dynamics, such as partnerships with streaming service providers and recognition as the best 5G network in Portugal.

Consequently, it is assumed that the user base in the mobile segment will continue to increase, at a rate of 4.16% (YoY), which is aligned with market expectation (Global Data Technology 2021) and the historical trend. Similarly, to the bundle segment, it will gradually slow down until 2030, when 6G commercialization is expected to be a new tailwind. Moreover, ARPU too is expected to increase by €2.50 over the forecasted period, based on the historical trend seen in the sector and its outlined trends, and the substitute effect of bundling growth.

The **fixed voice** segment is shaped by two noteworthy trends (Oldham 2021). Firstly, there is a clear reduction in the use of fixed telephones, with mobile and other alternative communication methods experiencing significant growth. Secondly, the ARPU is expected to keep declining as telecom companies grapple with the difficulty of sustaining current pricing levels for fixed voice services, particularly among millennials and younger

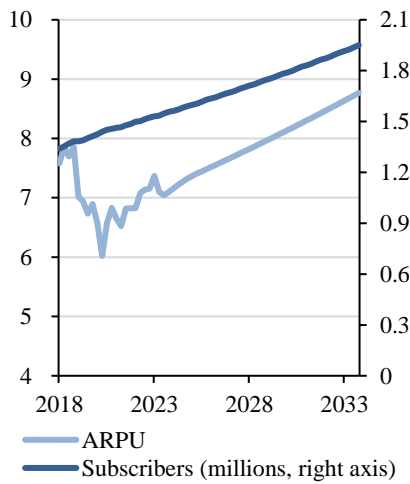
**Figure 63.**

Fixed Broadband Forecasted Revenue (EUR, in millions)



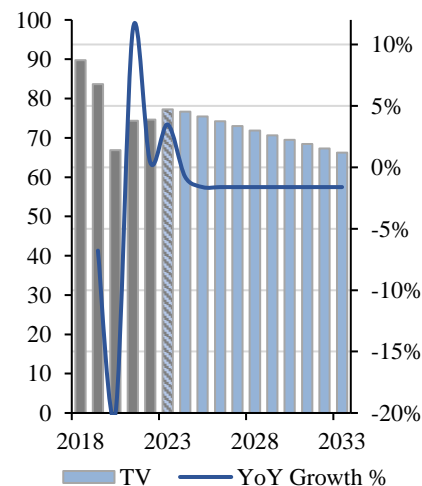
**Figure 64.**

Evolution of ARPU and Number of Subscribers – Fixed Broadband



**Figure 65.**

Pay TV Forecasted Revenue (EUR, in millions)



generations, there is a preference for mobile over fixed voice services. However, it's worth noting that fixed voice services still find relevance in B2B (business-to-business) sales. Consequently, the ARPU and the number of users is projected to decrease but eventually level off at €5.0, supported by the business segment as seen in other developed markets (ASEAN 2023).

Much like other individualized services, the **fixed broadband** service line has grown very slowly, with constant or even decreasing ARPU. Nonetheless, fixed broadband, for the last 5 years, grew substantially its user base, at c. 0.6% per quarter, helped by increasing internet usage and adoption. Contrary to other segments the broadband ARPU have showed a large correlation with the post pandemic inflation, perhaps suggesting that NOS has a higher capability of transferring inflationary pressures to its subscribers. As such ARPU is expected to increase at inflation over the forecasted period. Due to increasing demand for internet usage, connectivity, and data usage, it is expected that the broadband line will increase at a CAGR of 4.46%.

The **Pay TV** service line experienced a significant decline in the pandemic years (Mann 2021), witnessing a 20% reduction in 2020 partially due to lower demand from the business segments (e.g. sport bars). Additionally, the service is marketed independently, often as a supplementary offering alongside traditional bundles, leading to indirect competition with on-demand streaming services (OTT) (Arunasalam 2023). As the pandemic is over, the expectation is for the pay TV line to recover to its previous levels gradually and naturally. Anticipated growth factors include a user base increase aligned with population growth rates and an ARPU in accordance with the current downward trend of the service line.

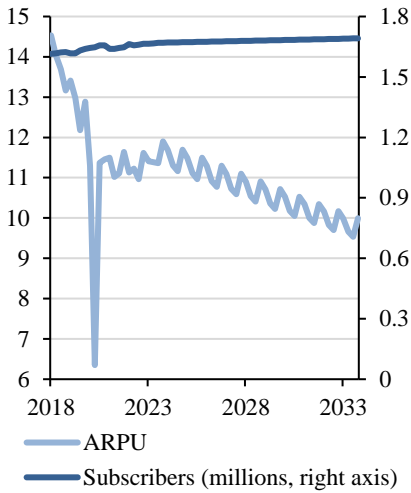
Other revenue lines such as **Equipment sales** and **Other Sales** are expected to grow in line with their historical performance and as a complement to the expected telecommunication services revenues, as this service lines are mostly related to support and complementary services.

### Revenues Forecast - Audiovisuals

The second element of NOS's revenue stream encompasses five distinct service and product lines. At its core lies the Cinema Exhibitions segment,

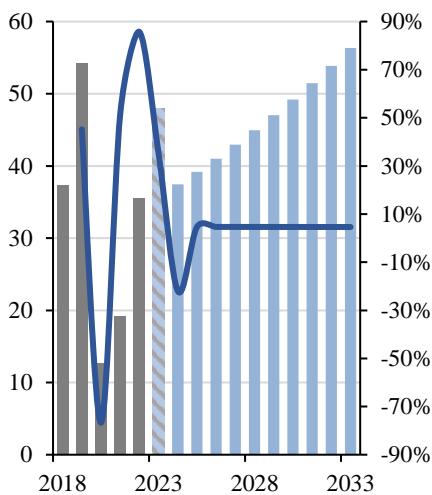
**Figure 66.**

Evolution of ARPU and Number of Subscribers – Pay TV



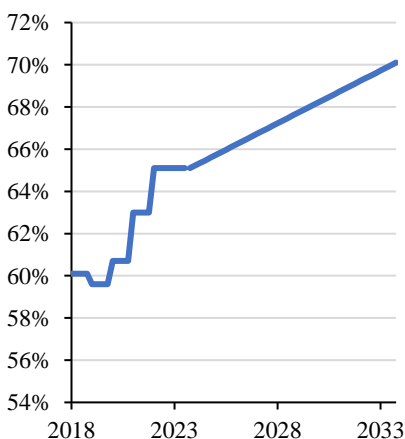
**Figure 67.**

Cinema Ex. Forecasted Revenue (EUR, in millions)



**Figure 68.**

Cinema Exhibition Market Share Evolution



which plays a pivotal role in driving other components, such as bar sales and advertising.

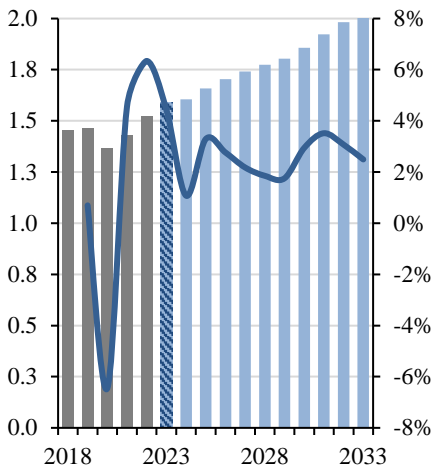
Despite global expectations for a burgeoning **cinema exhibition** market (Yahoo Finance 2022) the reality in Portugal tells a different story. A meticulous examination of the market's size in Portugal reveals that, despite seasonal fluctuations, it has shown minimal year-over-year growth.

Given the recent surge in on-demand streaming services, many of which offer their exclusive content to a substantial audience, consumers have been slow to return to traditional cinema experiences following the pandemic. Moreover, the market's dynamics are highly unpredictable, with the fourth quarter historically standing out as an anomaly, driven by holiday-related family outings and varying levels of public engagement with new film releases. Notably, the third quarter of 2023 was a remarkable exception as titles like "Oppenheimer" and "Barbie" achieved record-breaking global revenues, setting a new benchmark for NOS Cinema Exhibitions at €15.9 m. Nonetheless, NOS has managed to boost its revenues by steadily capturing market share from smaller regional players (ICA 2023). Figure 68 illustrates that approximately 6-8% of market share is still held by these regional entities, and it is expected that NOS will continue to gain market share, albeit at a more gradual pace. This is in part due to the company's limited expansion of cinema facilities, resulting in an anticipated 70% market share by the end of 2033. Considering that the market size is projected to remain relatively stagnant over the next decade, we anticipate NOS to achieve a steady increase in its revenues, reaching €42.9 m in 2028 and €56.3 m in 2033.

The **Advertising** service segment displays a consistent historical pattern of seasonality without any significant increases. This seasonality is strongly tied to the revenue generated from cinema exhibitions and Content and TV Channels, as they serve as the company's primary advertising platforms. Consequently, it is expected that the historical quarterly average (expressed as a percentage of advertising-related lines) will remain stable in the future.

Over the past five years, the **Content and TV channels** service line has witnessed a decline in revenues due to stiff competition from on-demand streaming services. However, NOS has implemented strategic measures,

**Figure 69.**  
Forecasted Total Revenues  
(EUR, in billions)

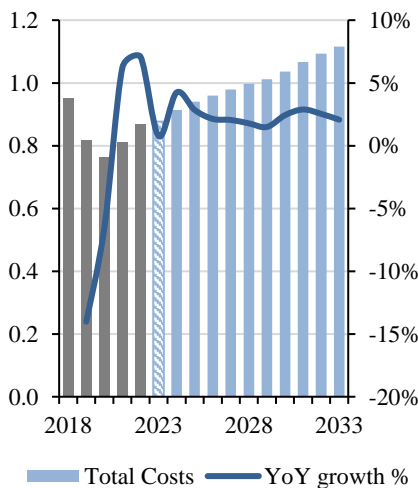


such as the introduction of the UMA TV platform and enhancements to TV Cine channel content, with the aim of mitigating the contraction of this service line. These initiatives are expected to expand its user base in line with the projected population growth rate while maintaining its ARPU growth at a level not exceeding the inflation rate.

Historically, Bar Sales have exhibited a strong correlation with cinema exhibitions, accounting for approximately 31.82% of the revenues generated over the past five years. It is assumed that this relationship will persist in the future.

Figure 69 shows the forecasted evolution of Revenues until 2033, showing the revenue growth from 6G deployment and corresponding to a CAGR of 2.2% from 2030 to 2033 (2.54% for Telco and 1.80% for Audiovisuals), implying an acceleration from the 1.8% CAGR from 2018 to 2023.

**Figure 70.**  
Forecasted Total Costs  
(EUR, in billions)

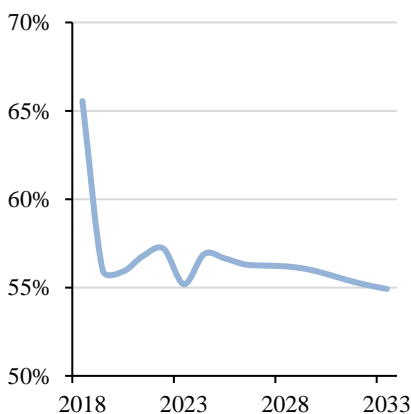


### Costs Forecast

In line with the revenues projected, a comprehensive assessment was performed to forecast the respective costs of the company. NOS total costs have been slightly increasing in the past 4 years, with a CAGR (2019-2022) of 1.83%, and gaining a larger share of the total revenues generated (56.81%, when compared to 55.97% in 2019). In 2018 costs represented over 65% of total revenues, which is mainly explained by a significantly higher level of direct costs in that year.

Overall, NOS's total costs are expected to grow at a CAGR (2023-2033) of 2.30% (Figure 70). Nonetheless, its share of the total revenues is expected to slightly decrease to 55% by 2033, as revenues are projected to be generated at a higher rate (Figure 71).

**Figure 71.**  
Forecasted Total Costs  
as a % of Revenues



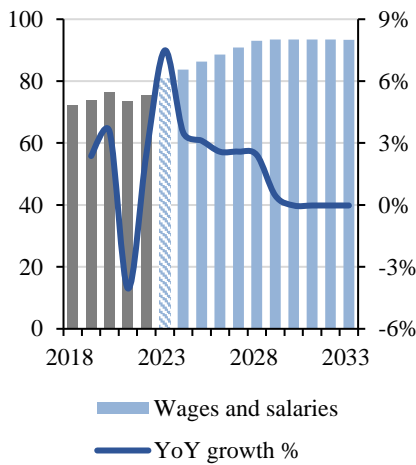
Both segments of NOS, Telecommunications and Audiovisuals, have a cost structure that can be divided into several sections, all of which will be fully analysed and projected.

### Costs Forecast - Telco

Predicting the trajectory of costs within the Telecom segment demands a meticulous analysis that combines historical performance with forward-

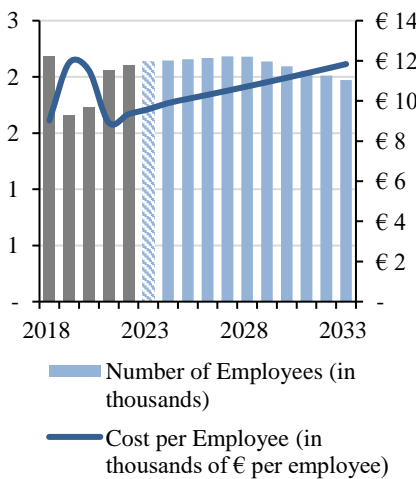
**Figure 72.**

Forecasted Telecom Wages and Salaries (EUR, in millions)



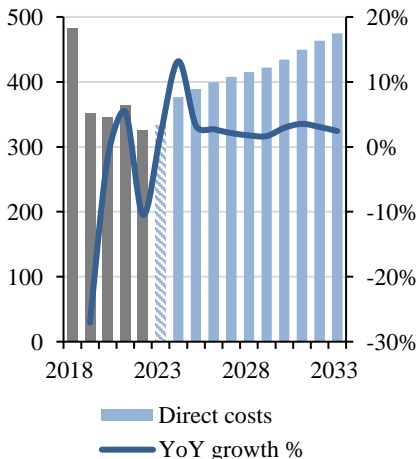
**Figure 73.**

Forecasted Telecom Number of employees and associated costs



**Figure 74.**

Forecasted Telecom Direct Costs (EUR, in millions)



looking assumptions. This forecast aims to shed light on the intricacies of cost projection methodologies, delineating the driving factors and rationale behind the estimations.

In order to better understand how wages and salaries will grow in the firm, this expense was divided into two main drivers, the number of employees, and the cost per employee. To obtain the number of employees for each segment, it was assumed that the salaries in each segment were proportional to the number of employees.

The continuous expansion and installation of new technology will require more human capital, and so, for the following five years, it was assumed that the number of employees would grow at the same rate as customers, as has happened in the last couple of years. After that, it is assumed a decreasing trend as, on the other hand, emerging technologies are adopted, and the need for employees diminishes. Finally, the cost per employee is assumed to grow with inflation.

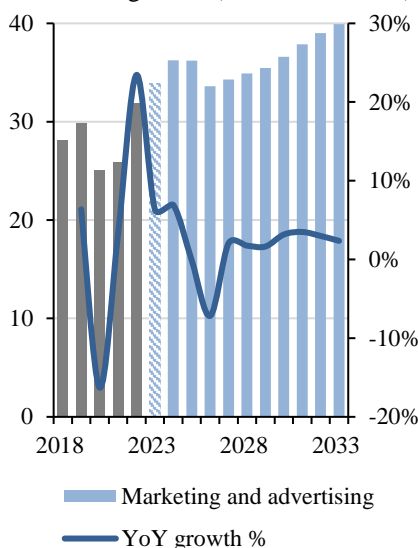
Direct costs represent the greatest cost that the firm incurs, representing almost 40% of total costs in 2022. In fact, in previous years this cost was even more significant, representing over a quarter of the revenues produced. To estimate how these costs will behave in the future, an analysis of how these costs behave quarterly with the total revenues was performed, excluding 2018's values, as before 2019 direct costs were accounted for in a different format by the firm. It was then assumed that direct costs would represent, on average, 26.42% of the firm's revenues, as no change is expected in this cost structure.

As for the cost of products sold, a similar approach was presumed, where a more specific driver was used: equipment and product sales, as this expense is directly related to the sales of these products.

To understand how marketing and advertising costs will evolve in the following years, a more comprehensive breakdown was performed. When analysing this expense's relation with the total revenues, a clear trend is observed, as costs more than doubled in the last quarter. Hence, these expenses were forecasted taking into account its seasonality. Furthermore, in

**Figure 75.**

Forecasted Telecom Marketing and Advertising Costs (EUR, in millions)



the next two years, an increased level of marketing and advertising expenses are expected, as NOS intends to invest more in Digital Marketing.

To project the **support services** expenses that the firm will incur, an assessment of the previous costs in relation to the total telecommunications users was undertaken. With that, it was possible to infer a seasonal trend with increased costs in the first and last quarters, which was then used to determine how these costs will navigate in the future.

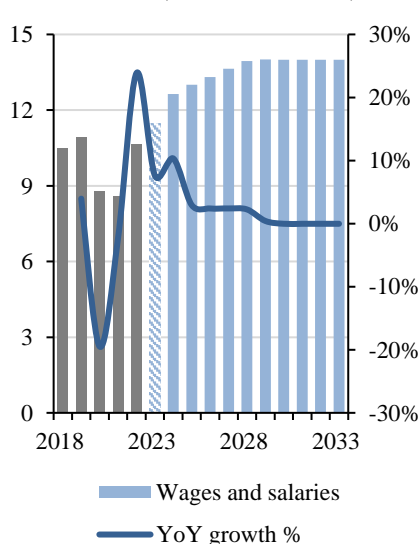
Regarding **supplies and external services** and **indirect taxes**, these expenses were forecasted taking into account their relationship with total revenues in the past 5 years, as no significant shifts in this relationship are expected in the foreseeable future. Furthermore, **other operating losses and gains** were simply assumed as an average of the past, as these are not related to the firm’s main operations.

As for **provisions and adjustments**, this item mainly regards impairment of accounts receivables, and so, they were estimated as a percentage of the revenues generated by the firm. Additionally, it was observed a seasonal trend, as it seems that NOS incurs in higher provisions in the last quarter of the year, and adjusts its level usually on the second quarter.

Finally, **other losses and gains** were also estimated as an average of the past, excluding however some outliers, as the firm occasionally realises significantly high values. As for the **losses and gains in participated companies**, these were assumed to remain stable throughout the years, as has been the case in the last 5 years.

**Figure 76.**

Forecasted Audiovisual Wages and Salaries (EUR, in millions)



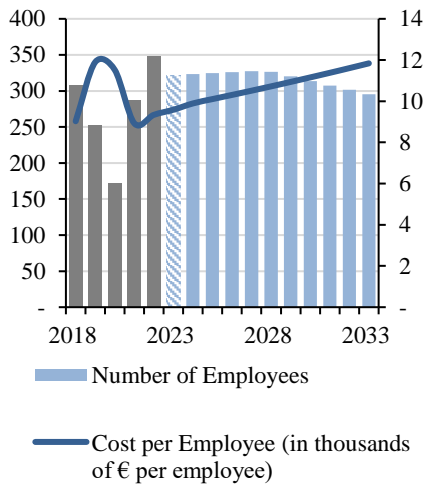
### Costs Forecast - Audiovisuals

The forecasting methodology employed for the audiovisuals segment is similar to that of the primary segment of the firm. Nevertheless, due to the pronounced impact of the pandemic on the audiovisuals industry, several outliers within historical data were recognized and subsequently excluded from the analysis.

Regarding **wages and salaries**, on the same note, the number of employees in the audiovisual segment is expected to remain somewhat stable in the

**Figure 77.**

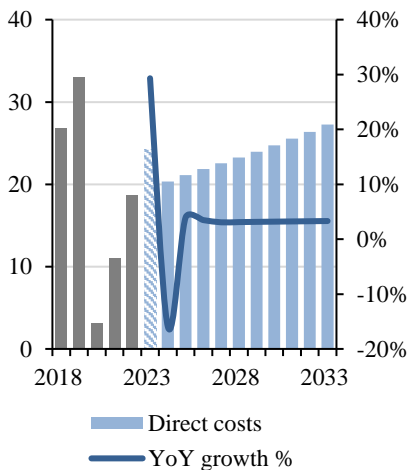
Forecasted Audiovisuals Number of employees and associated costs



following 5 years, increasing only marginally as revenues and demand increase. After that, a negative trend is estimated as the need for employees diminishes with the adoption of new technological trends, such as entering the cinema with QR codes instead of having employees scan their tickets. As for the cost per employee, it was also assumed to grow with inflation.

**Figure 78.**

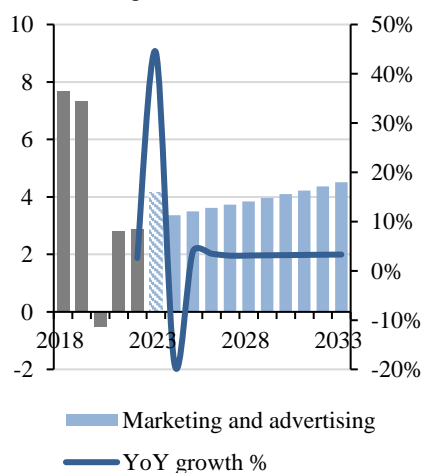
Forecasted Audiovisuals Direct Costs (EUR, in millions)



With regards to **direct costs, marketing and advertising, support services, and supplies and external services**, the same methodology was applied. These expenses are very related to the segment’s activity and how it performs, and so, they were forecasted based on its average representation of total revenues. In doing so, the values before 2022 were excluded since most values before this year were highly affected by the pandemic. Furthermore, there are no changes expected in how these costs behave with the revenues generated by the firm.

**Figure 79.**

Forecasted Audiovisuals Marketing and Advertising Costs (EUR, in millions)



When analysing the **costs of products sold** for the segment, the same logic regarding the analysed period was used, as the values before 2022 are not representative of the standard activity. For this cost, a different driver was used, as a more specific correlation was established with bar sales and DVDs, allowing for a more precise estimation of this expense.

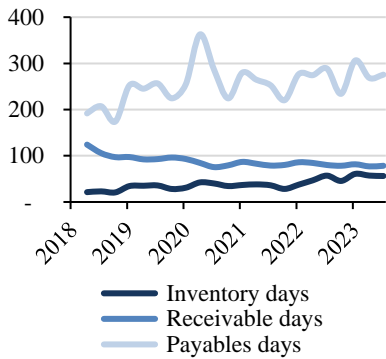
On the other hand, **indirect taxes** remained quite steady in relation to total revenues through the last 5 years, and so, these were forecasted taking into account the whole period in analysis.

**Provisions and adjustments** were analysed using a methodology akin to that applied in the telecommunications segment. This approach was adopted due to the observed trend within the firm, indicating higher costs incurred during the last quarter of the year.

Lastly, regarding **other losses and gains (in participated companies and others)**, it was assumed that these would maintain stability over the forecasted period and were forecasted as an average of the past as these factors hold minimal representation within NOS’s overall cost structure.

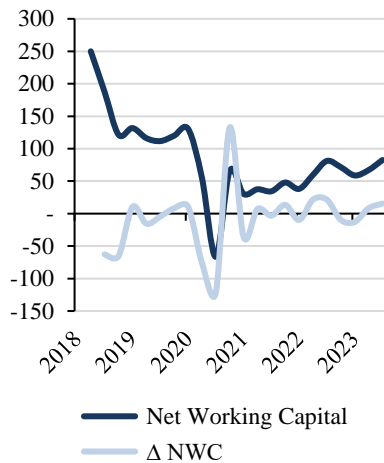
Considering all costs, it is expected that EBITDA margin to evolve according to the assumptions made. A visible decrease in 2024 is clear, explained by short term inflationary pressures and a record-breaking performance in 2022

**Figure 80.**  
Historical Operating Cycle  
(in days)



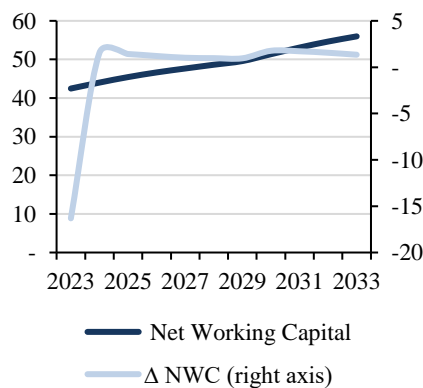
Source: NOS institutional reports

**Figure 81.**  
Historical Net Working Capital  
(EUR, in millions)



Source: NOS institutional reports

**Figure 82.**  
Forecasted Net Working Capital  
(EUR, in millions)



fuelled by 5G growth and extraordinary cinema ticket office, which the historical and market analysis suggest to not be sustainable. Nevertheless, a positive trajectory is expected in EBITDA margin (+0.1% per year), supported by increased ARPU, streaming partnerships and cost scaling (e.g. wages and customer support).

### Net Working Capital

Regarding the Net Working Capital (NWC), it was derived through a more specific approach that concentrates solely on the key components of its current assets and liabilities that are directly related to the firm’s operating cycle. Following such approach provides a more dynamic and time-based perspective on NOS’s working capital needs, as it considers the time it takes to sell inventory, collect receivables, and pay payables.

To derive the average number of days it takes NOS to turn its inventory into sales, the change in inventory values reported by the telecommunications firm were divided by the direct costs and costs of products sold of its segments, and then multiplied by the average amount of days in a quarter<sup>5</sup>. The resulting metric, NOS's inventory days, remained relatively constant over the analysed period, especially in the last 3 years, as it can be seen in Figure 80. As such, they were assumed to remain at the 3-year historical average. Then, the forecasted inventory days were used to derive the expected inventory values for the next 10 years, by multiplying them by the previously forecasted direct costs and costs of products sold that NOS would have in the future and then dividing them by 91.25.

When it comes to receivable days and payable days, these are metrics used to measure the average number of days it takes for a firm to collect payments from its customers and to pay its suppliers, respectively. To derive NOS’s receivable days, the historical accounts receivable (current and non-current) were divided by the by group total operating revenue in the same period, and then multiplied by 91.25. The same logic was applied to compute the payable days but with the relevant accounts. Regarding the evolution of these metrics, on average both of them appeared to be fairly constant over the past 3 years. In this way, both receivable and payable days were assumed to remain at the

<sup>5</sup>365/4=91.25 average days in a quarter

3-years historical average level. Following a similar procedure as mentioned earlier, NOS’s accounts receivable and accounts payable for the next 10 years were estimated by multiplying the projected group revenues by the forecasted receivable and payable days, respectively, and then dividing by the average days in a quarter.

Finally, one can reach NOS’s forecasted NWC by deducting the expected accounts payable from the projected inventory levels and the accounts receivable. Such values are depicted in Figure 82, alongside the firm’s forecasted changes in networking capital.

### Capital Expenditures

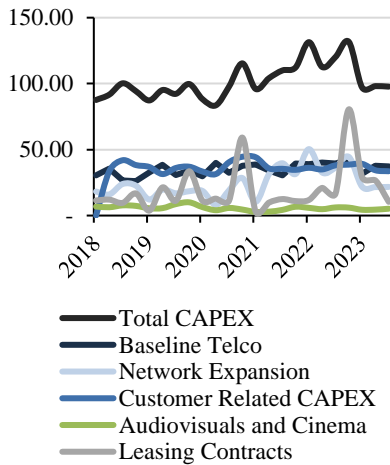
Capital Expenditures play a pivotal role in shaping the trajectory of NOS in the highly competitive Portuguese telecommunications market. Indeed, given that the firm mainly operates in such a dynamic industry that is constantly evolving with new technology, it is extremely important for NOS to keep substantially investing in CAPEX to stay modern and competitive.

Diving into its historical values, the firm’s overall CAPEX levels remained relatively constant from the first quarter of 2018 up until the third quarter of 2020, as it can be observed in Figure 83. In 2021 and 2022, NOS experienced a significant increase in its total CAPEX (excluding leasing contracts, spectrum licenses and other contractual rights), reaching almost €500.0 m in the financial year of 2022, record level for the firm.

According to NOS’s management team, such increase in CAPEX was a deliberate step aligned with the company's strategic vision, as it was mainly driven by the launch and implementation of 5G technology in Portugal, in accordance with NOS’s 5G leadership strategy. After these peak years, NOS expects its overall CAPEX (excluding leasing contracts, spectrum licenses and other contractual rights) to decrease in line with the progressive deceleration of 5G and FttH deployment, and land between €370.0 and €390.0 m in 2023 and 2024.

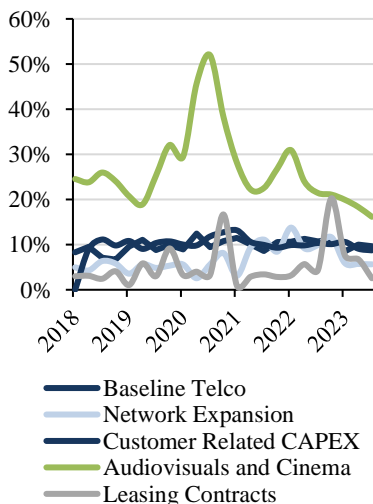
Looking deeper into the firm’s CAPEX, it can be broken down into Telecommunications, Audiovisuals and Cinema Exhibition, Leasing Contracts & Other Contractual Rights, and Spectrum Licenses. As illustrated

**Figure 83.**  
Historical CAPEX Breakdown  
(EUR, in millions)



Source: NOS institutional reports

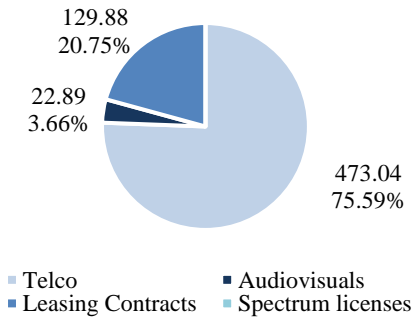
**Figure 84.**  
Historical CAPEX Breakdown  
(in % of Relevant Revenues)



Source: NOS institutional reports

**Figure 85.**

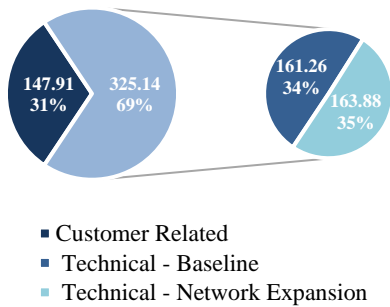
2022 CAPEX Breakdown  
(EUR, in millions)



Source: NOS institutional reports

**Figure 86.**

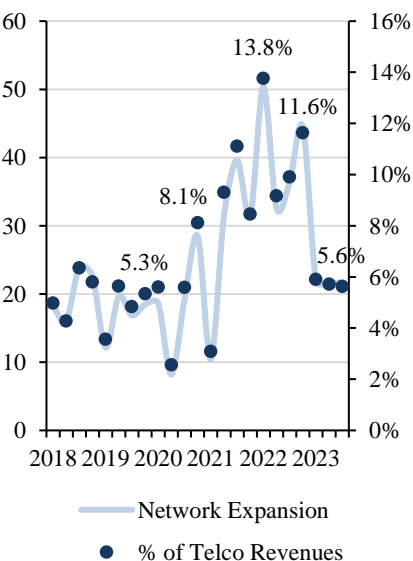
2022 Telco CAPEX Breakdown  
(EUR, in millions)



Source: NOS institutional reports

**Figure 87.**

Historical Network Expansion CAPEX  
(EUR, in millions, and %)



Source: NOS institutional reports

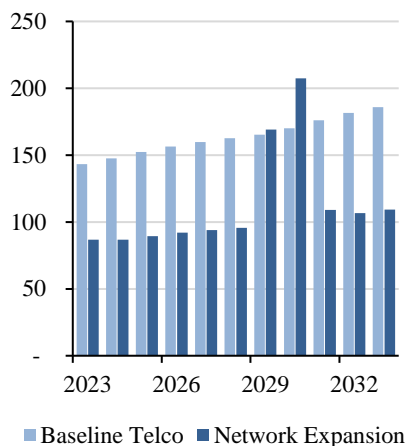
in Figure 85, in 2022, Telecommunications CAPEX was by far the most significant CAPEX category, accounting for approximately 75.59% of the firm’s total CAPEX. It was followed by Leasing Contracts & Other Contractual Rights CAPEX (around 21%), being Audiovisuals and Cinema Exhibition the least CAPEX intensive category (only 3.66%).

As depicted in Figure 86, Telecommunications CAPEX can be decomposed into Technical CAPEX and Customer Related CAPEX. When it comes to Technical CAPEX, it includes mainly network deployment, upgrade and replacement expenditures, and IT development. Within Technical CAPEX we can further distinguish Baseline Telco CAPEX and Network Expansion & Substitution and Integration Projects CAPEX.

On the one hand, Baseline Telco refers to more recurrent levels of Telco CAPEX, such as continuous replacement and modernization expenditures that occur on an ongoing basis. This means that there isn’t disruptive CAPEX in this account, providing a normalized figure for Technical CAPEX. In this way, Baseline Telco CAPEX was forecasted so that it remained at its historical average proportion with respect to the firm’s Telecommunications Revenues (9.8%). On the other hand, in the Network Expansion & Substitution and Integration Projects CAPEX is where very important expenditures are included, namely 5G and FttH investments.

Looking into NOS historical Network Expansion CAPEX in percentage of its Telecommunications Revenues, depicted in Figure 87, one can observe that such percentage remains relatively constant around 5% and 6%, starting to increase in 4Q of 2020, and only returning to average levels after 4Q of 2022. Considering the fact that NOS was the first firm to launch 5G in Portugal, in December 2021, those Network Expansion CAPEX variations can be directly linked to the rollout of 5G technology, and it should be highlighted that they started one year prior to its launch and ended one year after. According to NOS Earnings Calls, the majority of the 5G and FttH investments were concluded before the first quarter of 2023, as its 5G network covered 87% of the population and more than 63% of its Gigabit fixed network were covered with FttH at the end of 2022. Therefore, 2023 investment levels are the best proxy for standard levels of Network

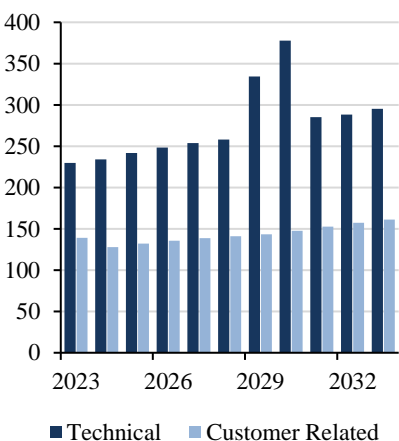
**Figure 88.**  
Forecasted Technical CAPEX  
(EUR, in millions)



Expansion & Substitution and Integration Projects CAPEX. In this way, it was assumed that, in the following 10 years, it would maintain its 2023 average proportion with respect to the firm’s Telecom Revenues (5.76%), except for the period between 1Q29 and 1Q31. Undertaking an average 10-year technological renewal cycle in mobile, it was presumed that 6G would be launched in 2030, implying an increase in Network Expansion CAPEX in the quarters around that period, similarly to what previously happened with 5G.

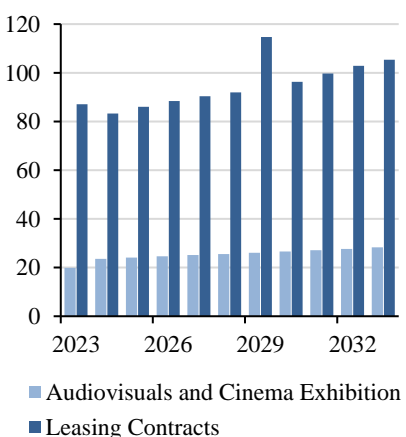
Moving on to Customer related CAPEX, it includes the costs associated with the production, sale, support, and installation of telecom equipment for the firm’s customers. Such costs are considered CAPEX because they are capitalized to the balance sheet to match the lifetime of its customers. According to NOS, decreases in Customer Related CAPEX are reflecting the continuing low levels of churn and efficiency gains achieved by the firm, which are helping mitigate the inflationary pressures in terms of equipment unit cost and indirect salaries related to sales and installation services providers. This trend is expected to continue, as NOS keeps being distinguished as a consumer preference, being assumed that, in the next 10 years, the proportion of Customer Related CAPEX with respect to the firm’s Telecommunications Revenues will decrease to a plateau rate of 8.5%.

**Figure 89.**  
Forecasted Telco CAPEX  
(EUR, in millions)



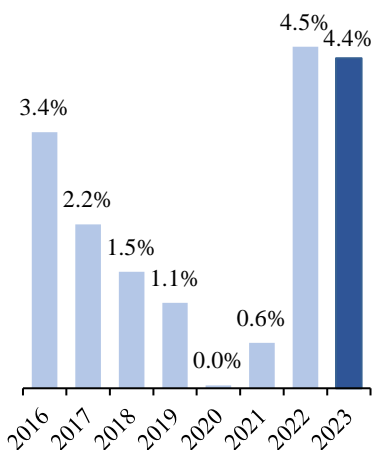
Regarding Audiovisuals and Cinema Exhibition CAPEX, it has decreased as a percentage of Audiovisuals Revenues, excluding pandemic years which severely damaged this segment’s proceeds due to the mandatory lockdown measures. This suggests that Audiovisuals and Cinema Exhibition CAPEX is related to fixed maintenance costs, so it was assumed that this value would remain at the 5-year historical average of €5.76 m per quarter and then increase with inflation during the forecasted period.

**Figure 90.**  
Forecasted Audiovisuals and Leasing  
Contracts CAPEX (EUR, in millions)



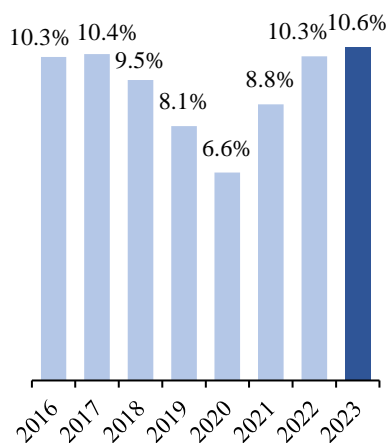
Finally, the percentage of Leasing Contracts & Other Contractual Rights CAPEX with respect to NOS total group revenues was assumed to keep in line with the 5-year historical average of 5.19%, except on the first quarter of 2029, where 10.0% was used instead to accommodate for the preparation for 6G commercialization in 2030, similarly to what previously happened with 5G.

**Figure 91.**  
After-tax Cost of Debt Evolution  
2016-2023



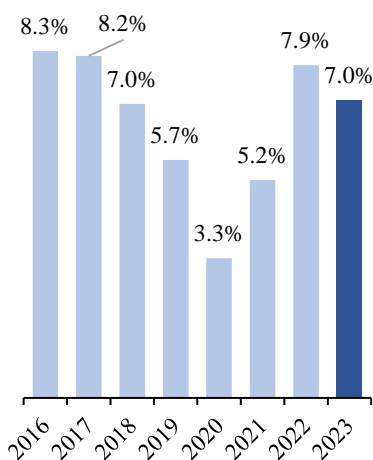
Source: Bloomberg

**Figure 92.**  
Cost of Equity Evolution 2016-2023



Source: Bloomberg

**Figure 93.**  
WACC Evolution 2016-2023



Source: Bloomberg

## Cost of Capital

According to Maria Carrapato, director of investor’s relations at NOS, the strategy of the firm includes keeping a target debt-to-equity ratio and thus the cost of capital was computed assuming NOS’s capital structure will not have significant changes, remaining at a debt-to-equity ratio of 1.

To arrive at the cost of debt, the 10-year German Treasury Yield, 2.01% (Bloomberg 2023), was considered as the risk-free rate. Additionally, to account for the fact of the debt being from a Portuguese firm, a rating-based default spread of 2.04%<sup>6</sup> (Damodaran 2023) was also taken into consideration, along with the European corporate credit spread of the telecommunication sector of 1.60% (PWC 2023), given that the firm’s revenues arrive mainly from that industry. Finally, a cost of debt of 4.37% was reached, higher than the 2022 cost of debt due to the end of 2020 moratoriums (Figure 91).

Regarding the cost of equity, it was obtained using the CAPM model adjusting once again the risk-free to account for country risk premium. NOS’s unlevered beta was assumed to be the weighted average of the unlevered betas concerning the sectors in which the firm operates (Bloomberg). The unlevered betas of each sector were computed using a benchmark analysis of peers in the respective industry. reach the levered beta, the corporate tax rate value considered was 22.5%, which is mentioned in the Annual Report and doesn’t include de deduction of tax incentives. Cost of equity obtained equalled 10.6%, in line with the historical cost, when disregarding the pandemic years (Figure 92).

This set of assumptions resulted in a WACC of 7.00%, in line with historical values and a slight decrease from 2022 due to an increase in Book Value D/E from 1.56 to 1.88 and a recent decrease in interest rates (Figure 93).

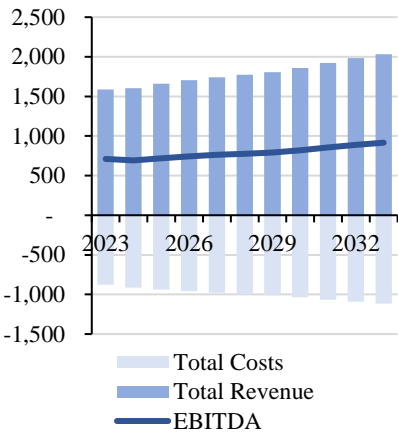
## Discounted Cash Flow

Combining the aforementioned assumptions, the expected future cash flows are derived from the firm’s projected ability to generate profit during the

<sup>6</sup> To obtain this value the Moody’s rating for Portugal was used (Baa2) to estimate the default spread over a default-free government bond rate

**Figure 94.**

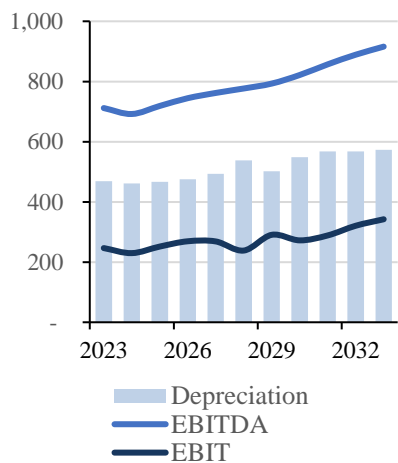
Forecasted Revenues, Costs & EBITDA (EUR, in millions)



forecasted period. Looking into the evolution of NOS revenues and costs forecasted for the next 10 years illustrated in Figure 94, it becomes clear that, even though both are growing, revenues are growing at a faster pace, leading to an increasing EBITDA. Indeed, the telco firm EBITDA is expected to go from €711.8 m in 2023 to €916.1 m in 2033, implying a 2.56% CAGR.

**Figure 95.**

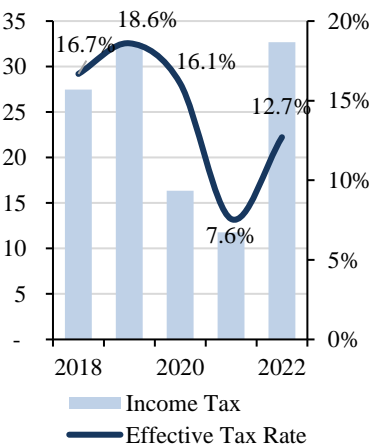
Forecasted EBITDA, Dep & EBIT (EUR, in millions)



Then, the firm’s depreciation and amortization expenses previously forecasted can be deducted from NOS EBITDA, yielding the company’s EBIT. As depicted in Figure 95, NOS forecasted EBIT appears relatively more stable than the firm’s forecasted EBITDA, due to the expected slight increase in depreciation expenses. Nonetheless, EBIT still presents a positive tendency over the forecasted 10 years, reaching €342.4 m in 2033.

**Figure 96.**

Income Tax & Effective Tax Rate (EUR, in millions, and %)



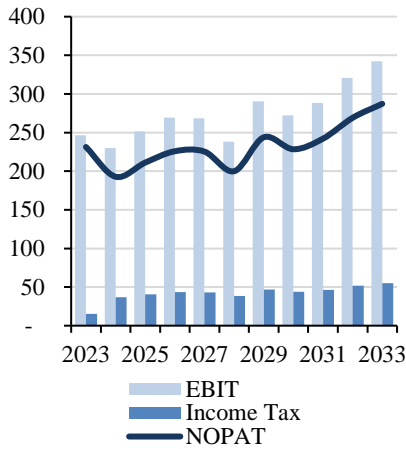
Subject to the Portuguese Corporate Income Tax (IRC), NOS and its subsidiaries currently operate under a tax rate of 21% on taxable profit. Furthermore, the telecommunications firm also faces an IRC surcharge at the maximum of 1.5%, resulting in a total statutory tax rate of approximately 22.5%. Nonetheless, NOS benefits from several fiscal advantages arising mainly from the attribution of tax incentives for business research and development, including the SIFIDE (Business Research and Development Tax Incentives System), as well as the RFAI (Investment Tax Incentive Regime). Additionally, NOS falls under the special tax regime designed for groups of companies, further contributing to the company's favourable tax position. Indeed, over the past five years, NOS has consistently reported an effective annual tax rate below the statutory tax rate, fluctuating between 16.7% in 2018 and 12.7% in 2022, and reaching values as low as 7.6% in 2021, as illustrated in Figure 96. Since the firm plans to keep investing in research and development initiatives, it was assumed that it would keep benefiting from such tax incentives during the next 10 years. In this way, NOS effective tax rate was forecasted to remain at the 5-year historical median, amounting to 16.1%.

Taking such tax rate, one can compute the income tax expenses and reach NOS Net Operating Profit After Tax (NOPAT). As shown in Figure 97, the telco firm NOPAT is expected to increase in the forecasted period, going from €231.3 m in 2023 to €287.30 m in 2033, implying a 2.19% CAGR.

Source: NOS institutional reports

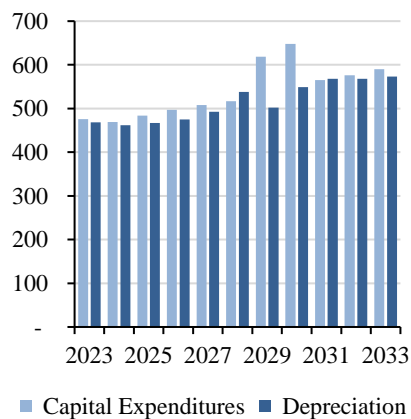
**Figure 97.**

Forecasted EBIT, Inc Tax & NOPAT (EUR, in millions, and %)



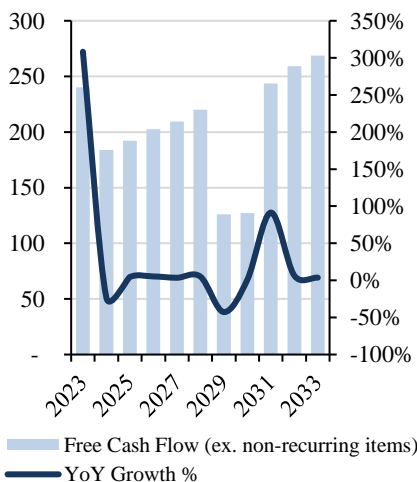
**Figure 98.**

Forecasted CAPEX & Depreciation (EUR, in millions, and %)



**Figure 99.**

Forecasted Free Cash Flow (EUR, in millions, and %)



Then, to derive NOS Forecasted Free Cash Flows (FCFs) from the firm’s NOPAT, depreciation is added back to the figure and the changes in NWC and Capital Expenditures are deducted. Subsequently, the present value of those cash flows was computed by discounting them using the previously established weighted average cost of capital (WACC) of 7.00%. This resulted in a total present value of €1,517.43 m.

Nonetheless, it is assumed that NOS will continue to operate and generate value after 2033, so the firm’s terminal value must be computed to account for its long-term worth beyond the forecast period. In order to calculate the terminal growth rate, it is important to understand how both the economy and the industry in which NOS operates are expected to grow in the future. Regarding economic growth, the European Central Bank (ECB) Long Run Target Inflation Rate of 2% was used as it is more forward looking. Taking the telecommunications global revenue in Portugal from 2011 to 2022 available in ANACOM, one gets an Historical Industry CAGR of approximately 0.27%. Anticipating technological advances such as 5G and 6G to increase the telecommunications industry long term CAGR, while also recognizing that the growth rate of such a stable and mature industry is extremely likely to remain well below the long run target inflation rate, NOS terminal growth rate was forecasted as the average between the ECB Long Run Target Inflation Rate and the Historical Industry CAGR, amounting to 1.14% (Global Data 2023), in line with market analysis calculating the terminal value involved aggregating the forecasted FCFs of the last 4 quarters to obtain the terminal year FCF. Subsequently, this figure was multiplied by 1 plus the previously computed terminal growth rate and discounted as a growing perpetuity to derive its present value (€2,351.01 m).

NOS Enterprise Value can be derived from combining the present value of the forecasted cash flows with the firm’s discounted terminal value, totalling approximately €3,868.45 m. The deduction of current and non-current borrowings (net debt) from this figure yields NOS Total Equity Value, which stands at €2,093.24 m.

However, since the main goal is to determine the implied share price for common shareholders, the value of preferred shares and minority interest

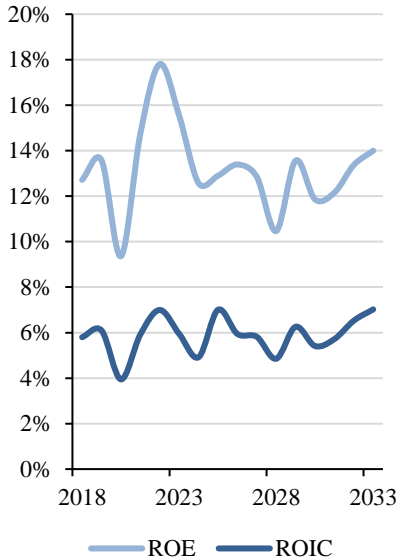
needs to be deducted from the firm’s Total Equity Value. This adjustment serves to isolate NOS Common Equity Value, which amounts to approximately €2,086.91 m.

Upon dividing NOS Common Equity Value by the number of ordinary shares outstanding as of the 3Q of 2023 (approximately 511.4 million), the resulting implied share price stands at approximately €4.08 per ordinary share.

Comparing the intrinsic share value derived from the model with the market price of NOS shares (€3.40 as of the 4<sup>th</sup> of December of 2023), there is an upside of approximately 19.91%. This indicates that NOS shares are currently undervalued by the market, making it a favourable time for investors to consider purchasing shares.

Figure 100 shows the expected evolution of ROE and ROIC during the forecasted period, showing a slight uptrend in returns over the next 10 years reaching 14.2% and 7.0% in 2033, respectively.

**Figure 100.**  
ROIC and ROE



### Sensitivity Analysis

To evaluate the resilience and viability of the company's operational framework, an in-depth sensitivity analysis was carried out, focusing on what were considered the most relevant parameters of the firm’s valuation: the terminal growth rate, the WACC, and the quarterly growth rates of mobile users, and bundles users.

		Weighted Average Cost of Capital				
		6.30%	6.65%	7.00%	7.35%	7.70%
Terminal Growth Rate	1.02%	5.02 €	4.47 €	3.99 €	3.56 €	3.17 €
	1.08%	5.09 €	4.53 €	4.03 €	3.60 €	3.21 €
	<b>1.14%</b>	5.15 €	4.58 €	<b>4.08 €</b>	3.64 €	3.24 €
	1.19%	5.22 €	4.64 €	4.13 €	3.68 €	3.28 €
	1.25%	5.28 €	4.69 €	4.18 €	3.72 €	3.31 €

**Figure 101** – Sensitivity analysis of share price using the WACC and the Terminal growth rate

The table above (Figure 101) showcases the impact of the terminal growth rate and the WACC on the NOS’s share price.

As expected, these two factors display a significant influence on the value of the firm, with particular emphasis on the WACC. In fact, a 10% increase in

the cost of capital would lead to a decrease of over 20% of the firm’s share price to 3.24€, which is below the firm’s current market price. Regarding the terminal growth rate, even though its impact is not as remarkable as the cost of capital, it still results in some fluctuations in the price, since a 10% drop in this rate maintains the price comfortably close to the 4€ threshold.

		Bundle Users Quarterly Growth				
		0.53%	0.71%	<b>0.88%</b>	1.06%	1.24%
Mobile Users Quarterly Growth	0.62%	3.31 €	3.54 €	3.78 €	4.02 €	4.28 €
	0.83%	3.46 €	3.69 €	3.92 €	4.17 €	4.42 €
	<b>1.04%</b>	3.62 €	3.84 €	<b>4.08 €</b>	4.33 €	4.58 €
	1.24%	3.78 €	4.01 €	4.25 €	4.49 €	4.75 €
	1.45%	3.96 €	4.18 €	4.42 €	4.66 €	4.92 €

**Figure 102** – Sensitivity analysis of share price using Bundle and Mobile Users’ quarterly growth

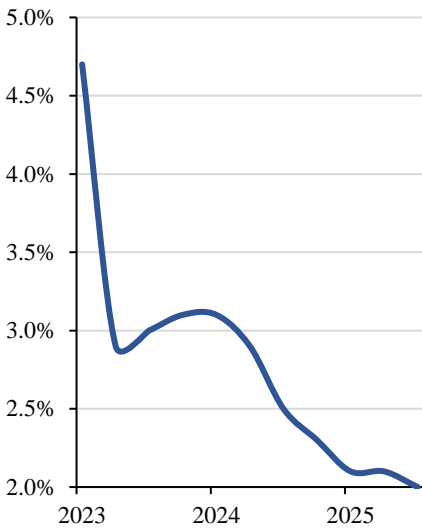
On Figure 102, a different analysis was performed, focusing on the two biggest activities of the company. Bundles’ revenues have represented around half of the total revenues of the firm, while revenues directly attributable to Mobile usually represent just above 20% of the total. For that reason, changes in these activities could significantly impact the firm’s share price. To dive deeper into this obstacle, this sensitivity analysis takes into account the forecasted growth for the number of users of Bundles and Mobile services. As expected, NOS’s price is more sensitive to changes in Bundles users’ growth. Nonetheless, it should be noted that the price is not overly sensitive to a change in this rate, as a 40% decrease in this growth would result in a 11.3% decrease in the share price. As for the Mobile users’ growth, the same change in this rate only results in a 7.5% decrease in the price.

### Scenario Analysis: Inflationary Pressures

On the 12th of December 2023, NOS announced an increase in prices scheduled for February 2024 (ANACOM 2023a). Despite inflation adjusted price increases being an almost yearly occurrence, a quick analysis of the data analysis of the ARPU evolution clearly shows that the metric hasn’t increased in line with inflation. The difference can be explained by contractual constraints, negotiation and retention strategies and more-for-more strategies. In other words, it is common for telecom companies to justify increases to their existing consumers by offering them additional

**Figure 103.**

Annualized HICP Inflation Forecast



services, which explains why subscriber additions showed more variation in inflationary periods than ARPU.

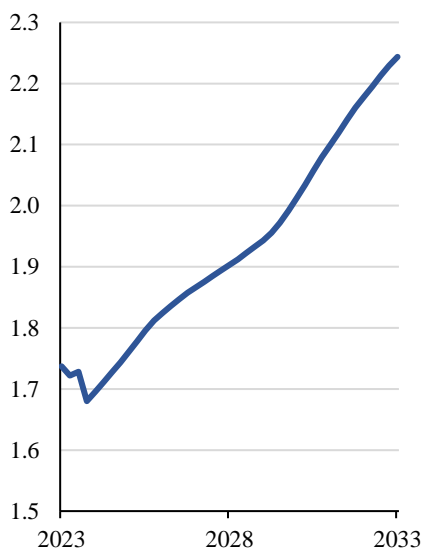
Nonetheless, to acknowledge any possible price increases, a scenario where the bundle segment line grows at a higher than previously forecasted rate was considered<sup>7</sup>. Figure 103 shows how a yearly increase in ARPU in line with ECB forecasted inflation would impact revenue from this segment. Going from a CAGR of 2.54% to a CAGR of 4.01% in telecom segment when assuming that NOS is capable of fully transferring inflation to its customers. Implying a share price of €5.21. Please note that costs would also suffer a more accentuated cost increase when compared to the base scenario (most variables are revenue dependent) and that this scenario assumes that NOS would be able to fully transfer its price increases to costumers, without impacting its market share, which historically isn't verified.

### Adjusted Present Value

To better understand how debt financing impacts the share price, the adjusted present value model was applied using the same operating assumptions stated previously. The model relies on unlevered cost of capital (8.11%), cost of debt (4.37%) and tax rate (22.5%) to calculate the tax shield generated by the financial debt held. Accordingly, 2 distinct scenarios were considered. First a permanent debt scenario was considered, under which the tax shield provided by debt held on the 3Q 2023 is assumed to be constant forever, as expected this scenario yields a lower valuation at €3.63. Then, a scenario aligned with the target leverage ratio of 2.4x was applied, implying constant increases of the level of financial debt held. In turn this method yielded a share price of 4.00, below the value reached using the WACC method due to differences between the market value and book value of debt. Nonetheless, the application of the Adjusted Present Value method helps showcase how an increase in debt has a net positive effect on the value of the company through increased tax shield, amounting to a €0.37 increase over a permanent debt scenario, assuming no additional debt related costs or increased cost of debt.

**Figure 104.**

Financial Debt Evolution (EUR, in billions)



<sup>7</sup> The scenario can be changed in the DCF Excel Tab (cell B92)

### Cash Flow to Equity

As NOS is dividend paying company, the EFCF method provides a valuable perspective into the generation of cash flow available to shareholders, and helps validate the results previously obtained. In this approach it is once again assumed that NOS will continue to increase debt in order to keep its debt levels at 2.4x EBITDA, given the expected growth in EBITDA this translates into a positive cash inflow from debt financing. Appendix 1 shows the evolution of debt over time. As expected this method yielded the same share price as the FFCF approach €4.08. It is important to note that the share price would change according to different leverage ratio targets (assuming no bankruptcy costs and a stable cost of debt).

### Monte Carlo Simulation

To further assess the robustness of the valuation model, a Monte Carlo simulation was employed. This simulation technique is particularly valuable when dealing with uncertainties inherent in financial projections and aids in understanding the range of potential outcomes based on varying input assumptions.

By considering uncertainties in crucial parameters affecting the firm's valuation, such as the tax rate, the WACC, the terminal growth rate, and the growth of users in both bundles and mobile services, this simulation ensures a more comprehensive evaluation of the firm's value. Acknowledging that bundles and mobile services constitute the primary revenue drivers for NOS, the inclusion of these factors in the simulation aligns with the strategic focus of the valuation.

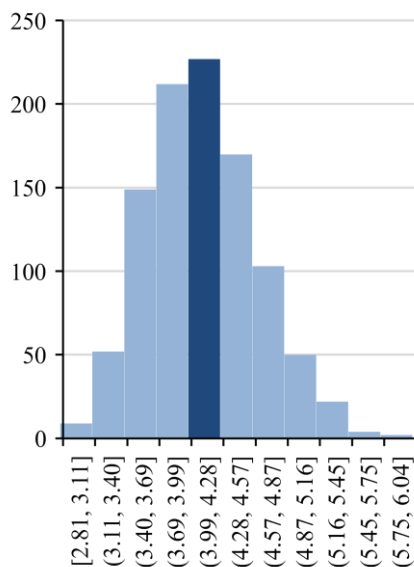
Upon generating 1,000 iterations with a standard deviation of 5% for the input variables, the Monte Carlo simulation produced a sample with a mean of 4.12€.

The results indicate a range of potential outcomes for NOS's share price, demonstrating its sensitivity to the variation in input parameters. As it can be seen on Figure 105, the wide spread between the maximum and minimum share prices underlines the significance of uncertainties in the valuation process. Moreover, the standard deviation of 0.50€ signifies the extent of

**Figure 105.**  
Monte Carlo Statistics

Analysis	
Max	6.04 €
Min	2.81 €
Mean	4.12 €
Std Dev	0.50 €
<b>NOS's Share Price</b>	<b>3.40 €</b>
BUY/HOLD	939
as a % of iterations	93.9%
BUY	764
as a % of iterations	76.4%

**Figure 106.**  
Monte Carlo Share Prices' Distribution (n° of iterations)



**Figure 107.**  
Comparable Companies  
(by Business Segment)

Name	Ticker	Country
<b>Telco</b>		
Cellnex Telecom	CLNX	ES
Telefonak. Ericsson	ERICB	SE
Vodafone Group	VOD	UK
Swisscom	SCMN	SW
Veon	VEON	NL
Telenor	TEL	NO
Deutsche Telekom	DTE	DE
BT Group	BT/A	UK
Telefonica	TEF	ES
<b>Audiovisuals</b>		
AMC Ent. Holdings	AMC	US
Cineplex Inc	CGX	CN
Kinepolis Group	KIN	BE
Cinemark Holdings	CNK	US

Source: Bloomberg

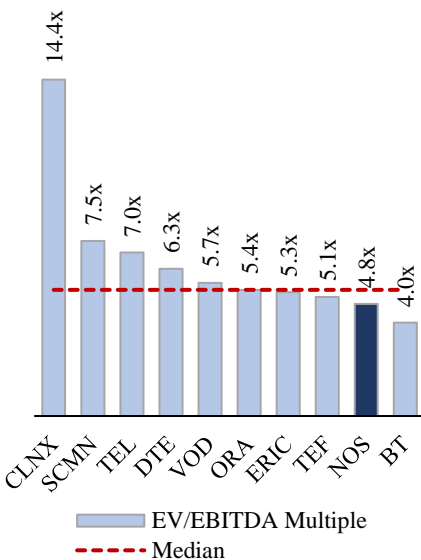
variability around the mean share price, highlighting the inherent volatility in the valuation outcome.

In the 1,000 iterations conducted, it is mostly important to note that approximately 76% of the total simulations projected a share price exceeding the current value by 10%. This indicates a significant upward potential in the valuation outcomes. Furthermore, over 93% of these iterations concluded with a recommendation for a BUY/HOLD decision. These findings highlight a prevalent positive trend in the simulated share prices, affirming the potential value and attractiveness of NOS shares in the simulated scenarios.

### Relative Valuation: Comparable Companies

The selection of the comparable group of companies was guided by criteria such as geography (Western and Central Europe), company size (>€1B Market Cap.), business model (Fixed Line, Mobile and Other Telco Networks), and product similarity (Bundled, and individualized service offering with a focus in B2C and B2B). The list primarily features major telecom operators within the European Economic Area, with a notable focus on Spanish and other Western European markets. Recognizing the weight of the Audiovisual segment in the operations of the company (c.6-7%), a smaller peer group composed of comparable companies in the Cinema Exhibition and Distribution was considered<sup>8</sup>. A weighted approach was employed to achieve multiples that consider both distinct core segments.

**Figure 108.**  
EV/EBITDA Forward Looking  
Multiples



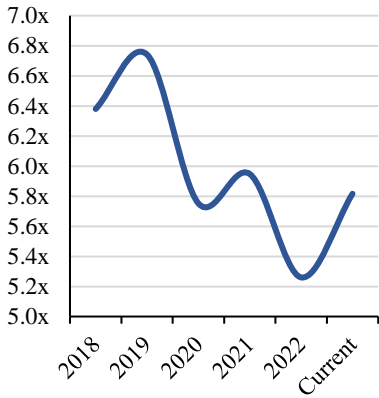
Source: Bloomberg

The EV/EBITDA multiple is valuable as it provides a broad measure of a company's operational efficiency by considering earnings before certain non-operating expenses. Additionally, a historical analysis of the multiple over the last 5 years in the telecom industry reveals that it has been a consistent metric, having only decreased during the pandemic, making it a reliable valuation method. Within the specified peer segments, the EV/EBITDA multiples showcases significant variation. The telecom sector exhibits an EV/EBITDA multiple of 5.40x, while the audiovisual component displays a distinct metric at 9.70x. The audiovisual sector's higher multiple could be attributed to its strategic investments in cutting-edge content creation,

<sup>8</sup> Due to the small amount of publicly traded companies dedicated solely to cinema exhibition, the comparable companies may not correspond to the geographical and size criteria previously mentioned.

**Figure 109.**

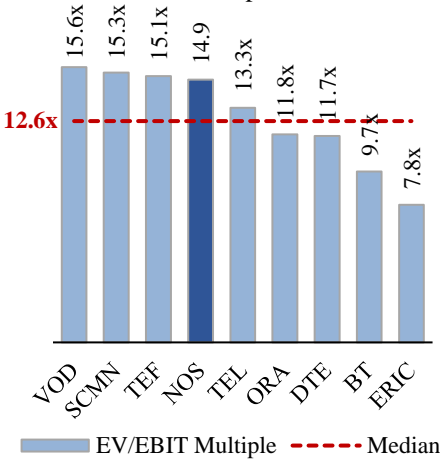
Median Peer Group EV/EBITDA  
2018-2023



Source: Bloomberg

**Figure 110.**

EV/EBIT Forward Looking  
Multiples



Source: Bloomberg

**Figure 111.**

P/E and EV/Sales Forward  
Looking Multiples

Ticker	P/E	EV/Sales
NOS.LS	11.6x	2.1x
ERIC	10.2x	0.7x
BT.A.L	6.6x	1.6x
DTE.DE	11.8x	2.5x
ORA.PA	9.7x	1.6x
TEL.OL	14.7x	3.1x
TEF.MC	11.1x	1.6x
SCMN	15.2x	3.1x
VOD.L	9.6x	1.7x
VEON	n.a.	1.1x

Source: Bloomberg

technological innovation, and successful market penetration, signifying a higher growth expectation. A segmented analysis reveals that larger markets correlate with higher valuation, for example for Swisscom and Deutsche Telekom, which trade significantly higher than the average. When applying a weighted approach, resulting in a comprehensive valuation, a median valuation of €4.39 per share is reached.

The EV/SALES multiple is valuable as it offers insights into a company's efficiency in generating revenue relative to its overall enterprise value. It provides a snapshot of market sentiment regarding a company's pricing strategies, market share dynamics, and diversification efforts. An historical analysis of the multiple over the last 5 years in the telecom industry reveals consistency, making it a reliable valuation metric. When applying a weighted approach, resulting in a comprehensive valuation, a valuation of €1.59 per share is reached. The low valuation is explained by NOS high margins, meaning that it can generate more shareholder value for each euro of revenue

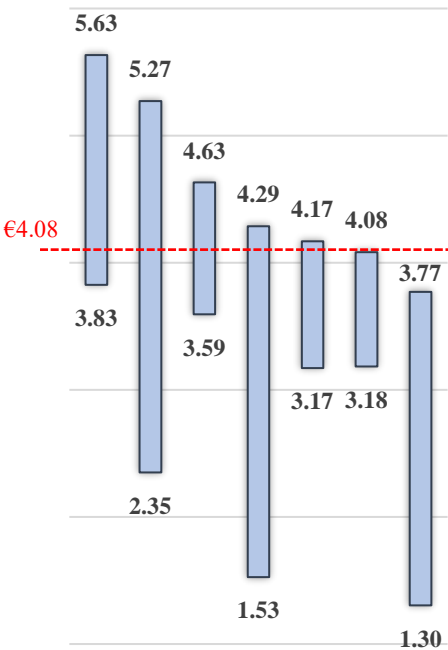
The EV/EBIT multiple is valuable as it refines the analysis by factoring in D&A, offering insights into a company operation. This metric provides the widest range of multiples, making it unreliable and of low value added.

Concluding with the P/E ratio, the segmented analysis highlights divergent market sentiments. The P/E multiples for the telecom and audiovisual components demonstrate variability, reflecting the market's expectations for future earnings potential. When applying a weighted approach, resulting in a comprehensive valuation of €3.50 per share is reached, a direct result of the low EPS growth expectation for the industry.

### Relative Valuation: Comparable Transactions

To complement the public comparable data, an analysis of relevant transactions in the industry for the last 4 years was carried out using the same multiples as discussed above. Unlike in the public markets, transactions multiples clearly show a declining trend when it comes to multiple valuation, with the most pronounced being the EV/EBITDA, which gradually decreased from 10.6x in 2019 to 5.5x in 2023. According to Bain (M. Dahlke, Alex 2019), this trend can be associated with an increasing scarcity of good scale deals in the telecom industry, especially in Europe, moreover,

**Figure 112.**  
Football Field (EUR)



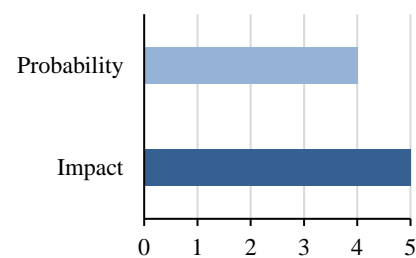
increasing cost of debt with ever higher capital expenditure requirements have played a bearish role in telecom valuations. Nonetheless, this is a trend that was transversal across the entire market and NOS’s peer group. Accordingly, we expect the current valuation of NOS to reflect the same market conditions.

In summary, Figure 112 provides a visualization of the range of valuation reached using multiples. The weighted valuations, floor and ceiling per share values, and the influence of company size underscore the multifaceted nature of these metrics, with higher multiples potentially reflecting strategic investments and growth prospects in the audiovisual sector. Considering the analysis made above, it should be considered that the EV/EBITDA, EV/Sales, and Past Transaction Multiples provide the best approach to the market valuation of NOS, since they provide industry consistent multiples and low variance amongst the peer group.

### Football Field

When combining all valuation methods used most indicate a significant upside over the current price of €3.40, in addition, the target price of 4.08€ is supported by the range obtained in the relative valuation and past transactions approaches. Nonetheless the market sentiment is subjective to several risks and ESG practices that can significantly impact the company.

**Figure 113.**  
Risk 1.1



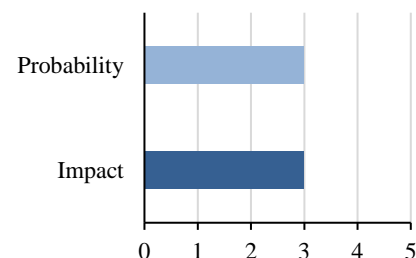
### RISK ANALYSIS

Embarking on potential threats for the firm, an analysis of the risks that NOS is exposed to will be conducted, dividing them into economic, financial, and legal. Additionally, solutions to mitigate risks will be discussed.

#### Economic Risks

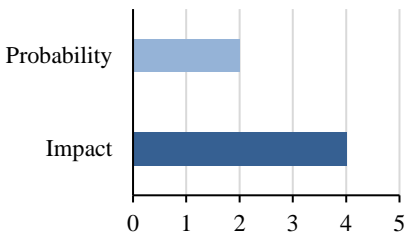
**1.1. Economic environment:** NOS’s performance might be limited by the socio-economic environment among which unemployment, strikes and demographics, and variations in economic conditions. To tackle the increasing costs, the firm, among others, renegotiated supply contracts.

**Figure 114.**  
Risk 1.2.

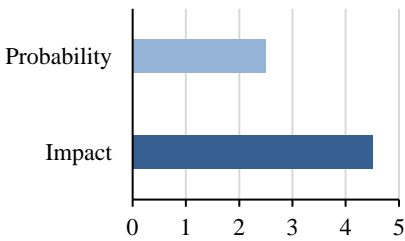


**1.2. Competition:** New entries within the telecom industry associated with the auction for the acquisition of 5G frequencies impose challenges upon NOS’s market share and its ability to attract and retain customers.

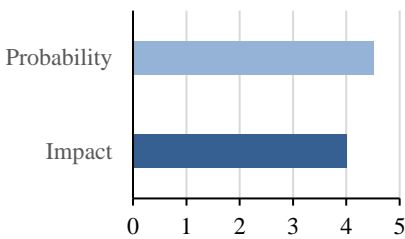
**Figure 115.**  
Risk 1.3.



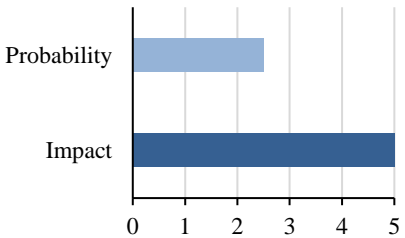
**Figure 116.**  
Risk 1.4.



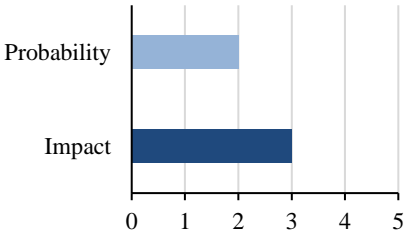
**Figure 117.**  
Risk 1.5.



**Figure 118.**  
Risk 1.6.



**Figure 119.**  
Risk 1.7.



Continuously investing in innovation (e.g., NOS alarms), increased quality, and diversification of offers enables the minimization of this risk.

**1.3. Talent Recruitment and Retention:** Owning appropriate recruitment and retention policies is increasingly difficult given the present increased demand for technology backgrounds by firms. Thus, NOS continuously attempts to improve recruitment processes by, for instance, investing in the Talent Acquisition team. Additionally, programs such as Alfa Biz and Alfa Tech select and recruit highly skilled graduates.

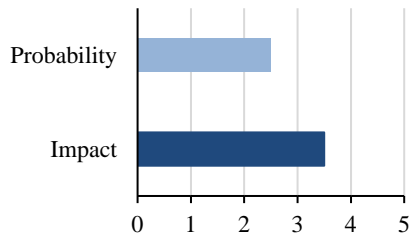
**1.4. Product & Service Performance:** Products or services revealed to be below a customer’s expectations along with possible complaints might decrease customer loyalty. To tackle this, the firm is, for instance, strengthening the capacity of mobile and fixed networks, and re-evaluating policies in communications network infrastructures.

**1.5. Cybersecurity:** Crucial resources such as systems and platforms may be subject to security flaws and, consequently, prone to threats as destruction, attacks, and alterations deriving from both internal and external sources. The current national and international increase of cyber-attacks endangers the information security of customers and is the origin of several interruptions in services. NOS’s cybersecurity team is improving its strategy, cyber architecture and cyber capabilities as well as strengthening its policies.

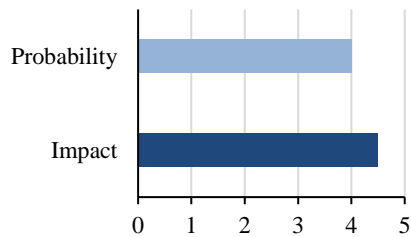
**1.6. Technological Innovation:** Not only investment is required to achieve success but also the capability of monetizing technological advances responsible for enabling a firm to sustain competitive advantage. This creates pressure on firms and a risk that some will stay behind. NOS makes efforts to address this issue by establishing programs with the goal of ensuring long-term competitive differentiation among which NOS Hub 5H, an innovation centre aiming to strengthen firms, partners, universities, and start-ups providing the most advanced technical capabilities, teams and resources associated with 5G.

**1.7. Customer/Third-Party Fraud:** Fraud, either from customers or third parties, presents a common risk within the telecom industry. Fraudsters recognize and exploit potential weaknesses regarding business operations, network infrastructure or communication services. In response, NOS owns

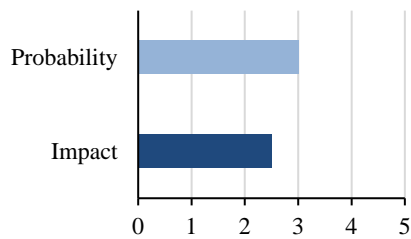
**Figure 120.**  
Risk 1.8.



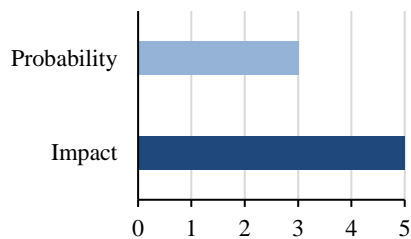
**Figure 121.**  
Risk 2.1.



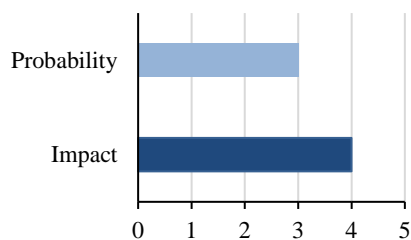
**Figure 122.**  
Risk 2.2.



**Figure 123.**  
Risk 2.3.



**Figure 124.**  
Risk 3.1.



specialized teams that aim to minimize several types of fraud among which consumption, subscription, and content fraud. Fraud controls avoid fraudulent consumption and misuse of services and positively impact customer satisfaction as diminish phishing through SMS directed at NOS customers.

**1.8. Environmental impacts:** Operations of NOS might result in environmental threats related with, for instance, the production of waste which is currently one of the main national environmental challenges. The firm created a programme to reuse equipment previously owned by residential customers, among many other policies that aim to protect the environment as increased energy efficiency of its operations.

### Financial Risks

**2.1. Liquidity and interest rates:** The current economic environment include a rise in interest rates along with increased uncertainty regarding financial markets and debt costs vulnerable to excessive volatility in the future constitutes a risk for the firm. Additionally, it may result in shortfalls in cash flows or their timing being imprecise and difficulties meeting financial obligations. To battle this, NOS’s liquidity position was improved through refinancing operations that count with less volatile market conditions.

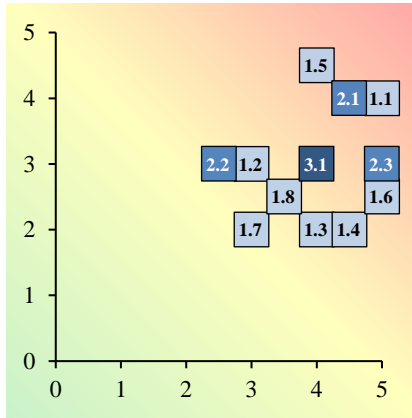
**2.2. Credit and collections:** There are a potential revenue loss deriving from ineffective collection procedures or changes in service-related legislation impacting debt recovery. NOS assesses this risk by launching a monthly plan of recovery, monitoring and validation actions, and evaluation of possible outcomes.

**2.3. Taxation:** NOS is exposed to variations in tax legislation and diverse interpretations of tax and related regulations. To tackle this, the firm presents dedicated tax teams that are responsible for monitoring all tax regulations and are challenged to optimize tax efficiency.

### Legal Risks

**3.1. Legal and Regulatory:** Alterations in specific Portuguese or European legal and regulatory frameworks may significantly affect the activities of the firm. Thus, NOS entities are subject to potential penalties from sector-

**Figure 125.**  
Risk Heat Map

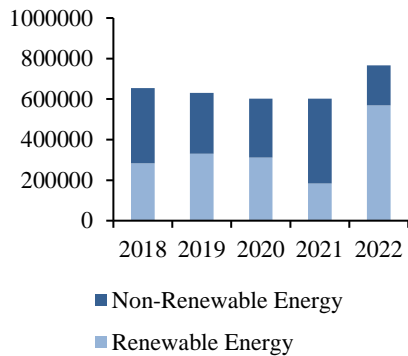


specific regulators such as ANACOM and ERC. Legal departments of NOS face this challenge by monitoring evolving legal and regulatory landscapes.

### Risk Heat Map

Overall, considering the likelihood and the impact of each risk, the economic environment, cybersecurity and liquidity and interest rates constitute the main sources of risk for the firm (Figure 125). Therefore, NOS should address them by continuously investing in new solutions to mitigate its impact, such as considering investing in new revenue streams to decrease dependence in specific economic contexts, increasing frequency of regular audits, set targets for liquidity ratios that allow the firm to smooth an emergency requirement and hedging against variations in interest rate by using interest rate derivatives.

**Figure 126.**  
Energy Consumption (in gigajoules)

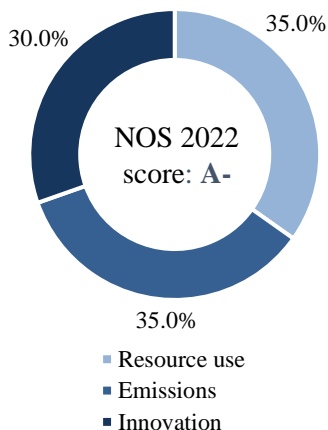


Source: Refinitiv

### ESG ANALYSIS

Navigating towards an analysis concerning the environmental, social and governance (ESG) dimensions, NOS’s business model includes a diligent management of its resources, evaluating every risk and opportunity involved in a decision-making process to achieve a positive impact on society. Therefore, the dimensions of ESG are incorporated into their 2021-2025 strategic plan through four sustainable strategic pillars that together aim to tackle ESG issues. Each category of ESG will be analysed in the following paragraphs, next to Figures 127, 129 and 131 that include weights attributed to the components of each pillar to compute the respective score.

**Figure 127.**  
Environment Pillar Refinitiv Weighs

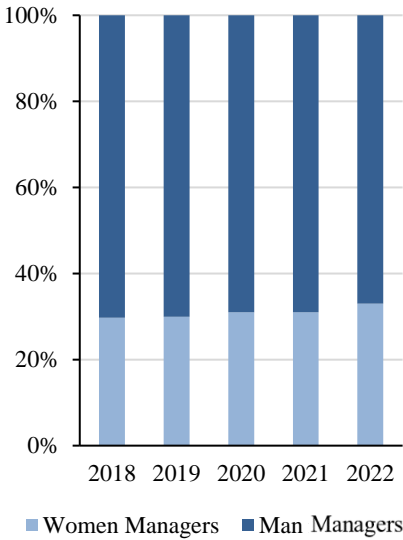


Source: Refinitiv

### Environment

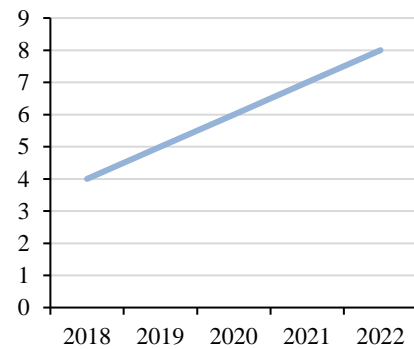
The first pillar included in the strategy of NOS is referred to as “In the name of the planet” and its goal is to fight against climate change and to incentivize circular economy. Actions related to this include using renewable energy and recycling old equipment. Since 2011, the firm started including emission reduction initiatives and climate change policies while only in 2020 did the firm began discussing consistently both risks and opportunities regarding climate change. A milestone worth mentioning took place in June of 2023, when NOS and 11 other global operators and GSMA committed to decrease e-waste, which is considered the main environmental problem that the country is facing. The main waste of the firm’s activities arises from end-of-

**Figure 128.**  
Gender distribution of managers



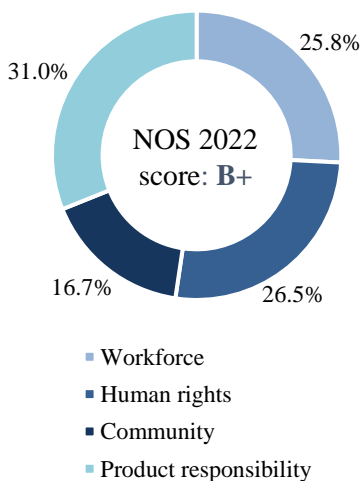
Source: Refinitiv

**Figure 130.**  
Auditor Tenure (in years)



Source: Refinitiv

**Figure 129.**  
Social Pillar Refinitiv Weighs



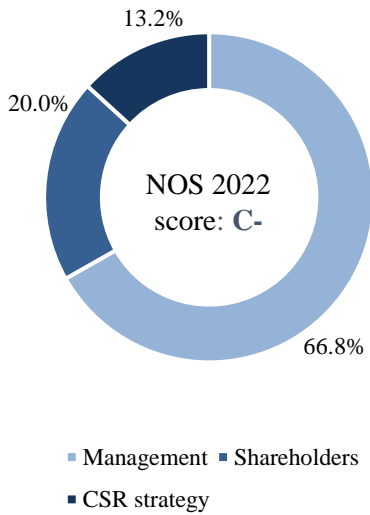
Source: Refinitiv

life electrical and electronic equipment and its packaging and batteries. Thus, a goal established to fight against it consists of collecting, by 2030, a minimum of 20% of used mobile devices through take-back schemes, as well as guaranteeing that all the received devices are either repaired, reused, or transferred to institutions responsible for recycling. Energy efficiency policies led to the vast majority of energy used being renewable. In 2022 the company achieved its highest level of total energy consumption which consisted of 765,979.2 gigajoules and total CO<sub>2</sub> emissions increased by approximately 12%, which is likely associated with the quick expansion of the installed capacity for the 5G network (Figure 126). The environment overall score remained stable from 2021 to 2022, being the most well-ranked category of ESG.

### Social

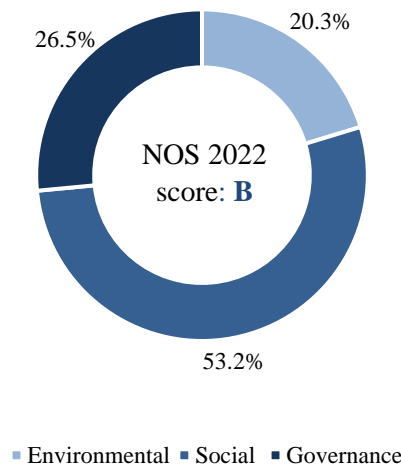
Another pillar is called “For a Digital Future” and, as the name suggests, aims to boost the digital transformation of society through democratic access to technology and inclusion of the most vulnerable groups. It proposes to generalize digital access through the expansion of network coverage and services and to promote the sustainable development of firms through their digital transformation. The third pillar, “More for our people”, involves setting NOS as the best firm to work in by incentivizing equality of opportunities, inclusion, diversity, and physical equilibrium. Thus, along with the formation of an inclusive mindset and many other aspects, it redefines a well-being program aiming to promote a more sustainable and healthier lifestyle. Therefore, NOS presents several policies regarding health, safety, career development, human rights, data privacy and diversity. As presented in Figure 128, in 2022 the percentage of woman managers followed the ongoing increasing trend and achieved 33%, revealing that within this metric the efforts of the firm to promote diversity are shown in its results. In the same year, donations increased 150%, which might be related with the firm being in a comfortable financial position. As Figure 129 reveals, in 2022, the overall ESG score of the social pillar was B+.

**Figure 131.**  
Governance Pillar Refinitiv Weights



Source: Refinitiv

**Figure 132.**  
Refinitiv score components



Source: Refinitiv

## Governance

Finally, the fourth pillar, “Ethical and Responsible Management”, intends to place NOS as an example regarding the establishment of better management practices that focus on ethics, government, management risk and continuous evaluation of the supply chain. Following this, it aims to encourage reflection on the current government model along with acting in an ethical manner that reveals accountability towards its employees, suppliers, and partners.

NOS counts with a Corporate Governance and Sustainability Committee, which is a Board Committee including non-executive Directors specialized in ESG issues. It has the responsibility of analysing business operations in matters of corporate governance, environmental sustainability, and others. As shown in Figure 130, the auditor tenure has been increasing which, although might provide auditors a better understanding of the firm, it can also impact their objectivity.

According to Figure 131, Governance is the worst-ranked pillar of ESG. The firm seems to not being exploring the full potential of already created policies related with this pillar, as there is a lot of room for improvement and the firm could, for instance, contribute to more SDGs. The investigation of Isabel dos Santos, who presents a significant stake in NOS, could potential contribute to a decline in the governance score through controversies, conflicts of interest and her impact on essential governance issues which might endanger the perception of transparency and ethical practices of the firm.

## Threats & Opportunities

As recorded in Figure 132, Refinitiv attributes a B to the overall ESG score of NOS. According to another well-known rating agency, Moody’s ESG Solutions, NOS accomplished the fourth-highest ESG score within European Telecoms in 2022, which consisted of 66 out of 100. Not only was there an improvement of 3 points in the final score when compared to 2021, but that improvement was in the performance of all areas evaluated – environmental, social, and governance.

NOS acknowledges risks concerning ESG issues among which are: current and emerging regulation risks, as operational costs are affected by climate

change regulation that influence energy prices; technology risks, due to the difficulty of keeping up tech trends that might compromise energy efficiency measures in operations; and reputation risks, because if the firm fails to deliver to the public its well-intended commitment concerning ESG, the negative perception affects the firm's reputation and allows for market loss, a decrease in interest of investors and of brand value. Nonetheless, there are also associated opportunities. Indeed, with the increasing energy needs of NOS, the firm must continue investing in green energy sources in order to benefit from the establishment of energy management programmes to raise energy efficiency enabling to reduce operating costs. Additionally, the rise in interest regarding carbon reduction solutions allows to strengthen NOS's low carbon P&S portfolio and use this new potential market to increase revenues.

The strong position in Moody's ranking along with the actions that NOS has undertaken so far and plans to perform in the future, reveal a possible source of competitive advantage as it attracts customers who are increasingly aware and concerned about sustainability and ethical business practices, and for the already existing customers, it might even strengthen customer loyalty. Additionally, it can contribute to risk mitigation as focusing on areas such as cybersecurity can prevent possible network outages and distinguish them from competitors who are more vulnerable to cyberattacks (e.g., Vodafone cyberattack February 2022). Nonetheless, as competitors are also aware of the benefits associated with focusing on ESG issues, it is of extreme importance to continue to innovate within this area.

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Appendix

Appendix 1.

Forecasted Balance Sheet (EUR, in millions)

ASSETS	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>NON - CURRENT ASSETS:</b>												
Tangible assets	1,107.1	1,098.3	1,105.6	1,123.0	1,145.2	1,160.0	1,138.8	1,255.6	1,354.9	1,351.7	1,360.1	1,377.2
Investment property	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Intangible assets	1,209.6	1,209.1	1,209.1	1,209.1	1,209.1	1,209.1	1,209.1	1,209.1	1,209.1	1,209.1	1,209.1	1,209.1
Contract costs	160.6	159.0	159.0	159.0	159.0	159.0	159.0	159.0	159.0	159.0	159.0	159.0
Rights of use	297.7	309.6	309.6	309.6	309.6	309.6	309.6	309.6	309.6	309.6	309.6	309.6
Jointly controlled companies	39.0	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2
Tax receivable	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Other financial assets non-current	5.2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Deferred income tax assets	89.6	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0
Derivative financial instruments	11.2	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
<b>TOTAL NON - CURRENT ASSETS</b>	<b>2,920.8</b>	<b>2,916.5</b>	<b>2,923.8</b>	<b>2,941.2</b>	<b>2,963.4</b>	<b>2,978.2</b>	<b>2,957.0</b>	<b>3,073.7</b>	<b>3,173.1</b>	<b>3,169.9</b>	<b>3,178.2</b>	<b>3,195.4</b>
<b>CURRENT ASSETS:</b>												
Inventories	67.2	63.2	65.4	67.5	69.2	70.6	71.8	73.1	75.8	78.3	80.6	82.4
Accounts receivable - trade	362.2	358.6	371.3	382.9	392.7	400.7	408.1	415.2	430.5	445.1	457.9	468.5
Contract assets	60.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
Tax receivable	6.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
Prepaid expenses	52.2	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4
Derivative financial instruments	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Cash and cash equivalents	15.2	43.4	124.0	248.9	330.8	386.1	466.9	415.5	430.9	577.0	698.0	788.8
<b>TOTAL CURRENT ASSETS</b>	<b>563.9</b>	<b>587.6</b>	<b>683.1</b>	<b>821.7</b>	<b>915.1</b>	<b>979.7</b>	<b>1,069.2</b>	<b>1,026.1</b>	<b>1,059.5</b>	<b>1,222.9</b>	<b>1,358.9</b>	<b>1,462.1</b>
<b>TOTAL ASSETS</b>	<b>3,484.7</b>	<b>3,504.1</b>	<b>3,606.9</b>	<b>3,762.9</b>	<b>3,878.5</b>	<b>3,957.9</b>	<b>4,026.2</b>	<b>4,099.9</b>	<b>4,232.6</b>	<b>4,392.8</b>	<b>4,537.2</b>	<b>4,657.5</b>
<b>SHAREHOLDER'S EQUITY</b>												
Share capital	855.2	855.2	855.2	855.2	855.2	855.2	855.2	855.2	855.2	855.2	855.2	855.2
Capital issued premium	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Own shares	- 16.0	- 15.1	- 15.1	- 15.1	- 15.1	- 15.1	- 15.1	- 15.1	- 15.1	- 15.1	- 15.1	- 15.1
Legal reserve	1.0	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Other reserves and accumulated earnings	- 22.9	90.9	217.0	291.2	331.7	366.5	390.4	409.7	460.5	512.7	560.1	600.8
Net Income	224.6	18.6	23.7	27.7	29.3	23.0	23.3	30.5	26.3	32.0	36.9	39.9
Non-controlling interests	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
<b>TOTAL EQUITY</b>	<b>1,052.3</b>	<b>964.5</b>	<b>1,095.8</b>	<b>1,173.9</b>	<b>1,216.0</b>	<b>1,244.5</b>	<b>1,268.7</b>	<b>1,295.2</b>	<b>1,341.8</b>	<b>1,399.7</b>	<b>1,452.0</b>	<b>1,495.8</b>
<b>LIABILITIES</b>												
<b>NON - CURRENT LIABILITIES:</b>												
Borrowings	1,210.2	1,547.0	1,505.3	1,570.9	1,634.0	1,676.7	1,713.1	1,752.8	1,822.7	1,909.5	1,988.1	2,053.6
Provisions	81.3	83.4	83.4	83.4	83.4	83.4	83.4	83.4	83.4	83.4	83.4	83.4
Deferred income	2.8	-	-	-	-	-	-	-	-	-	-	-
Deferred income tax liabilities	50.1	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8
<b>TOTAL NON - CURRENT</b>	<b>1,344.4</b>	<b>1,681.3</b>	<b>1,639.5</b>	<b>1,705.1</b>	<b>1,768.2</b>	<b>1,810.9</b>	<b>1,847.3</b>	<b>1,887.0</b>	<b>1,956.9</b>	<b>2,043.8</b>	<b>2,122.3</b>	<b>2,187.8</b>
<b>CURRENT LIABILITIES:</b>												
Borrowings	427.5	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0
Accounts payable - trade	541.1	379.3	392.7	404.9	415.2	423.5	431.3	438.6	454.9	470.3	483.9	494.9
Tax payable	38.8	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Accrued expenses	212.4	222.3	222.3	222.3	222.3	222.3	222.3	222.3	222.3	222.3	222.3	222.3
Deferred income	38.2	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
Derivative financial instruments	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>TOTAL CURRENT LIABILITIES</b>	<b>1,258.4</b>	<b>858.3</b>	<b>871.6</b>	<b>883.9</b>	<b>894.2</b>	<b>902.5</b>	<b>910.2</b>	<b>917.6</b>	<b>933.8</b>	<b>949.3</b>	<b>962.9</b>	<b>973.9</b>
<b>TOTAL LIABILITIES</b>	<b>2,602.8</b>	<b>2,539.6</b>	<b>2,511.1</b>	<b>2,589.0</b>	<b>2,662.4</b>	<b>2,713.4</b>	<b>2,757.5</b>	<b>2,804.6</b>	<b>2,890.8</b>	<b>2,993.1</b>	<b>3,085.1</b>	<b>3,161.7</b>
<b>TOTAL LIABILITIES AND SHAREHOLDER'S EQUITY</b>	<b>3,484.7</b>	<b>3,504.1</b>	<b>3,606.9</b>	<b>3,762.9</b>	<b>3,878.5</b>	<b>3,957.9</b>	<b>4,026.2</b>	<b>4,099.9</b>	<b>4,232.6</b>	<b>4,392.8</b>	<b>4,537.2</b>	<b>4,657.5</b>

## Appendix 2.

### Forecasted Free Cash Flow Map (EUR, in millions)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>Revenues</b>												
Telco												
Bundles	757.3	802.4	820.3	848.2	871.6	889.3	903.0	915.6	941.6	974.7	1,003.3	1,025.5
Mobile	354.8	376.0	386.5	403.5	419.1	432.3	443.9	455.0	472.5	493.8	513.6	530.8
Fixed Voice	47.5	42.2	40.6	39.2	37.8	36.7	36.6	36.7	36.7	36.8	36.8	36.9
Fixed Broadband	42.6	44.4	45.7	47.9	50.0	52.2	54.4	56.8	59.2	61.8	64.5	67.3
Pay TV	74.6	77.2	76.6	75.4	74.2	73.0	71.8	70.7	69.5	68.4	67.3	66.2
Other Services	4.7	7.4	8.7	9.0	9.3	9.5	9.6	9.8	10.1	10.4	10.7	11.0
Equipment & Sales	115.8	98.9	100.6	103.8	106.6	108.8	110.8	112.6	116.0	120.1	123.7	126.7
Other Sales	29.2	27.9	26.4	27.3	28.0	28.6	29.1	29.6	30.5	31.5	32.5	33.3
<b>Telco Revenues</b>	<b>1,426.5</b>	<b>1,476.4</b>	<b>1,505.5</b>	<b>1,554.4</b>	<b>1,596.6</b>	<b>1,630.4</b>	<b>1,659.2</b>	<b>1,686.7</b>	<b>1,736.1</b>	<b>1,797.5</b>	<b>1,852.4</b>	<b>1,897.6</b>
<i>YoY Growth %</i>	<i>5.1%</i>	<i>3.5%</i>	<i>2.0%</i>	<i>3.2%</i>	<i>2.7%</i>	<i>2.1%</i>	<i>1.8%</i>	<i>1.7%</i>	<i>2.9%</i>	<i>3.5%</i>	<i>3.1%</i>	<i>2.4%</i>
Audiovisuals												
Cinema Exhibitions	35.5	48.0	37.4	39.2	41.0	42.9	44.9	47.0	49.2	51.5	53.9	56.3
Advertising	19.9	22.5	23.7	24.7	25.5	26.2	27.0	27.8	28.6	29.5	30.4	31.3
Content & TV Channels	25.8	24.0	26.0	26.7	27.1	27.1	27.1	27.2	27.2	27.2	27.3	27.3
Bar sales and DVDs	12.3	16.5	11.9	12.5	13.1	13.7	14.3	15.0	15.7	16.4	17.1	17.9
Other	1.1	1.0	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
<b>Audiovisuals Revenues</b>	<b>94.5</b>	<b>112.1</b>	<b>100.0</b>	<b>104.0</b>	<b>107.6</b>	<b>110.9</b>	<b>114.3</b>	<b>117.9</b>	<b>121.7</b>	<b>125.6</b>	<b>129.7</b>	<b>134.0</b>
<i>YoY Growth %</i>	<i>29.7%</i>	<i>18.6%</i>	<i>-10.7%</i>	<i>3.9%</i>	<i>3.5%</i>	<i>3.1%</i>	<i>3.1%</i>	<i>3.2%</i>	<i>3.2%</i>	<i>3.2%</i>	<i>3.3%</i>	<i>3.3%</i>
<b>Total Revenue</b>	<b>1,521.0</b>	<b>1,588.4</b>	<b>1,605.5</b>	<b>1,658.3</b>	<b>1,704.2</b>	<b>1,741.3</b>	<b>1,773.5</b>	<b>1,804.6</b>	<b>1,857.8</b>	<b>1,923.1</b>	<b>1,982.2</b>	<b>2,031.6</b>
<i>YoY Growth %</i>	<i>6.3%</i>	<i>4.4%</i>	<i>1.1%</i>	<i>3.3%</i>	<i>2.8%</i>	<i>2.2%</i>	<i>1.9%</i>	<i>1.8%</i>	<i>2.9%</i>	<i>3.5%</i>	<i>3.1%</i>	<i>2.5%</i>
<b>Costs</b>												
Wages and salaries	(85.9)	(92.3)	(96.4)	(99.3)	(101.9)	(104.5)	(107.0)	(107.5)	(107.5)	(107.4)	(107.4)	(107.4)
Direct costs	(345.0)	(357.0)	(396.9)	(409.9)	(421.2)	(430.3)	(438.2)	(445.9)	(459.0)	(475.1)	(489.7)	(501.9)
Costs of products sold	(114.6)	(96.5)	(95.5)	(98.6)	(101.3)	(103.5)	(105.5)	(107.3)	(110.6)	(114.5)	(118.0)	(121.0)
Marketing and advertising	(34.7)	(38.0)	(39.6)	(39.7)	(37.2)	(38.0)	(38.7)	(39.4)	(40.7)	(42.1)	(43.4)	(44.4)
Support services	(83.5)	(93.5)	(94.1)	(94.6)	(95.2)	(95.8)	(96.4)	(97.1)	(97.7)	(98.4)	(99.1)	(99.8)
External Services	(155.2)	(144.4)	(136.4)	(140.9)	(144.8)	(147.9)	(150.6)	(153.3)	(157.8)	(163.3)	(168.4)	(172.5)
Other operating losses	(0.8)	(0.9)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)
Indirect Taxes	(35.0)	(36.1)	(36.9)	(38.1)	(39.2)	(40.0)	(40.7)	(41.4)	(42.6)	(44.1)	(45.5)	(46.6)
Provisions	(15.2)	(18.0)	(17.1)	(17.7)	(18.1)	(18.5)	(18.8)	(19.1)	(19.7)	(20.4)	(21.0)	(21.5)
<b>Total Costs</b>	<b>(869.9)</b>	<b>(876.6)</b>	<b>(913.6)</b>	<b>(939.6)</b>	<b>(959.7)</b>	<b>(979.3)</b>	<b>(996.8)</b>	<b>(1,011.6)</b>	<b>(1,036.2)</b>	<b>(1,066.1)</b>	<b>(1,093.2)</b>	<b>(1,115.8)</b>
<b>EBITDA</b>	<b>651.1</b>	<b>711.8</b>	<b>691.9</b>	<b>718.7</b>	<b>744.5</b>	<b>761.9</b>	<b>776.8</b>	<b>793.0</b>	<b>821.5</b>	<b>857.0</b>	<b>889.0</b>	<b>915.8</b>
<i>% of Total Revenues</i>	<i>42.8%</i>	<i>44.8%</i>	<i>43.1%</i>	<i>43.3%</i>	<i>43.7%</i>	<i>43.8%</i>	<i>43.8%</i>	<i>43.9%</i>	<i>44.2%</i>	<i>44.6%</i>	<i>44.8%</i>	<i>45.1%</i>
D&A Expenses	(480.9)	(468.7)	(461.7)	(466.6)	(474.9)	(492.9)	(537.9)	(501.9)	(548.8)	(568.0)	(567.8)	(573.0)
<b>EBIT</b>	<b>257.1</b>	<b>246.5</b>	<b>229.7</b>	<b>251.6</b>	<b>269.1</b>	<b>268.6</b>	<b>238.3</b>	<b>290.6</b>	<b>272.2</b>	<b>288.5</b>	<b>320.7</b>	<b>342.2</b>
Income Tax	(32.7)	(15.3)	(37.0)	(40.5)	(43.3)	(43.2)	(38.3)	(46.7)	(43.8)	(46.4)	(51.6)	(55.1)
<b>EBIAT</b>	<b>224.4</b>	<b>231.3</b>	<b>192.8</b>	<b>211.1</b>	<b>225.8</b>	<b>225.3</b>	<b>200.0</b>	<b>243.8</b>	<b>228.4</b>	<b>242.1</b>	<b>269.1</b>	<b>287.2</b>
(-) Capital Expenditures	(625.8)	(476.0)	(469.0)	(484.1)	(497.1)	(507.6)	(516.7)	(618.6)	(648.2)	(564.8)	(576.2)	(590.1)
(-) Change in NWC	20.7	(16.3)	1.5	1.4	1.2	1.0	1.0	1.0	1.8	1.7	1.6	1.3
(+) D&A Expenses	(480.9)	(468.7)	(461.7)	(466.6)	(474.9)	(492.9)	(537.9)	(501.9)	(548.8)	(568.0)	(567.8)	(573.0)
<b>Free Cash Flow</b>	<b>58.9</b>	<b>240.3</b>	<b>184.0</b>	<b>192.2</b>	<b>202.4</b>	<b>209.6</b>	<b>220.2</b>	<b>126.1</b>	<b>127.3</b>	<b>243.5</b>	<b>259.2</b>	<b>268.7</b>
<i>% of Total Revenues</i>	<i>3.9%</i>	<i>15.1%</i>	<i>11.5%</i>	<i>11.6%</i>	<i>11.9%</i>	<i>12.0%</i>	<i>12.4%</i>	<i>7.0%</i>	<i>6.8%</i>	<i>12.7%</i>	<i>13.1%</i>	<i>13.2%</i>

### Appendix 3.

#### Forecasted Free Cash Flow Map (EUR, in millions)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Telco	473.04	368.96	362.18	373.93	384.09	392.22	399.15	477.90	525.21	437.86	445.64	456.50
<i>% of Total CAPEX</i>	<i>95.4%</i>	<i>94.9%</i>	<i>93.9%</i>	<i>93.9%</i>	<i>94.0%</i>	<i>94.0%</i>	<i>94.0%</i>	<i>94.8%</i>	<i>95.2%</i>	<i>94.2%</i>	<i>94.1%</i>	<i>94.2%</i>
Technical	325.14	229.96	234.21	241.81	248.38	253.64	258.12	334.53	377.65	285.07	288.18	295.20
Baseline	161.26	143.21	147.53	152.32	156.46	159.77	162.59	165.29	170.13	176.14	181.53	185.95
Network Expansion	163.88	86.75	86.68	89.49	91.92	93.87	95.53	169.24	207.52	108.93	106.65	109.25
Customer Related	147.91	139.00	127.97	132.12	135.71	138.58	141.03	143.37	147.56	152.78	157.46	161.29
Audiovisuals	22.89	19.87	23.53	24.13	24.61	25.10	25.60	26.11	26.63	27.17	27.71	28.26
<i>% of Total CAPEX</i>	<i>4.6%</i>	<i>5.1%</i>	<i>6.1%</i>	<i>6.1%</i>	<i>6.0%</i>	<i>6.0%</i>	<i>6.0%</i>	<i>5.2%</i>	<i>4.8%</i>	<i>5.8%</i>	<i>5.9%</i>	<i>5.8%</i>
Leasing Contracts	129.88	87.13	83.27	86.01	88.38	90.31	91.98	114.64	96.35	99.74	102.80	105.37
Spectrum licenses	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total Group CAPEX</b>	<b>625.81</b>	<b>475.97</b>	<b>468.97</b>	<b>484.06</b>	<b>497.08</b>	<b>507.63</b>	<b>516.73</b>	<b>618.65</b>	<b>648.20</b>	<b>564.76</b>	<b>576.15</b>	<b>590.13</b>

### Appendix 4.

#### Forecasted Income Statement (EUR, in millions)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>Revenues</b>												
<b>Telco</b>												
Bundles	757.3	802.4	820.3	848.2	871.6	889.3	903.0	915.6	941.6	974.7	1,003.3	1,025.5
Mobile	354.8	376.0	386.5	403.5	419.1	432.3	443.9	455.0	472.5	493.8	513.6	530.8
Fixed Voice	47.5	42.2	40.6	39.2	37.8	36.7	36.6	36.7	36.7	36.8	36.8	36.9
Fixed Broadband	42.6	44.4	45.7	47.9	50.0	52.2	54.4	56.8	59.2	61.8	64.5	67.3
Pay TV	74.6	77.2	76.6	75.4	74.2	73.0	71.8	70.7	69.5	68.4	67.3	66.2
Other Services	4.7	7.4	8.7	9.0	9.3	9.5	9.6	9.8	10.1	10.4	10.7	11.0
Equipment & Sales	115.8	98.9	100.6	103.8	106.6	108.8	110.8	112.6	116.0	120.1	123.7	126.7
Other Sales	29.2	27.9	26.4	27.3	28.0	28.6	29.1	29.6	30.5	31.5	32.5	33.3
<b>Telco Revenues</b>	<b>1,426.5</b>	<b>1,476.4</b>	<b>1,505.5</b>	<b>1,554.4</b>	<b>1,596.6</b>	<b>1,630.4</b>	<b>1,659.2</b>	<b>1,686.7</b>	<b>1,736.1</b>	<b>1,797.5</b>	<b>1,852.4</b>	<b>1,897.6</b>
<i>YoY Growth %</i>	<i>5.1%</i>	<i>3.5%</i>	<i>2.0%</i>	<i>3.2%</i>	<i>2.7%</i>	<i>2.1%</i>	<i>1.8%</i>	<i>1.7%</i>	<i>2.9%</i>	<i>3.5%</i>	<i>3.1%</i>	<i>2.4%</i>
<b>Audiovisuals</b>												
Cinema Exhibitions	35.5	48.0	37.4	39.2	41.0	42.9	44.9	47.0	49.2	51.5	53.9	56.3
Advertising	19.9	22.5	23.7	24.7	25.5	26.2	27.0	27.8	28.6	29.5	30.4	31.3
Content & TV Channels	25.8	24.0	26.0	26.7	27.1	27.1	27.1	27.2	27.2	27.2	27.3	27.3
Bar sales and DVDs	12.3	16.5	11.9	12.5	13.1	13.7	14.3	15.0	15.7	16.4	17.1	17.9
Other	1.1	1.0	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
<b>Audiovisuals Revenues</b>	<b>94.5</b>	<b>112.1</b>	<b>100.0</b>	<b>104.0</b>	<b>107.6</b>	<b>110.9</b>	<b>114.3</b>	<b>117.9</b>	<b>121.7</b>	<b>125.6</b>	<b>129.7</b>	<b>134.0</b>
<i>YoY Growth %</i>	<i>29.7%</i>	<i>18.6%</i>	<i>-10.7%</i>	<i>3.9%</i>	<i>3.5%</i>	<i>3.1%</i>	<i>3.1%</i>	<i>3.2%</i>	<i>3.2%</i>	<i>3.2%</i>	<i>3.3%</i>	<i>3.3%</i>
<b>Total Revenue</b>	<b>1,521.0</b>	<b>1,588.4</b>	<b>1,605.5</b>	<b>1,658.3</b>	<b>1,704.2</b>	<b>1,741.3</b>	<b>1,773.5</b>	<b>1,804.6</b>	<b>1,857.8</b>	<b>1,923.1</b>	<b>1,982.2</b>	<b>2,031.6</b>
<i>YoY Growth %</i>	<i>6.3%</i>	<i>4.4%</i>	<i>1.1%</i>	<i>3.3%</i>	<i>2.8%</i>	<i>2.2%</i>	<i>1.9%</i>	<i>1.8%</i>	<i>2.9%</i>	<i>3.5%</i>	<i>3.1%</i>	<i>2.5%</i>
<b>Costs</b>												
Wages and salaries	(85.9)	(92.3)	(96.4)	(99.3)	(101.9)	(104.5)	(107.0)	(107.5)	(107.5)	(107.4)	(107.4)	(107.4)
Direct costs	(345.0)	(357.0)	(396.9)	(409.9)	(421.2)	(430.3)	(438.2)	(445.9)	(459.0)	(475.1)	(489.7)	(501.9)
Costs of products sold	(114.6)	(96.5)	(95.5)	(98.6)	(101.3)	(103.5)	(105.5)	(107.3)	(110.6)	(114.5)	(118.0)	(121.0)
Marketing and advertising	(34.7)	(38.0)	(39.6)	(39.7)	(37.2)	(38.0)	(38.7)	(39.4)	(40.7)	(42.1)	(43.4)	(44.4)
Support services	(83.5)	(93.5)	(94.1)	(94.6)	(95.2)	(95.8)	(96.4)	(97.1)	(97.7)	(98.4)	(99.1)	(99.8)
External Services	(155.2)	(144.4)	(136.4)	(140.9)	(144.8)	(147.9)	(150.6)	(153.3)	(157.8)	(163.3)	(168.4)	(172.5)
Other operating losses	(0.8)	(0.9)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)
Indirect Taxes	(35.0)	(36.1)	(36.9)	(38.1)	(39.2)	(40.0)	(40.7)	(41.4)	(42.6)	(44.1)	(45.5)	(46.6)
Provisions	(15.2)	(18.0)	(17.1)	(17.7)	(18.1)	(18.5)	(18.8)	(19.1)	(19.7)	(20.4)	(21.0)	(21.5)
<b>Total Costs</b>	<b>(869.9)</b>	<b>(876.6)</b>	<b>(913.6)</b>	<b>(939.6)</b>	<b>(959.7)</b>	<b>(979.3)</b>	<b>(996.8)</b>	<b>(1,011.6)</b>	<b>(1,036.2)</b>	<b>(1,066.1)</b>	<b>(1,093.2)</b>	<b>(1,115.8)</b>
<b>EBITDA</b>	<b>651.1</b>	<b>711.8</b>	<b>691.9</b>	<b>718.7</b>	<b>744.5</b>	<b>761.9</b>	<b>776.8</b>	<b>793.0</b>	<b>821.5</b>	<b>857.0</b>	<b>889.0</b>	<b>915.8</b>
<i>% of Total Revenues</i>	<i>42.8%</i>	<i>44.8%</i>	<i>43.1%</i>	<i>43.3%</i>	<i>43.7%</i>	<i>43.8%</i>	<i>43.8%</i>	<i>43.9%</i>	<i>44.2%</i>	<i>44.6%</i>	<i>44.8%</i>	<i>45.1%</i>
D&A Expenses	(480.9)	(468.7)	(461.7)	(466.6)	(474.9)	(492.9)	(537.9)	(501.9)	(548.8)	(568.0)	(567.8)	(573.0)
<b>EBIT</b>	<b>257.1</b>	<b>246.5</b>	<b>229.7</b>	<b>251.6</b>	<b>269.1</b>	<b>268.6</b>	<b>238.3</b>	<b>290.6</b>	<b>272.2</b>	<b>288.5</b>	<b>320.7</b>	<b>342.2</b>
Interest Expenses	(31.58)	(64.3)	(73.3)	(74.6)	(77.5)	(79.6)	(81.2)	(82.9)	(85.2)	(88.9)	(92.4)	(95.4)
Income Tax	(32.7)	(47.4)	(25.2)	(28.5)	(30.8)	(30.4)	(25.3)	(33.4)	(30.1)	(32.1)	(36.7)	(39.7)
<b>Net Income</b>	<b>182.3</b>	<b>131.2</b>	<b>148.5</b>	<b>160.8</b>	<b>158.6</b>	<b>131.8</b>	<b>174.3</b>	<b>156.9</b>	<b>167.5</b>	<b>191.6</b>	<b>207.1</b>	

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<b>Buy</b>	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
<b>Hold</b>	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
<b>Sell</b>	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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## Introduction

The arrival of 5G technology represents a pivotal shift in the telecommunications landscape, offering groundbreaking advancements in connectivity and reshaping industries on a global scale (Poonkuzhale 2023). This analysis navigates through the challenging terrain of 5G adoption, focusing on Portugal's telecom market, a benchmark with key European countries, and the potential implications of market dynamics on NOS. By exploring market strategies and employing scenario analyses, this study seeks to provide crucial insights into the transformative potential of 5G technology within the telecom sector. Specifically, this paper aims to quantify the potential impact of NOS's presumed 5G advantage on its market positioning and consequently, on the valuation of its share price, shedding light on the intricacies of competitive dynamics and market fluctuations in this dynamic era of telecommunications.

## 5G technology

5G is the fifth generation of wireless technology, and it represents a monumental leap in the evolution of mobile networks, promising a paradigm shift in how people connect, communicate, and utilize technology (Giosuè 2022). To comprehend the significance of 5G, it's crucial to contextualise its development by reflecting on the trajectories of its predecessors, namely 3G and 4G, and the impact they've had on industries and society.

The introduction of 3G in the early 2000s marked a pivotal moment in mobile communications. It brought about mobile internet access, allowing users to browse the web, send emails, and conduct basic online activities on their phones. This technological jump laid the groundwork for enhanced connectivity, albeit with limited data speeds and capabilities compared to subsequent generations (Moes 2023).

Following 3G, the advent of 4G networks around 2010 marked a transformative era. With significantly faster data speeds and improved performance, 4G enabled high-definition video streaming, app-based services, and the proliferation of mobile commerce. This revolution fuelled the rise of on-demand services, mobile gaming, and social media platforms, profoundly impacting consumer behaviour, businesses, and industries (Olaf Swantee 2012). Companies that adapted swiftly to the 4G landscape experienced substantial growth and market dominance (Ménard et al. 2012).

Currently, the onset of 5G heralds an era of unprecedented possibilities. Its technical prowess surpasses that of its predecessors by offering astonishingly fast speeds, nearly imperceptible latency, and exceptional connectivity, enabling the download of movies in seconds, experiencing augmented reality applications seamlessly, and granting instant communication for critical systems like autonomous vehicles and remote healthcare (Intel 2020).

The implications of 5G extend far beyond mere speed enhancements. This technology serves as a catalyst for innovation across multiple industries. Smart cities will leverage 5G to optimize infrastructure, transportation, and energy management, enhancing efficiency and sustainability (Mudaliar 2023). Healthcare will witness groundbreaking advancements with telemedicine, remote surgeries, and the proliferation of medical IoT devices, transcending geographical barriers and transforming patient care (Georgiou, Georgiou, and Satava 2021).

Moreover, the impact of 5G extends to industries like manufacturing, entertainment, agriculture, and beyond. Enhanced connectivity and real-time data transmission will revolutionize production lines, entertainment experiences, precision agriculture, and logistics, unlocking new levels of efficiency, customization, and interconnectivity (Zimmermann 2023).

In this era of 5G, the dynamics within the telecommunications industry face a strong possibility of shifting. Established players such as MEO, NOS, and Vodafone, are making substantial investments to lead in 5G infrastructure and services (Nunes 2023). However, new entrants and partnerships may emerge, capitalizing on 5G's transformative potential to disrupt established markets and create innovative solutions (Morris 2019).

Notwithstanding, challenges arise: infrastructure investments, spectrum allocation, cybersecurity, and privacy concerns pose significant hurdles in realizing the full potential of 5G. Addressing these barriers requires collaboration between governments, regulatory bodies, technology providers, and businesses to ensure a secure, accessible, and inclusive 5G ecosystem (Catherine Udell 2023).

## 5G in Portugal

The 5G investment in Portugal started back in 2019 (Caetano 2021). However, it was only in 2021 that NOS announced the launch of 5G technology, claiming to be the first operator to introduce it in Portugal, which was then confirmed by ANACOM, who granted NOS the initial 5G license, as the company was the highest bidder, investing over €165 million in the extensive 5G auction (ECO 2021).

The delay in the launch of this technology placed Portugal as the penultimate European Union country to offer commercial 5G services (ECO 2022a). NOS's proactive stance in claiming victory in the auction and swiftly launching 5G could position the company as a potential market leader (ECO 2021).

At present, NOS commemorates two years of providing 5G services, marking a milestone with the successful implementation of a state-of-the-art Core 5G Stand Alone (SA) (NOS 2023).

Underscoring the pivotal role of 5G network development in NOS's strategy, with the company investing around €420 million to date, propelling them to hold the largest 5G coverage in Portugal, enveloping over 93% of the population (Rodrigues 2023).

The collaboration with Nokia and Ericsson yielded an innovative 5G SA infrastructure that promised ultra-low latency, clocking in at under 10 milliseconds. Remarkably, a substantial 25% of NOS's customer base already owns 5G-enabled devices, with 84% actively engaging with this technology regularly, underlining the rapid adoption and utilization of 5G services among customers (APDC 2023). Notably, 76% of smartphones sold in Western Europe in 2022 are 5G-compatible (ECO 2022b), setting the stage for further expansion and utilization of this advanced technology.

Moreover, NOS's venture into the business landscape showcases promising potential, with over 500 agreements already forged for 5G/IoT projects across sectors such as healthcare and retail (Srikapardhi 2023). These initiatives signify the transformative power of 5G in revolutionizing industry practices, enhancing operational efficiencies, and fostering innovation.

NOS's dedication to the advancement of 5G technology extends beyond infrastructure; the company has actively contributed to digital transformation through its 5G & Digital Transformation Hub since May 2022. This innovative incubator aims to fuel innovation, drive technological convergence, and accelerate 5G adoption across Portugal, solidifying NOS's commitment to spearheading technological innovation in the Portuguese market (NOS 2022).

As of the third quarter of 2023, Portugal witnessed a notable surge of 5% in 5G base stations compared to the previous quarter, indicating the addition of 395 new installations. In the realm of telecommunications providers, the race for dominance in the 5G market is evident. NOS

emerges as the frontrunner, boasting a total of 3,889 5G base stations, capturing 47% of the market share. Following closely, Vodafone holds 2,950 stations, while MEO solidifies its presence with 1,387 stations (ANACOM 2023a).

With 8,226 5G base stations spread across 308 municipalities, the entirety of Portugal's districts is now covered. Additionally, 5G base stations already cover 1,924 parishes, constituting 62% of the total across the nation (ANACOM 2023a).

## 5G in Europe

The European Commission's proactive approach to 5G began in 2013, launching the 5G-PPP partnership and committing over €700 million for research and innovation. This initiative aligns with global consensus building and investments in 5G research, aiming to support high traffic volumes expected by 2025, particularly in emerging fields like IoT and machine-to-machine communication (European Commission 2023).

In 2016, the Commission introduced a 5G action plan to ensure early deployment of infrastructure across Europe, aiming for 5G services in all EU Member States to be fully operational by 2020 (which was not achieved by Lithuania, Malta, and Portugal), followed by comprehensive coverage in urban areas and transport routes by 2025 (European Commission 2022).

Up until 2021, several European countries have made significant strides in the implementation of 5G technology. Notably, countries such as Italy, Denmark, Netherlands, Switzerland, and Germany, emerged as frontrunners in the deployment of 5G networks (Taylor 2023). The progress observed in these nations can be attributed to various factors, including favourable regulatory environments and strategic initiatives undertaken by leading telecom operators.

To obtain a deeper understanding of the operational intricacies and the consequential impacts on telecom entities in these dynamic environments, a focused analysis was conducted on Switzerland, Germany, and Italy.

Switzerland's telecom market has three main players: Swisscom, dominating with 57% of mobile connections in 2022, followed by Sunrise with 26%, and Salt with 16% (ComCom 2023). Sunrise was the first to launch 5G services in 2019 (Sunrise 2019), but the giant Swisscom quickly followed within just a month (Ericsson 2021). Though both Sunrise and Swisscom's market share increased by around 1 percentage point in this period (Table 1), these shifts in market share may not solely stem from their 5G implementations, as there could be expansion strategies or innovative marketing campaigns at play during the same period (Ploe 2020).

Italy has a more competitive market with 3 main players holding a relatively close market share in 2022: WindTre (25.60%), TIM (24.70%), and Vodafone (22.60%) (Laricchia 2023). Additionally, Iliad, a low-cost French operator, joined the Italian market in 2018 with an aggressive pricing strategy (Agnew 2018). All four of these operators launched their 5G services in 2019 (Tomás 2020). Since then, the top three operators lost ground to Iliad, which surged from 6.60% in 2019 to 12.20% in 2022 (Table 1), showcasing a significant impact despite unclear ties to their 5G services.

Germany's telecom industry resembles Portugal's in the sense that both countries share a telecom landscape structured around three well-established companies that maintain similar market positions and shares. Its three main players are Deutsche Telekom (33.50%), Vodafone (38.30%), and Telefonica O2 (28.20%) (Davies 2023). While Deutsche Telekom (Deutsche Telekom 2019) and Vodafone (Tomás 2023) launched their 5G commercial operations in mid-

2019, Telefonica O2 did so later in October 2020 (Telefónica O2 2020), creating a notable gap. Furthermore, Vodafone is the operator that has been investing in and developing the most 5G SA antennas across the country over the last few years (Tomás 2023). In this period, Vodafone's market share increased by 2 percentage points, while Deutsche Telekom gained 50 basis points, whereas Telefonica O2 dropped over 2 percentage points (Table 1).

Although it's uncertain if these operators' growths relate directly to their 5G investments, some players in these regions have indeed bolstered their market standings (Table 1).

### Potential competitive advantage

While one telecom operator often becomes the first to launch 5G services in a specific region, the subsequent entry of competitors is swift. In most regions, rival telecom companies have taken only a couple of months to roll out their 5G services after the initial launch by the first mover (as can be seen in the aforementioned examples). This trend suggests that the competitive advantage doesn't solely stem from being the initial provider but could be influenced by the importance and investment level each company dedicates to seizing this opportunity.

In Portugal, NOS was indeed the pioneer in delivering 5G services (NOS 2021), but the lead over competitors was brief, lasting only four days until Vodafone's rapid launch (Vodafone 2021). MEO, being the largest telecom operator in Portugal, entered the race last, unveiling its 5G services just over a month after its primary competitors (SAPO 2021). Despite launching 5G around the same time, the current landscape reveals NOS controlling approximately 47% of the 5G base stations, surpassing the closest competitor (Vodafone) by more than 10%. This statistic underscores NOS's significant focus and investment in this opportunity, highlighting their strategic emphasis on 5G, rather than merely being the first entrant in the new market.

Considering the substantial importance of this emerging technology and NOS's strategic planning, it's reasonable to envision scenarios where the company strengthens its market position and expands its customer base in comparison to its rivals. This strategic alignment with 5G could position NOS for considerable growth and influence in the telecommunications sector.

In light of this, conducting a scenario analysis becomes crucial to comprehend how NOS's potential competitive advantage in the realm of 5G could impact the company's share price.

Analysing potential scenarios will shed light on the extent to which NOS's strategic positioning in the 5G landscape might influence its financial performance and stock market valuation.

### Impact on Share price

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In the initial valuation model, it was implicitly assumed that NOS would keep a stable market share throughout the years and that 5G wouldn't result in major shifts in the players' market positions. It was presumed that all competitors would equally adopt this new technology in the market, without any perceived advantages for consumers in favour of a particular operator.

However, the focus now shifts to examining the potential impact of one player achieving a competitive edge in the realm of 5G technology on the valuation of NOS's share price.

The study will explore two scenarios: the first one involves NOS gaining a competitive advantage in 5G technology, resulting in an increased market share due to superior consumer perception of its developments. Conversely, the second scenario contemplates a situation where a competitor (such as MEO or Vodafone) outperforms NOS in 5G advancements, consequently attaining a higher market share.

To perform this study, the services analysed were bundles and individualized mobile services, since no changes are expected in Fixed Broadband, Fixed Voice, and PayTV, as they are not as

related to these 5G developments (Smith 2023). The services that are expected to experience a higher change in market share are individualized mobile services. This is primarily because the aforementioned, namely specific data plans or voice packages, can be more easily compared and switched by consumers based on factors like quality of service, or pricing. In contrast, consumers might find it more challenging to switch bundled services due to contractual agreements, convenience, or loyalty incentives tied to the packages (Ribeiro et al. 2023).

The telecom market is renowned for its stability and resistance to rapid changes, making alterations in market share a time-consuming venture (Lunn and Lyons 2018). Considering the stability and inertia inherent in the telecom sector, it's reasonable to anticipate that NOS's endeavours to boost its market share through 5G may realistically unfold over an estimated period of approximately three years, akin to what was witnessed in Switzerland's telecom market (Table 1). This timeframe allows for the gradual adoption of 5G technology, the establishment of market confidence, and the acquisition of a larger consumer base attracted by the enhanced services and experiences offered by NOS.

In the context of implementing 5G services, it is anticipated that the cost structure will maintain a comparable pattern to that outlined in the initial model. The commercialization of new technology, especially one as transformative as 5G, typically aligns with an upward trend in associated revenues (Ericsson 2019). However, this expected revenue surge might not necessarily translate into a direct bottom-line increase due to the simultaneous rise in costs associated with deploying and managing 5G networks (Dano 2021).

Considering the previously mentioned factors, the initial scenario demonstrates the impact of a 1.5% increase in the market share of individualized mobile services. This figure aligns with the observed growth among certain European players, reflecting the median increase witnessed by

operators experiencing positive growth between 2019 and 2022 (Table 1). Regarding the increase in bundles' market share, a smaller value of 1% was assumed for the aforementioned reasons. This increase in market share was tested as a gradual progression over a period of three years, until the end of 2026, when it would stabilize at 29.4% for mobile and 36.4% for bundles (Table 2).

Despite being a relatively modest rise, this would yield an incremental increase of more than €40 million annually in both bundled and personalized mobile revenues post-2025 (Graphs 1 and 2). As can be seen in Graphs 1 and 2, when compared to a base scenario, the YoY growth rate is expected to increase significantly while the market share is growing steadily. From 2028 onwards, the growth rate reverts back to the one obtained in a base scenario, nonetheless, it operates at a notably higher scale, resulting in an increase of over €440 million over the next decade.

Finally, looking at the impact of this strengthening of NOS's market position on its share price, these increases in market shares would result in a value of 4.42€ (Figure 1), which represents an upside of 30.10%, over 10 percentage points higher than the base scenario (Table 3), highlighting how a leadership position in 5G could increase the firm's value.

When comparing the first to a second scenario, where a competitor would achieve this competitive advantage, it is important to note that the effects would be less impactful, in absolute terms, as the negative impact of a competitor increasing its market share would be captured by various players and not just by NOS. Keeping that in consideration, this scenario will take into account a decrease of 1% in the individualized mobile services' market share and a decrease of 0.5% in the bundles' market share.

Similar to the first scenario, a moderate decline in the firm’s market position would still implicate a significant downturn in its future revenues, showcasing a decrease of over €250 million until 2033 (Graphs 3 and 4). Moreover, as can be seen in Graphs 3 and 4 this decrease slowly becomes more significant and, from 2026 onwards, this would represent an annual decrease of over €25 million.

Regarding NOS’s share price, this small decrease in market share would see NOS fall below the 4€ threshold to 3.88€ (Figure 1). Nonetheless, it would still be 14% above the firm’s current price (Table 3), still indicating a BUY position.

A more extensive scenario analysis was also performed to fully understand the extent of these market share changes impact on NOS’s share price.

		NOS Market share - Mobile 4Q2026 (incremental)								
		-2.00%	-1.50%	-1.00%	-0.50%	0.00%	0.50%	1.00%	1.50%	2.00%
NOS Market share - Bundles 4Q2026 (incremental)	-1.50%	3.59 €	3.65 €	3.71 €	3.76 €	3.82 €	3.88 €	3.93 €	3.99 €	4.04 €
	-1.00%	3.68 €	3.74 €	3.79 €	3.85 €	3.91 €	3.96 €	4.02 €	4.07 €	4.13 €
	-0.50%	3.77 €	3.82 €	3.88 €	3.94 €	3.99 €	4.05 €	4.11 €	4.16 €	4.22 €
	0.00%	3.86 €	3.91 €	3.97 €	4.02 €	4.08 €	4.14 €	4.19 €	4.25 €	4.31 €
	0.50%	3.94 €	4.00 €	4.06 €	4.11 €	4.17 €	4.22 €	4.28 €	4.34 €	4.39 €
	1.00%	4.03 €	4.09 €	4.14 €	4.20 €	4.25 €	4.31 €	4.37 €	4.42 €	4.48 €
	1.50%	4.12 €	4.17 €	4.23 €	4.29 €	4.34 €	4.40 €	4.45 €	4.51 €	4.57 €

Figure 1: Scenario Analysis

As can be seen in the table above (Figure 1), the same percentual increase in the different services’ market share yields different share prices. Naturally, as the bundled services represent a higher share of NOS’s revenues than individualized mobile services, the same change in market share will implicate a bigger impact from the bundled services. However, as discussed earlier in this paper, 5G developments are expected to generate higher changes in the mobile

market, thus, the impact on the firm's share price ends up fairly balanced between both these categories.

In a more optimistic scenario, where NOS would be able to increase its mobile market share by 2% and its bundles market share by 1.5%, the firm's share price would surge to 4.57€, 14.3% above the initial valuation price, where a constant market share was assumed.

## Conclusion

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The evolution of telecommunications, marked by the advent of 5G technology, stands poised to redefine connectivity and revolutionize industries on a global scale. Amidst this evolving landscape, the analysis meticulously crafts scenario analyses to envision the potential ramifications of NOS's presumed 5G advantage on its market positioning and share price valuation.

Notably, the data suggests that NOS's proactive stance and substantial investments in 5G infrastructure position the company as a frontrunner in Portugal's 5G market. Should NOS leverage this perceived advantage effectively, it could translate into a significant improvement in its market share and, subsequently, its share price valuation.

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Appendix

Table 1 – European Countries Mobile Market Share [2018-2022]:

Switzerland						
Market share	2018	2019	2020	2021	2022	Δ 19-22
Swisscom	58.30%	56.40%	n.a.	n.a.	57.00%	0.60%
Sunrise	24.90%	25.10%	n.a.	n.a.	26.00%	0.90%
Salt	16.80%	16.10%	n.a.	n.a.	16.00%	-0.10%
Others	0.00%	2.40%	n.a.	n.a.	1.00%	-1.40%
Italy						
Market share	2018	2019	2020	2021	2022	Δ 19-22
WindTre	32.80%	30.00%	27.70%	26.50%	25.60%	-4.40%
TIM	27.90%	27.20%	26.60%	25.50%	24.70%	-2.50%
Vodafone	25.70%	24.70%	23.90%	23.10%	22.60%	-2.10%
Iliad	3.40%	6.60%	9.30%	10.90%	12.20%	5.60%
Others	10.20%	11.50%	12.50%	14.00%	14.90%	3.40%
Germany						
Market share	2018	2019	2020	2021	2022	Δ 19-22
Deutsche Telekom	32.40%	33.00%	32.30%	31.70%	33.50%	0.50%
Vodafone	35.20%	36.20%	38.10%	38.70%	38.30%	2.10%
Telefonica O2	32.40%	30.80%	29.50%	29.60%	28.20%	-2.60%

Source: Statista Research Department 2023; ComCom 2023; Laricchia 2023; Davies 2023

Table 2 – NOS’s Market share:

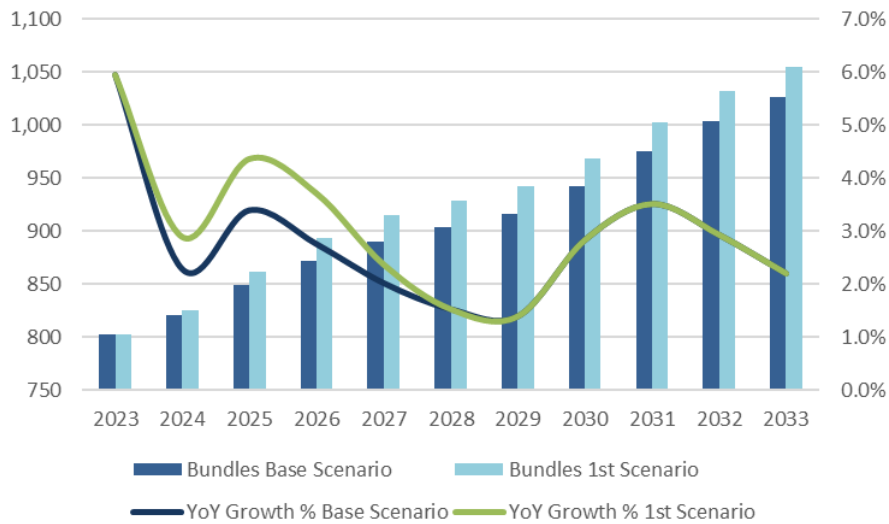
	NOS' Market share		
	Current MS	g until 2026	MS 2026
Mobile	27.90%	1.50%	29.40%
Bundles	35.40%	1.00%	36.40%

Source: ANACOM 2023b; ANACOM 2023c

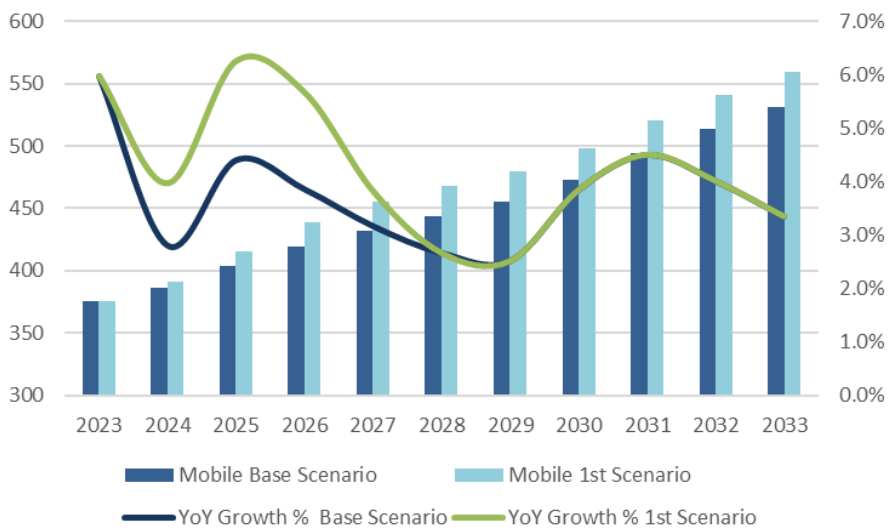
Table 3 – Share price and its upside in the studied scenarios:

Scenario	Share price implications		
	Base	1 <sup>st</sup> Scenario	2 <sup>nd</sup> Scenario
Share Price	4.08 €	4.42 €	3.88 €
Implied upside	20.02%	30.10%	14.15%

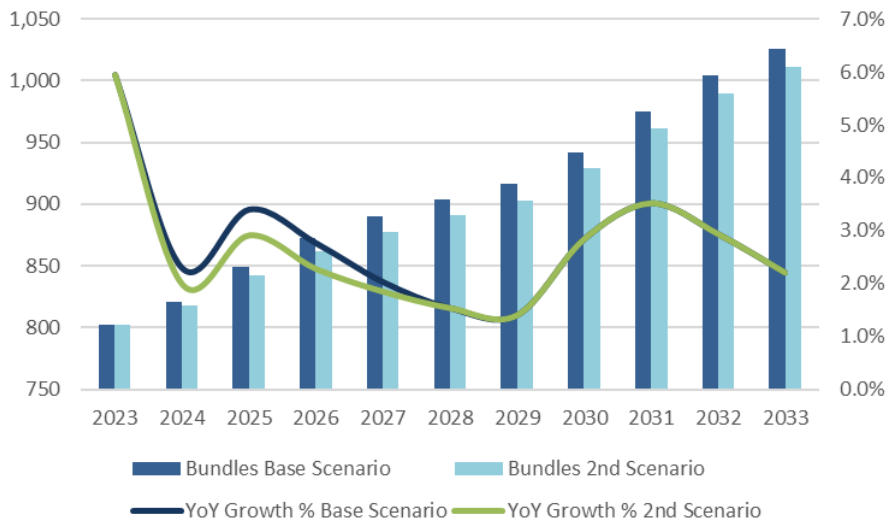
Graph 1 – Market share increase effect on bundles revenues’ evolution:



Graph 2 – Market share increase effect on individualized mobile revenues’ evolution:



Graph 3 – Market share decrease effect on bundles revenues’ evolution:



Graph 4 – Market share decrease effect on individualized mobile revenues’ evolution:

