The Creator Economy on the Metaverse Platform

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The metaverse platform has been gaining popularity since the pandemic. It facilitates non-face-to-face interaction among creators, users, advertisers, various forms of organizations, and itself. Such interaction has brought light to the new forms of economy, which is called the "creator economy." By providing the virtual space, easy tools, and methods, the platform allows the creators to produce value for the users in the forms of virtual items, content, and experiences. At the same time, it provides audiences to the organizations that need attention. In the course, the platform and the creators generate revenue. Among the diverse revenue sources, this study focuses on revenue generated from advertising and studies how the revenue sharing between the platform and the creator is affected by the abilities of the metaverse platform. With an analysis of the analytical model, we show that if the platform has the ability to reduce advertising avoidance, it can reduce the revenue share of the creator without discouraging the creator from making the proper effort in content creation. Also, as the platform provides effective tools and methods for quality content creation, it can reduce the revenue share of the creator without damaging the creator's required motivation. The ability of the platform in increasing advertising effectiveness helps it to reduce the revenue share of the creator as well.

Key Words : Ad-supported business model, Creator economy, Metaverse platforms, Revenue sharing
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Received : November 7, 2022   Revised : November 7, 2022   Accepted : December 2, 2022
Publication Type : 학술대회 Fast Track   Corresponding Author : Eunjin Kim

1. Introduction

Since the pandemic, metaverse platforms have started to proliferate. They have leveraged the strength of the technologies such as virtual reality (VR) and augmented reality (AR), which allow interaction among people in the three-dimensional virtual world. Well-recognized metaverse platforms include Roblox, Fortnite, and ZEPETO. The term metaverse was first coined by Neal Stephenson in his 1992 fiction novel (Golf-Papez et al., 2022). In

2007, the Acceleration Studies Foundation (ASF) explored the metaverse in two key dimensions: one ranging from augmentation to simulation, and the other raining from intimate to external (Park, 2021). It then developed four scenarios of the metaverse, which are augmented reality, life logging, mirror world, and virtual world (Park, 2021). The scenario of augmented reality suggests the use of technology that combines virtual images and the real world as found in the case of Pokémon Go. The lifelogging scenario centers on acquiring, keeping, and sharing

data of daily lives like the Apple watch. The mirror world echoes the real world like in the case of Google Earth. Lastly, the virtual world simulates and magnifies the real world like Roblox. Nowadays, the separation between the scenarios has been obscured as they are combined. With its complexity, there have been various definitions of the metaverse. Recently, Ball (2021) defined the term comprehensively as an immensely scaled and expansive network of real-time three-dimensional virtual worlds encountered simultaneously and persistently by many users with a personal sense of existence, and with continuousness of data, such as identification, chronicle, communications, and payments (Ball, 2021; Golf-Papez et al., 2022).

As the metaverse has set up a virtual place for interaction and the creation of new forms of value and a large number of audiences, it has boosted a new phenomenon which is called the creator economy. In the past, there was a clear distinction between the producers who create products or services combining abundant capital and capability and the consumers who use them. However, recent online platforms and digitized tools have reduced the barriers to producing digitized products and services and blurred the distinction between producers and consumers. Such a phenomenon has brought a rise to the creator economy (Radionova and Trots, 2021). Entities who participate in the creator economy include the platform, the creators, the consumers of digitized goods and services, and various types of organizations that plan to earn attention from the audiences (Radionova and Trots, 2021). Interaction among the entities and the value

created and consumed during interaction allow the entities who are involved in value creation to generate revenues. The metaverse platforms are known to provide easy tools and methods for the users to develop virtual items, games, and other contents which are valued and consumed by other users. For example, Roblox allows its platform users to easily develop games and items without incurring upfront costs and with the use of its game creation tools and engine. The revenue generated through the sales of games and the items is shared between the platform and the developers. The platform then uses the earnings on the platform hosting, user support, and further improvement of the platform. The metaverse platforms try to diversify their revenue sources beyond the revenue generated from the sales of items or experiences. As they have large audiences, they started to consider advertising as an attractive source of revenue. For example, Roblox announced to launch of three-dimensional advertising on the platform in 2023 and plans to test the advertisements with developers and some advertisers at the end of the year 2022 (Adams, 2022). In general, advertising revenue has played a critical role in the growth of online platforms (Dwivedi et al., 2022).

While digital marketing or advertising through the digital medium prevails, the metaverse platform provides two distinguished features which are immersiveness and interactivity (Dwivedi et al., 2022). Compared to other media, the metaverse offers broader and richer sensory cues and hence provides a more immersive experience (Dwivedi et al., 2022). Also, the intense interactions that the

users encountered in a virtual three-dimensional place or through a virtual object in the metaverse result in stronger interactivity of the experience (Dwivedi et al., 2022). Such characteristics of the metaverse provide opportunities for advertisers of better gaining the audiences' attention.

In this paper, with an analytical model, we study the creator economy focusing on value co-created by the platform and the creator for the advertisers and the revenue generated by advertising. Especially, we focus on how the revenue sharing between the platform and the creator is affected by the ability of the platform in making effective delivery of advertising, in reducing advertising avoidance, and in allowing creators to easily develop the content by providing effective tools and methods. It is shown in this study that such ability of the platform helps it to properly motivate the value creation by the creators while it allows reducing the revenue share of the creators.

The rest of this paper is organized as follows. In the following section, we do the literature review. In Section 3, we present our analytical model. Section 4 reports the results of the analysis of our model. In the final section, we suggest the managerial implications and conclude the research.

2. Literature Review

2.1. Digital products and services

The metaverse platforms provide tools and methods to content creators for the creation of digital products and services and ways to generate revenue (Kim, 2021). Studies have shown that product or service quality affects the perceived value and further the intention to use (Lee et al., 2017; Hossain and Kim, 2018; Kuo et al., 2009). Online, product quality has long been recognized as a factor that motivates people to purchase the product (Lee et al., 2017). Service quality on social networking services is also known to have positive effects on satisfaction and use intention (Hossain and Kim, 2018). On the mobile platform, it is shown that service quality positively affects perceived value and customer satisfaction (Kuo et al., 2009). Focusing on the informative side of digital products and services, previous studies have shown that information content quality positively affects user satisfaction and intention to use (Dong et al. 2016; Sohn et al. 2016). We can infer from the previous studies that quality digital products and services on the metaverse platform would attract users. In this study, we will show how the metaverse platform should design its revenue sharing with content creators to incentivize them considering the attraction of the users to the platform.

2.2. Advertising Avoidance and Effectiveness

Previous studies have shown that users tend to avoid digital marketing advertisements (Cho and Cheon, 2004; Barreto, 2013). Cho and Cheon (2004) argued that website visitors' negative attitude explains low click rates on advertisements. However, studies also show that such avoidance can be reduced by designing the advertisement more informative and

entertaining (Kim et al., 2013; Yang et al., 2013; Bae and Park, 2018). The advertising on the metaverse is expected to offer an immersive experience for users with exciting content. Hence, we can infer that the metaverse platform can mitigate the users' avoidance of the advertisement through its effort in placing, developing, and designing the advertisement in the proper format.

Yang et al. (2020) showed that the use of augmented reality in advertising positively affects advertising effectiveness by incurring curiosity. Studies have found that the interactivity of advertisements increases their effectiveness of the advertisement (Leung et al., 2020; Hussain et al, 2022). Leung et al. (2020) showed that advertisement leveraging virtual reality (VR) technologies provides high interactivity, decreases distractions, and direct interest in ads, hence driving advertising effectiveness. We can infer from the previous studies that the metaverse platform utilizing VR or AR technologies and increasing the interactivity of the advertisements can improve advertising effectiveness. In this paper, we will study how advertisement aversion and effectiveness impact revenue sharing between the platform and the creator.

3. The Model

For developing an analytical model, we assume the existence of a metaverse platform and a content creator that create valued content on the platform. Audiences, who are content users are attracted to the platform and the platform places the advertisement targeting them. The platform then shares the advertising revenue with the creator.

Let q denote the content quality. We assume that the cost to create the content is the function of q. That is, to maintain higher content quality, it costs more for the content creator. For simplicity of analysis, we assume the content cost function as cq where c is determined by the easiness of quality content creation which becomes available with effective tools and methods provided by the platform.

It is assumed that there are number of potential users of content, which is normalized to 1. Their taste parameter in valuing content quality, ρ varies and is distributed according to $U[0,1]$. According to the previous studies, we assume that they avoid the advertisement because of the disutility incurred. The disutility is noted as v. Higher disutility means lesser ability of the metaverse platform in designing the advertisement in an informative and entertaining form. Therefore, the total utility of a potential user is defined as $U = \rho q - v$. An individual user consumes the content when $U \geq 0$. Therefore, the number of users are calculated as n, where $n = 1 - v/q$.

We assume that the platform places the advertisement targeting the content users and generates advertising revenue. The total advertising revenue generated is the function of the number of content users and advertising effectiveness. Here we assume the larger the number of users, the more the advertising revenue, and the higher the effectiveness of advertising, the more the

advertising revenue. For simplicity, we assume the total advertising revenue as tn where t represents advertising effectiveness. Previous studies show that the higher the interactivity of advertisements, the higher the advertising effectiveness.

The share of advertising revenue of the content creator is α where $0 < \alpha < 1$. Among the total advertising revenue, the platform transfer αtn to the content creator and the platform keeps the rest which is $(1 - \alpha)tn$.

We assume that the platform determines α given c, v, and t. Then, the creator determines his or her level of efforts made onto content. That is, the creator determines q. For the analysis of the model, we build a two-stage game theoretic model. In the first stage, the platform determines α. In the second stage, the creator determines q.

4. Analysis and Results

To examine the model, we first derive the sub-game equilibrium of q in stage 2. With the backward induction (Fudenberg and Tirole, 1991), we then get optimal α in stage 1. The detailed derivation is shown in Appendix A.

With the equilibrium content quality, q derived as (2) and the revenue share, α as (4) in Appendix A, we can get the following proposition that show the effect of the platforms ability in reducing the advertising avoidance on the optimal revenue sharing determined by the platform.

Proposition 1. When the platform has greater

ability to reduce the advertising avoidance (i.e., as v decreases), the metaverse platform can decrease the level of revenue share of the creator (i.e. decrease the optimal level of α).

Proof. See Appendix C.

Appendix B shows that when the platform has greater ability to reduce the advertising avoidance, the creator can reduce his or her effort on increasing the content quality, which should be made to compensate the disutility caused by the advertisement. For the sub-game equilibrium content quality, q as (2) in Appendix A, it is shown that $\frac{\partial q}{\partial \alpha} > 0$. This implies that if the platform intends to increase the content quality, it should increase the revenue share of the creator. However, as the optimal content quality is reduced due to higher ability of the platform in reducing the advertising avoidance, the platform can also reduce the share of the content creator.

We then find the following results for the effect of the platforms' providing easy tools and methods, which reduces the cost of quality content creation, on the optimal revenue sharing.

Proposition 2. When the platform better supports the easiness of quality content creation (i.e., as c decreases), the metaverse platform can decrease the level of revenue share of the creator (i.e. decrease the optimal level of α).

Proof. See Appendix E.

Appendix D shows that as c decreases, equilibrium content quality, q increases. That is, as it becomes easy to create quality content, the creator is better

to increase the content quality given the revenue share, α. Therefore, when the platform provides effective tools and methods for the content creation, the platform can reduce the revenue share of the creator without violating the motivation of the creator in investing for better content quality.

Next, we get the following proposition that shows the effectiveness of advertising on the optimal revenue sharing.

Proposition 3. When the advertising effectiveness is high (i.e., as t increases), the metaverse platform can decrease the level of revenue share of the creator (i.e. decrease the optimal level of α).

Proof. See Appendix G.

Appendix F shows that as t increases, equilibrium content quality, q increases. This implies that given the revenue share α, the creator can expect to generate more advertising revenue per user when the advertising effectiveness is higher. Hence, the creator has an incentive to attract more users through increasing the content quality. It reduces the need of the platform to increase the revenue share α for the content creator to promote more investment on content quality improvement. Hence the firm can decrease the revenue share of the creator when it has better ability in improving advertising effectiveness.

5. Conclusion

In this paper, we study the creator economy on the metaverse platform especially focusing on the revenue generated by the advertising revenue and its sharing between the platform and the content creator. By increasing the revenue share of the creators, the platform can promote them to exert more effort on quality content creation. However, that would result in a smaller revenue share of the platform. We show that the ability of the platform to provide easy tools and methods for quality content creation, to design the advertisement in a way to reduce avoidance, and to increase the effectiveness of advertising provides the content creator to put more effort into quality content creation given the same revenue share. Hence, the ability of the platform allows it to reduce the revenue share of the creator without discouraging them from making an appropriate level of effort for quality content creation.

Roblox announced in September 2022 that it plans to provide new tools empowered by machine learning. They allow the developer to reduce the time and resources needed for the creation of quality full-body animation. It also plans to provide new advertising formats which are transporting the players to virtual worlds that let the player experience the products that are in ads. Such efforts made by the platform are expected to increase the desired ability and to allow the platform to reduce the revenue share of the creator compared to the case without such ability.

Regardless of the contributions, there are some limitations to our study. In this paper, we derive our results with the analysis of an analytical model. The limitations of our study are brought by

our research methodology, itself. To develop a game theoretic analytical model, we made assumptions by simplifying the situation and focused on the effect of a few factors of concern. Nevertheless, there are other factors not considered in this study, which are expected to add complexity in the real-world setting. Hence, further empirical studies are required to strengthen or complement our results.

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Appendix

Appendix A

Given the metaverse platform's decision on α in stage 1, the creator decides q in stage 2. The profit function of the creator is:

$$\pi_R = \alpha tn - cq. \quad (1)$$

From the first-order condition $\frac{\partial \pi_R}{\partial q} = 0$, and the second order condition $\frac{\partial^2 \pi_R}{\partial q^2} < 0$, we get the sub-game equilibrium q as:

$$q = \frac{\sqrt{\alpha tcv}}{c}. \quad (2)$$

We plug the sub-game equilibrium q derived as in (2), into the profit function of the platform as in (3).

$$\pi_P = (1 - \alpha)tn \quad (3)$$

From the first-order condition $\frac{\partial \pi_P}{\partial \alpha} = 0$, and the second order condition $\frac{\partial^2 \pi_P}{\partial \alpha^2} < 0$, we get the sub-game perfect equilibrium, α as:

$$\alpha = \frac{cv}{12t} + \sqrt[3]{A} + \frac{1}{\sqrt[3]{A}}\left(\frac{cv}{6t} + \frac{c^2v^2}{144t^2}\right) \quad (4)$$

Where

$$A = \frac{cv}{8t} + \frac{c^2v^2}{48t^2} + \frac{c^3v^3}{1728t^3} + \sqrt{\frac{c^2v^2}{64t^2} + \frac{c^3v^3}{1728t^3}}$$

Appendix B

For the sub-game equilibrium q as in (2), the following satisfies $\frac{\partial q}{\partial v} > 0$.

Appendix C

Similarly, for α derived as in (4), we get that

$$\frac{\partial \alpha}{\partial v} = \frac{c}{12t} + \frac{1}{3}A^{\frac{2}{3}}\frac{\partial A}{\partial v} + \frac{1}{\sqrt[3]{A}}\left(\frac{c}{6t} + \frac{2c^2v}{144t^2}\right) - \frac{1}{3}A^{\frac{4}{3}}\frac{\partial A}{\partial v}\left(\frac{cv}{6t} + \frac{c^2v^2}{144t^2}\right) > 0.$$

Appendix D

For the sub-game equilibrium q as in (2), the following satisfies $\frac{\partial q}{\partial c} < 0$.

Appendix E

For α in (4), we get that

$$\frac{\partial \alpha}{\partial c} = \frac{v}{12t} + \frac{1}{3}A^{\frac{2}{3}}\frac{\partial A}{\partial c} + \frac{1}{\sqrt[3]{A}}\left(\frac{v}{6t} + \frac{2cv^2}{144t^2}\right) - \frac{1}{3}A^{\frac{4}{3}}\frac{\partial A}{\partial c}\left(\frac{cv}{6t} + \frac{c^2v^2}{144t^2}\right) > 0.$$

Appendix F

For the sub-game equilibrium q as in (2), the following satisfies $\frac{\partial q}{\partial t} > 0$.

Appendix G

For α in (4), we get that

$$\frac{\partial \alpha}{\partial t} = -\frac{cv}{12t^2} + \frac{1}{3}A^{-\frac{2}{3}}\frac{\partial A}{\partial t} + \frac{1}{\sqrt[3]{A}}\left(-\frac{cv}{6t^2} - \frac{2c^2v^2}{144t^3}\right) - \frac{1}{3}A^{-\frac{4}{3}}\frac{\partial A}{\partial t}\left(\frac{cv}{6t} + \frac{c^2v^2}{144t^2}\right) < 0.$$

국문요약

메타버스 플랫폼의 크리에이터 이코노미:
광고수입 모델과 수익배분 구조를 중심으로

김은진*

코로나19 팬데믹으로 촉발된 메타버스 시장은 현재 가파른 성장세를 보여주고 있다. 메타버스 플랫폼은 컨텐츠를 생산, 소비하는 크리에이터와 사용자 그리고 플랫폼에 조성된 청중을 광고 대상으로 하는 광고주를 연결시키고 있다. 이들 플랫폼 참여자간의 상호작용은 새로운 형태의 경제인 크리에이터 경제의 부상을 가져왔다. 본 논문은 크리에이터와 메타버스 플랫폼의 다양한 수익원 중 광고 수익을 중심으로 플랫폼의 특성이 플랫폼과 크리에이터 간의 수익률 배분에 미치는 영향을 연구하였다. 게임 이론 기반 분석 모델을 통해 본 연구는 메타버스 플랫폼이 광고 회피를 감소시킬수록, 광고의 효과성을 높일수록, 그리고 효과적인 컨텐츠 제작 툴을 제공할수록 크리에이터의 수익 배분율을 낮출 수 있음을 보여주었다.
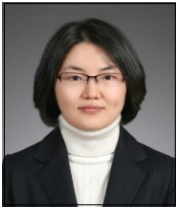
주제어 : 광고수입 비즈니스 모델, 크리에이터 경제, 메타버스 플랫폼, 수익 배분율

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저 자 소 개

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KAIST 경영대학원에서 MIS 전공으로 석사, 박사학위를 취득하였다. 현재 경기대학교 소프트웨어경영대학 경영학부에 교수로 재직 중이다. 주요 관심분야는 온라인 프라이버시, 정보보안, 공유경제 및 지식 공유 플랫폼 등 플랫폼 경제의 경제학적, 사회학적 이론 분석이다.