Bilibili profit model analysis

Ruolin Huang¹, †, Xingtai Wang², †, Zhengjiayang Xing³, †, Yuxin Ying⁴, †

¹Shanghai International High School of BANZ, Shanghai, China
²Chengdu foreign language school, Chengdu, China
³Shanxi Jinzhong Institute of Technology, Shanxi, China
⁴Zhejiang University City College, Zhejiang, China

*Corresponding author: 32011176@stu.zucc.edu.cn
†These authors contributed equally

Keywords: Bilibili, Profit model, Internet economy.

Abstract: As one of China's largest ACG culture video websites [1], Bilibili was listed on NASDAQ in 2018. Bilibili, an online video platform, has also gone from a small circle to the public. However, throughout Bilibili's annual reports for the past five years, it can be easily found that its net profit has been in the red every year. In this regard, this paper analyzes from multiple angles and puts forward specific suggestions. Firstly, the company's background is explained. Its consumer groups, industry status, and development trend are positioned with the PEST analysis method, which provides the precursor and necessary information for the central part of this paper -- profit model analysis. It is combined with its financial data analysis and mainly financial correlation ratio compared with the industry. To point out the problems in Bilibili's profit model and propose corresponding and feasible solutions. The primary analysis methods are literature analysis and case analysis.

1. Introduction

1.1 Research background

Bilibili is the most popular video website for the Chinese Z generation. It has always been at the top of Baidu's hot search list (top internet browser in China) for the post-00s. Due to the active and friendly community atmosphere of Bilibili, users are highly loyal. According to the statistics of Bilibili, the average daily usage time of a single Bilibili user is 79 minutes. The retention rate of full members in the 12th month is over 80%. Users play videos 1.2 billion times on average interact 5.2 billion times every month. The number of full members who pass exams reaches 39 million.

Generation Z has a large number of mobile Internet users, nearly 330 million. They will be the main force of cultural and entertainment consumption in the future. It is expected that they will contribute 66% of online entertainment market consumption by 2023.

Bilibili is the most popular video website for the Chinese Z generation. It has always been at the top of Baidu's hot search list (top internet browser in China) for the post-00s. Due to the active and friendly community atmosphere of Bilibili, users are highly loyal. According to the statistics of Bilibili, the average daily usage time of a single Bilibili user is 79 minutes. The retention rate of full members in the 12th month is over 80%. Users play videos 1.2 billion times on average interact 5.2 billion times every month. The number of full members who pass exams reaches 39 million.

In addition, Bilibili's unique social trends and diverse content provide an impetus for content creators to create ecologically, which also keeps Bilibili hot and vibrant. Bilibili gradually became the birthplace of much popular culture. As a result, Bilibili has formed a close symbiotic relationship with the younger generation of Chinese users [2].
1.2 Research significance

In 2019, the scale of China's Internet entertainment market was nearly 3.1 trillion yuan [3]. As an essential part of the online entertainment market, video websites cannot make profits and face huge losses. Although Bilibili has many Z generation users, the website has also been at a loss since its A round of financing: Bilibili continued to lose money from 2015 to 2019. In 2019, the deficit exceeded 1.3 billion yuan.

The analysis of Bilibili's profit model in this paper will help find the reasons for the problems existing in Bilibili and the continuous loss, which has a specific reference value for the company to establish a reasonable profit model, improve profitability and achieve profit from loss.

For a company, its primary goal is to maximize profit or value. Therefore, the study of this paper is not only an exploration of Bilibili's profit model but also of reference significance to similar video websites in China.

2. Bilibili consumer group analysis

Bilibili is the most popular App among China's Gen Z generation. It has always been at the top of Baidu's search list for the post-00s. As the following table, the user group under the age of 24, as a high-quality and young group, accounts for more than 50% of the total users of Bilibili, which is a significant feature different from other companies in the industry. User youth has brought significant advantages to Bilibili's development.

![Figure 1. The distribution of fans of Bilibilibama](Data source: Pyrocloud Data)

Bilibili has a highly and maturely youthful user structure. The website has a rapid growth in the number of months usage with a high-frequency interaction. Plus, the non-patch advertising gives users a high-quality experience. Through the data reflecting the two core indicators of user engagement (average daily usage times and average daily usage duration), Bilibili's performance can be proved to be particularly excellent.

As the data shows, Bilibili's 30-day user retention rate reaches 79%, making it the industry leader. Significantly higher than the retention rate of the Top10 video sites.

Bilibili content diversification and quality, appealing continuous improvement. With the development, Bilibili is no longer a small cartoon video site. The website has already contained 26 kinds of content, including live broadcasts, TV series and animation. It gradually becomes the trend
of Chinese youth exchange, carnival culture entertainment community. The same culture originated from the secondary yuan A; D stand entirely failed to comply with the adjustment ability of The Times. As a secondary video website with a highly youthful age structure, Bilibili has more advantages: broader business direction, superior content quality, accurate user group, tenacious user viscosity, and multi-faceted profitability. Bilibili’s excellent utilization of advantages ultimately makes it different from other websites of the same type.

3. Bilibili's profit model

3.1 Mobile game’s revenue

Game revenue is Bilibili's primary source of income. Take the report for the fourth quarter of 2018 as an example; its quarterly revenue was 1.15 billion yuan. Meanwhile, its game revenue was 710-million-yuan, accounting for 62% of the fourth quarter. Bilibili's gaming revenue has always been its top source of revenue.

Bilibili is the gathering place of many ACG cultures, and Bilibili deeply recognizes this point and fully excavates the platform’s advantage. From the beginning, Bilibili mainly operated games jointly with game manufacturers, "re-selling" to its users, especially its platform users.

Bilibili mainly acts as an agent of ACG games [4]. To gain the users accurately, Bilibili made its target audiences feel that the content of the platform and games is highly consistent with their interests, hobbies, and values, which also improved users' viscosity to Bilibili. Hence, Bilibili users will also be more willing to recharge within the game. From the view of revenue and tariff, it can be said that Bilibili's game agency direction and mode is relatively successful.

Meanwhile, the easy IP characteristics of ACG games enable Bilibili to carry out pan-entertainment. Pan-product market derivatives are better to obtain more attention and income through market promotion. Indeed, Bilibili has also held many events with the help of games and IP characters. Comic-con, for example, enhances the user experience while capturing traffic and revenue. Bilibili’s good promotion and positioning also made Bilibili the fourth fastest-growing mobile game revenue among the top10 in 2019[5].

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Listed company</th>
<th>Mobilegame revenue (hundred million yuan)</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tencent game</td>
<td>937.35</td>
<td>20.48</td>
</tr>
<tr>
<td>2</td>
<td>Netease game</td>
<td>331.58</td>
<td>16.25</td>
</tr>
<tr>
<td>3</td>
<td>Notoginseng and entertainment</td>
<td>119.89</td>
<td>114.80</td>
</tr>
<tr>
<td>4</td>
<td>Perfect World</td>
<td>38.81</td>
<td>43.13</td>
</tr>
<tr>
<td>5</td>
<td>Bilibili</td>
<td>35.97</td>
<td>22.48</td>
</tr>
<tr>
<td>6</td>
<td>Beijing Kunlun Tech</td>
<td>31.32</td>
<td>4.80</td>
</tr>
<tr>
<td>7</td>
<td>iDreamsky</td>
<td>24.47</td>
<td>17.20</td>
</tr>
<tr>
<td>8</td>
<td>XD</td>
<td>22.95</td>
<td>49.22</td>
</tr>
<tr>
<td>9</td>
<td>Yoozoo</td>
<td>22.52</td>
<td>-12.29</td>
</tr>
<tr>
<td>10</td>
<td>Elex</td>
<td>20.52</td>
<td>-33.06</td>
</tr>
</tbody>
</table>

Table 1. Mobile game revenue among the top10 in 2019

However, Internet games, especially mobile games, face more intense competition in the industry. Bilibili's development in games also faces many problems, such as unstable product life, users' picky taste, and high operating costs. The development of Bilibili games has also come to a standstill recently. Compared with 2020 in 2021, the operating income report shows its gaming revenue growth is slow. In 2021 known three quarterly financial reports, their highest increase ratio is only 9%. Compared with steady at around 30% growth last year, the 2021 Bilibili game's income increase amplitude is not brilliant, which confirmed its games industry in a certain stagnation. As a result, Bilibili game revenue cannot increase significantly.

Plus, with the promulgation of the Restriction law on minor games in China on August 31, 2021, game companies have been negatively affected in the number of users, user activity, and game
recharge. Bilibili, as figure 1 shows, has 75% of its users under the age of 24. Whether in the short term or the long term, the ban on minors will cause Bilibili to face volatile factors in the game’s development. Therefore, Bilibili also needs to reduce this risk by changing its single revenue structure to avoid economic losses caused by the environment and accidents.

Moreover, Tencent and Netease's market share accounted for more than 70% of the Chinese internet game market [5]. Lacking pop style and head games cause Bilibili inevitably not get more money out of the game. In this case, Bilibili should start independently researching and developing more games to avoid income split and better control the game management operations and planning.

3.2 Live-streaming revenue

As China's live-streaming industry has proliferated in recent years, Bilibili has also added live-streaming modules to its platform. Bilibili’s live streaming development has great potential. With the help of Bilibili's own good platform and reputation, Bilibili’s live-streaming mainly focuses on live games and ACG culture. Its users can easily find the parts they are interested in by classifying the live broadcast sections. The live-streaming part enriches Bilibili's content and diversity of user types and improves the number of users.

Meanwhile, the platform's live-streaming service development also indirectly forms a closed-loop from games to live-streaming. Bilibili’s subsequent development of virtual idols also meets the needs of its mainstream ACG cultural users. The careful maintenance and operation of the live-streaming section have also increased a lot of attention and revenue for Bilibili. Bilibili can effectively increase the flow and income of its platform by creating virtual idols or signing influential idols with substantial fan numbers and viscosity.

On this basis, Bilibili's live broadcast module has been further expanded. It is not difficult to see Bilibili's efforts to improve the income of the live broadcast business and its ambition in the income of the value-added live broadcast business. To some extent, the arrival of live-streaming value-added services has eased Bilibili's long-standing dependence on games for revenue. As Bilibili added comics app, FM and other value-added services, the total revenue from value-added services has surpassed
game revenue to become Bilibili’s most crucial revenue source since the fourth quarter of 2020. The trend has continued to this day. The development of live-streaming can effectively solve the problem of the single income of Bilibili and reduce the pressure from the game revenue stagnant.

3.3 Paid member revenue

Bilibili paid members (VIPS, also called significant members) have lower returns. Bilibili sets its unique membership rating mode. Ordinary users can be upgraded to ordinary members after answering questions in the platform and become Bilibili significant members after topping up. However, Bilibili’s significant members have only 1080P clarity and a small number of extra animes. Compared with ordinary members, the significant members have relatively low-cost performance and privilege.

Moreover, compared with the membership function of other paid video sites (which contains more video resources), Bilibili’s significant membership function is also fragile. As a result, Bilibili has fewer significant members and low revenue from significant members’ fees. For example, the third-quarter financial report of 2021 reported only 23 million monthly paying users (including but not limited to live-streaming value-added services), which is very small compared to 267 million monthly active users. Accompanying the low price of the significant memberships (just a few yuan per month), the current benefits of the significant memberships are minimal.

Nevertheless, as Bilibili has added more original drama content, it has also increased the value and appeal of significant members to a certain extent. Bilibili’s value-added service revenue can be further increased in the future if the value and attractiveness of the large membership can be still increased.

3.4 Advertisement revenue

Bilibili’s advertising revenues are not stellar, but they are improving. The main reason for the problem is that at the beginning of Bilibili’s establishment, in order to establish the positioning of Bilibili, the founder promised not to add patch ads in videos, which resulted in Bilibili having to give up this advertising income when other paid video websites set patch ads for ordinary users [6]. Fortunately, in recent years, Bilibili has added image advertising between the plate and plate of the home page and certain image advertisements on the content playing page. The type and color of the commercial contents are very close and not obtuse, which alleviates the gap in advertising revenue and obeys the vow.

On the other hand, Bilibili allows owners to receive commercial soft ads and cooperate with vloggers. vloggers produce content and add soft ads into the content. Bilibili shares advertising costs with them in proportion, which improves the loss situation and increases advertising revenue to a certain extent. In some content, video without patch advertising has become an essential characteristic for Bilibili to enhance user engagement. Bilibili should also focus its advertising revenue on soft advertising in the future.

3.5 e-commerce revenue

With the rapid development of the Internet e-commerce industry in China, it has become an excellent way to exchange tariffs for money through live-streaming and video e-commerce publicity. Bilibili is still in the development stage. Bilibili has a vast and rapidly growing number of monthly active users, providing a foundation for its e-commerce development. However, unlike Douyin and Kuaishou (two top short-videos apps in China), the leading players in e-commerce revenue, its picky users have prevented it from growing as quickly as Douyin and Kuaishou. Due to the picky taste from users to the video content, product quality and vloggers, Bilibili’s e-commerce development has been limited to some extent.

Nevertheless, Bilibili has also grown through high revenue sharing and reasonable maintenance of its live-streaming platform for e-commerce. For example, from the first quarter to the fourth quarter of the 2020 financial report, its e-commerce revenue increased five times to 730 million yuan. It even surpassed advertising to become the third-largest source of revenue. Bilibili’s e-commerce revenue will become more important as long as the number of monthly active users increases as expected.
4. Problem analysis of Bilibili profit model

Founded in 2009, Bilibili is less mature than other short video creation platforms, just like a baby eagle. It does not have the flawless operation and high-profit models of other platforms as a new platform due to its lack of rich "experience". Bilibili's profit mainly comes from six aspects: game revenue, live broadcast tax revenue, significant member revenue, advertising revenue, e-commerce business revenue and offline activity revenue. Games and live broadcasts brought Bilibili’s most crucial revenue. The following will analyze several problems of Bilibili's profit model [7].

4.1 Inchoate position restricts advertisement putting

At the beginning of the establishment of Bilibili, to position Bilibili, the founder promised that he would not put patch advertisements on Bilibili. It leads to the result that Bilibili has more than 100 million monthly active users but cannot serve ads. Some highly harmonious advertisements with the content can only be placed between modules and on the content playing page, leading to the difficulty of advertising screening in Bilibili. It is challenging to meet the appropriate advertising content consistent with the platform tone.

As seen from the following table, the proportion of its advertising income is relatively low in the industry.

<table>
<thead>
<tr>
<th>Name</th>
<th>Total income(billion)</th>
<th>Advertising revenue (billion)</th>
<th>proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>iQIYI</td>
<td>29.7</td>
<td>68</td>
<td>22.8</td>
</tr>
<tr>
<td>Mango TV</td>
<td>14.006</td>
<td>41.39</td>
<td>29.5</td>
</tr>
<tr>
<td>Bilibili</td>
<td>12</td>
<td>18</td>
<td>15</td>
</tr>
</tbody>
</table>

Bilibili has also developed a way for vloggers to add soft advertisements to their content. The platform and vloggers can share revenue. This form increases the income to a certain extent. However, it has to undertake the situation that the quality of the products promoted is not standard, which caused the vlogger's reputation to be damaged. Then the reputation of Bilibili is also affected. In addition, due to the limited number of fans of vloggers, the number of viewers is also limited, which is far inferior to the influence and purchasing power of advertising push by Bilibili itself.

In contrast, other paid video sites can be a minute to a minute and a half advertising patches. Its profit is fast and considerable. The advertising problem of Bilibili will be an urgent problem to be solved in recent years.

4.2 Focus on subculture video field, have single audience

Bilibili is a video website whose audience is mainly young people and has the characteristics of a subculture community [8]. The website has formed its unique business model by relying on the dissemination and audience expansion of ACG and other subcultures. Currently, it is the most prominent gathering place of subculture. Its business is mainly related to ACG and upstream and downstream industries, so the scope of video content is relatively limited. Bilibili is a platform based on the operation of video websites, combining games, live broadcasting and peripheral sales. In particular, the impact on Bilibili's leading source of revenue, especially game revenue, is profound: most of the games it themes are mainly anime, and there are few other types of games.

Then from the perspective of the user group, Bilibili's consumer group is small and relatively concentrated but with strong consumer awareness and high loyalty. Therefore, due to the small user group size, the scope of Bilibili’s profit has mainly come from the subculture and is relatively limited.
5. The financial evaluation of Bilibili profit model

5.1 Basic financial evaluation

Table 3. Financial ratios

<table>
<thead>
<tr>
<th>Year</th>
<th>Current ratio</th>
<th>Asset-liability ratio</th>
<th>Quick ratio</th>
<th>Turnover of current assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>154%</td>
<td>40.2%</td>
<td>153.3%</td>
<td>1.39%</td>
</tr>
<tr>
<td>2018</td>
<td>198.6%</td>
<td>31.4%</td>
<td>196.9%</td>
<td>0.95%</td>
</tr>
<tr>
<td>2019</td>
<td>241.6%</td>
<td>50.8%</td>
<td>240%</td>
<td>0.8%</td>
</tr>
<tr>
<td>2020</td>
<td>212.9%</td>
<td>67.4%</td>
<td>210.8%</td>
<td>0.92%</td>
</tr>
</tbody>
</table>

The above shows the financial proportion data of Bilibili from 2017 to 2020 to intuitively present its operating conditions in the past four years. As can be seen from the table, Bilibili's current ratio, asset-liability ratio and quick ratio showed an overall upward trend from 2017 to 2020. The turnover rate of current assets decreased year by year. The company's current assets accounted for a high proportion of total assets, among which monetary capital accounted for a large proportion. However, the proportion of non-current assets in total assets is low, affecting the company's development and profitability.

Due to the high debt and low investment from shareholders, the company's asset-liability ratio is too high, increasing the company's financial risk. If the cash flow cannot be supplemented on time, the cash flow may be insufficient, leading to the fracture of the capital chain, which is not conducive to the company's development.

Bilibili has a solid ability to repay the current liabilities because the quick ratio on the margin of safety may cause idle funds. Although it is gradually decreasing, Cash ratios have been too high, and if Bilibili still remains in the high range in the latest financial data, it will potentially affect its profitability. Generally speaking, the larger company's current asset turnover is better. However, Bilibili's current asset turnover is lower than other companies in the same industry. To a large extent, Bilibili needs to increase additional capital investment, which will increase the company's burden and reduce its income.

5.2 The defect of financial evaluation under this profit model

5.2.1 Single income structure

Although Bilibili has been adjusting its revenue structure in recent years, mobile games still account for more than 50%, mainly FGO and Blue Airlines (two top popular games in Bilibili). However, due to the rapid updating of the game market, some games may be eliminated quickly. Therefore, if mobile games account for too much revenue, it can easily lead to unstable profits. Bilibili needs further to adjust its income structure in its future operation.

5.2.2 Commercial realization contradicts positioning

In the context of the Internet economy, Bilibili's commercial realization comes from monetizing the traffic brought by many users on its platform through soft advertisements. However, the increased amount of advertising contradicts Bilibili's propaganda of zero advertising. In the commercialization process, if the excessive realization of traffic without paying attention to content quality operation and users' feelings will lead to the decline of user experience, then the loss of users brought by the result is more than worth the gain. Therefore, Bilibili needs to find the balance point between commercialization and users.

6. Suggestions on Bilibili profit model

6.1 Improve the cost performance of VIPs

Bilibili’s paid member group is mainly secondary-world enthusiasts. To improve the cost performance of Bilibili’s paid members, first, it can cooperate with some foreign films and television companies by adding to paid member-exclusive broadcasts and services. Bilibili can give paid member
groups exclusive access to high-quality videos resources (including films and series) with full translated subtitles, while ordinary groups cannot gain this right. Second, Bilibili can cooperate with the domestic mainstream media to spread Chinese traditional culture and traditional festivals. The Chinese young people like the traditional Chinese elements in the theme content. Bilibili can create such content for all users to watch, but the creating process content access only to paid members. In addition, Bilibili can also improve the cost performance of significant members by having more resources that suit and are popular for groups with older age, such as morning exercise on live and Mahjong skill teaching videos. In this case, it would not attract more people to use the website but also utilize the purchasing power of older people to increase Bilibili’s revenue.

6.2 Increase the proportion of video producers with goods

Bilibili platform has many video producers who upload their clips on the platform. Vloggers upload videos to the platform to display interest and hobbies, driving follower traffic and revenue for vloggers. If the fans are very cohesive, the vlogger will have a lot of sales potential. The "Thousand Coffee Plan" launched by Bilibili in 19 is a very successful case. Therefore, the platform should not only focus on the personality characteristics of video producers, professional knowledge characteristics and the ability to guide and purchase goods to improve the delivery system [9], but also improve the proportion of delivery goods through the support of traffic and capital. First, Bilibili can provide up vloggers by distributing flow to vloggers with the potential to increase users' attention to them. Under the condition of considerable flow, vloggers use flow to increase their influence and therefore achieve certain goals and earn profits by publicizing and selling products in their videos.

Meanwhile, it also improves the proportion of video producers in bringing goods on the platform. Second, Bilibili can provide vloggers with certain funds as a driving force. The platform can invest a certain amount of money to vloggers to carry out the delivery business or allocate the appropriate amount of money as a reward according to the quantity and quality of the delivery business of vloggers, which will also become a driving force for video producers to deliver goods and effectively improve the proportion of video producers to deliver goods.

6.3 Update advertising charging model

Bilibili, as the largest two-dimensional ACG communication network community in China, is breaking the two-dimensional label to promote the process of "going out of the circle"[10]. Advertising revenue is one of the most important income sources of Bilibili. The innovation of the advertising charging model also plays a positive role in promoting Bilibili's profit, gaining revenue through up main business order [11]. The vertical relationship between specific vloggers and relevant users can enable vloggers to publicize related products better. Second, the cooperation between platforms and vloggers can be strengthened. Bilibili platform can provide vloggers with specific targeted publicity and traffic, which improves the video playback volume and popularity of video producers.

Meanwhile, vloggers can bring income to the platform, thus achieving a win-win situation. Third, Bilibili can collect fees by inviting advertising. The vloggers can put the product link at the bottom of the product introduction video, directly jump to Taobao, Jingdong and other platforms, and finally settle the advertising price according to the click volume of the link. Fourth, Bilibili can also collect part of the funds to develop a unique page for users to discuss and evaluate the product on the platform. The references and suggestions on the unique page will help consumers or users decide what goods they want to buy.

6.4 Strengthen search engine construction

Search engine optimization techniques investment in enterprise website promotion is small, but the reward is enormous. The search technique will improve Bilibili' competitiveness [12]. Bilibili can improve the understanding of search engines for users to retrieve questions, and it can provide intelligent answers after the users ask the related issues. Search engines could analyze the structure and contents of the questions, extract the keywords and provide solutions to a problem, it also greatly improves the efficiency of search [13]. Bilibili can also use user customization, content filtering and
other retrieval technologies to independently decide to remove the additional redundant information and reduce the user's retrieval burden.

7. Conclusion

7.1 Main Findings

First, through the analysis of its financial situation, it can be seen that the overall revenue of the enterprise is good, but the net profit continues to be negative. Therefore, Bilibili needs to strengthen its profitability while seizing the Internet.

Second, Bilibili, due to its early ad-free positioning, leads to the contradiction between commercial realization and positioning at the current stage. Excessive advertising investment will undoubtedly lead to a considerable loss of users. Hence, commercial realization needs to find a new way.

Third, compared with other platform paid members, the pricing of Bilibili membership is simple in content and low in cost performance. The pricing of significant members needs to be adjusted appropriately. Plus, the significant member's content needs to be further enriched by more resources.

Fourth, since Bilibili was listed on the market, the diversified development of Bilibili members has led to the influx of many new users, resulting in the friction between old and new users and the deterioration of the community ecology. The ecological management of the Bilibili community needs to be enhanced.

7.2 Research significance

This paper firstly analyzes Bilibili's operation chain and its profit model and reveals two existing problems of Bilibili in combination with crucial financial data: Malformed income structure and Contradiction between commercial realization and positioning.

Second, according to the above problem, this paper focuses on three areas of advertising, copyright, and subculture. Then the paper offers suggestions for Bilibili’s enterprise development and tries to help Bilibili to realize mode innovation and profit creation.

(1) To enhance significant member’s cost of performance
(2) To increase the video producer goods accounted ratio in advertising
(3) To vary the charge pattern
(4) To strengthen community ecological management and the construction of a search engine

In addition, Bilibili, as the backbone of the video industry, has its existing advantages and problems that are worth learning from the industry. Therefore, this paper analyzes from multiple perspectives in the demonstration process, providing a reference for other platforms in the video industry.

References


