

Deriving Value in Digital Media Networks

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ABSTRACT

This paper presents a framework for the analyzing revenue distribution in the delivery of digital content such as music, movies, games, books, and news. In such content delivery networks, there are various roles played by producers, consumers, syndicators, aggregators and distributors in the marketplace. We outline a framework for business modeling known as VISOR and adapt some ideas from game theory in order to investigate notions of efficiency and fairness in the digital media eco-system. This framework suggests that the revenue distribution within a business model is determined by the range between producers' cost of production and consumers' willingness to pay. The allocation of these revenues among the players is in turn determined by their value capacity which is a function of the interface for content, service platform, organizing model and revenue streams. The game-theoretic notions of fairness and efficiency are introduced as a strategy for stability in the workplace. The paper concludes that stability is the key to derivative value in a digital media network.

Keywords: Digital economics, New Media Analysis, Game Theoretic Modeling.

1. INTRODUCTION

The Interactive Digital Media (IDM) marketplace is not entirely new. Even before the current fad of Massively Multiplayer and Online Role Playing Games (MMORPG), online music stores, Internet Protocol TV (IPTV) and a host of mobile applications, the digitization of content took off with the convergence of the world-wide web with modern telecommunications networks and devices (cf. [1], [2], [3], [4], [5], and [6]). Today's broadband Internet is at the centre of how much of this content is produced, consumed, repackaged and traded [7]. Whereas networks, content or services, and regulatory regimes have made progress through media, network and industry convergence, business models are only beginning to re-engineer themselves to the current realities of (dis-) intermediation [8], [9]. Much of this is due to the legacy cost- plus pricing of Telco's, licensing of broadcasters and subscription based revenue streams of the media industry. Content owners, on the other hand, are understandably concerned with digital rights management (DRM) and how business models and pricing strategies might cannibalize current revenues [10]. Advertising revenue streams are lucrative but work differently in the new media sectors and there is not yet an accepted split between vendors who own the content and those that own the customers [7].

Typically, the IDM marketplace comprises of 3 groups of intermediaries who come between the producers and consumers of digital media products and services [11].

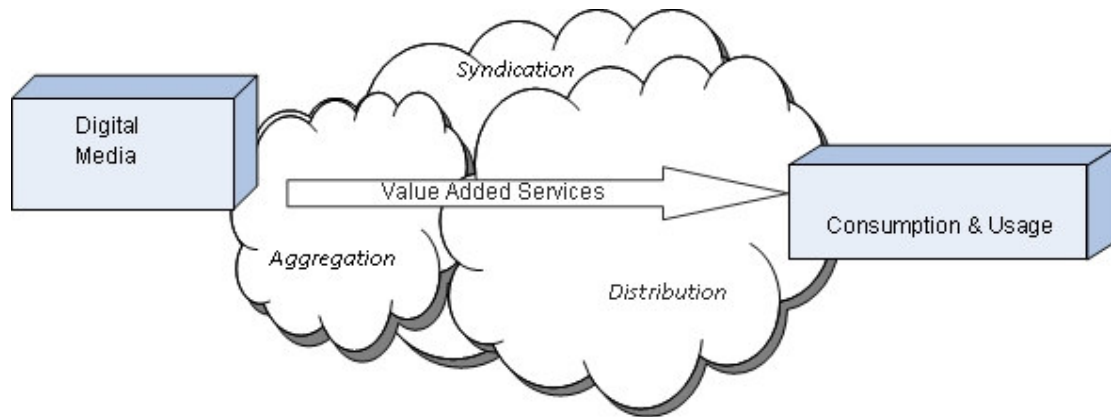


FIGURE 1: The Digital Media Business Eco-System.

Figure 1 depicts a simple flow chart of the IDM value cycle. Digital media is produced (or packaged) by a number of sources: online games developers, movie and animation studios, music producers, publishers of books and magazines, and a host of digital paraphernalia such as ringtones, screensavers and images. These are typically passed on to consumers in 3 stages. Aggregation is the collection of content from a variety of sources. Often content is repackaged or archived to facilitate catalog search and browsing [12]. Syndication is the proactive streaming of such content (especially after a window launch period) to alternate and repeat consumer segments [13]. Distribution is the conveying of digital content to the devices of consumers, including the billing and collection aspects [14], [15]. The roles of syndicators, aggregators and distributors are complex and often overlap. In some scenarios, some or all of these roles may even be redundant.

There are hence many such intermediary issues among the players of the IDM marketplace that remain unresolved. In this paper, we use a framework for analyzing the Digital Media business. We address the fundamental role of a business model in driving strategy and its accompanying features of alliances, pricing, and revenue sharing. One fundamental challenge would be the revenue sharing formula among the various participants of the IDM eco-system – content producers, aggregators, syndicators, distributors, other intermediaries (such as advertisers and payment brokers) and consumers. More specifically, we review some of the complex research issues that confront the continued development of the digital marketplace using the VISOR framework introduced by [16]. Some of the fundamental questions to be explored would include identifying the value brought to the market by the intermediaries of the IDM marketplace in fulfilling the syndication, aggregation and distribution roles. We will also introduce the notion of efficiency and fairness in an investigation that attempts to determine a strategic arrangement that may be seen to be stable and optimal within the IDM eco-system.

2. PRELIMINARIES

In this section, we briefly review the literature on media economics with respect to how business models for digital media may be formulated and roles of intermediaries may be analyzed. Strategy is an appropriation of value from the marketplace [17]. Hence a business model serves to implement strategy [18], [19]. Picard [6] has overviewed business models for online content services and how they have changed during the past two decades as technology changes and audience demand have affected operations. His work explored how the current business models emerged, how new developments are affecting those models. He also examines the implications of the changes to producers of multimedia and other content producers.

Business models are hence important in understanding the context and strategies of the major online content service providers, and how producers of content are and hope to be able to coordinate or integrate their operations to gain economic rents from the strengths and opportunities

provided by broadband operators [18]. Such players are necessary for the development of independent producers of digital content because they can help to provide access to the distribution systems and entry points that are necessary for commercially viable operations.

One important aspect of business models is pricing strategy. While conventional wisdom has it that value pricing is good and competitive pricing is detrimental. Several studies (cf. [5], [20], [21]) suggest that in cyber space, the potential revenue growth generated by syndicated content is far greater than mass produced and physically distributed content. In part, this could be due to the referral and distribution aspects of social networks which implicitly introduce notions of relevance, trust and branding [22]. Notwithstanding this social phenomenon, novel business models and revenue sharing arrangements are fast emerging in the space, popularly known as Triple Play (meaning voice, Internet and video) among operators and intermediaries such as content owners, portals, advertising firms and the advertisers (merchants) themselves [23].

Varian [24] suggests that information goods such as books, journals, computer software, music and videos may be copied, shared, resold, or rented in order to provide revenues. When such opportunities for sharing are present, the content producer will generally sell a smaller quantity at a higher price which may increase or decrease profits. Three circumstances where profits increase may be identified: (i) when the transactions cost of sharing is less than the marginal cost of production; (ii) when content is viewed only a few times and transactions costs of sharing are low; and (iii) when a sharing market provides a way to segment high-value and low value users. Swatman and her associates [10] have identified the following five possible revenue sources when businesses (either collectively or separately) target individual consumers: (1) subscription fees; (2) pay per item or view; (3) bundling and selling of related items; (4) selling marketing messages for the purpose of branding in traditional as well as new media versions; and (5) selling specific advertising messages (in the form of banner ads or text) for the purpose of influencing an immediate purchasing decision. In the "walled garden" scenario (closed to non-partners), there is hence an explicit requirement for the participants in the eco-system to derive benefits from the arrangement (business model, pricing, protection of digital or customer assets etc.) in an efficient and fair relationship.

Pricing therefore becomes a key factor of revenue. Conventional micro-economic theory suggests that the higher the price, the lower the demand. Kim & Xu [25] state four factors that could lead to lower price sensitivity: (i) reputation (reputation of a vendor enables customers to perceive fewer risks and lower cost of a disappointing purchase when buying from the vendor); (ii) familiarity (focus on transaction-related understanding about the use of the vendor's Web site, and of the whole procedure of transaction with the vendor based on previous experience); (iii) switching cost (procedural switching costs (setup costs and learning costs), financial switching costs (monetary loss costs), and relational switching costs (psychological or emotional discomfort); and (iv) pleasure (customer's emotional response or feelings to previous transactions with an online vendor).

Technology creates a paradox in the IDM marketplace. Prices for e-services go down with time and new revenue streams are needed. Moreover, Brynjolfsson [26], [27] concluded that while there is lower friction in many dimensions of Internet competition, branding, awareness, and trust remain important sources of heterogeneity among Internet retailers. So, in the IDM marketplace, price is set as a function of value more than as a mark-up on costs.

Related to the issue of pricing, Clemons [28] suggest two theories of competition: (i) resource based value-retention and (ii) newly vulnerable markets. A market is called vulnerable when it is: (a) newly easy to enter, (b) attractive to attack, and (c) difficult to defend. With the low entry-barrier afforded by the Internet, hence the position of key players is clearly vulnerable in the IDM market place.

To sum up, the literature suggests that the IDM marketplace is indeed complex and competitive. It is very much dependent on branding, pricing, partnerships and market positioning. Suffice to

say that the current practices of the music, movie and games industries do not as yet factor the disruption brought on by the Internet and hence much work remain to be done in business strategy and modeling.

3. Framework

In this section we present a framework for analyzing the stability of a business model in the IDM marketplace. More specifically, we seek a framework for identifying the added value of various intermediaries and their respective derived payoffs. We posit that there is both a transitive as well as symmetric relationship between intermediaries that is necessary and sufficient to bring stability to the marketplace. We also surmise that this stable state is reached when the value is directly proportional to the payoff derived by each and every intermediary as well as producers and consumers.

A business model is defined as a group of basic interdependent systems that give life and nourish a competitive organisation, which addresses customer needs, discriminates its offerings, and defines the tasks it should perform [19]. A business model is not a static representation. It captures the essential elements, dynamic relationships, and the basic logic strategic alternatives for the decision making process. It's major interest is the creation of value and appropriation of profit for the value created in a concrete reality and its environment [17]. The profit obtained and the core logic of their strategic alternatives provide businesses sustainability over time. Differentiation for completion based on these categories creates a competitive position [18].

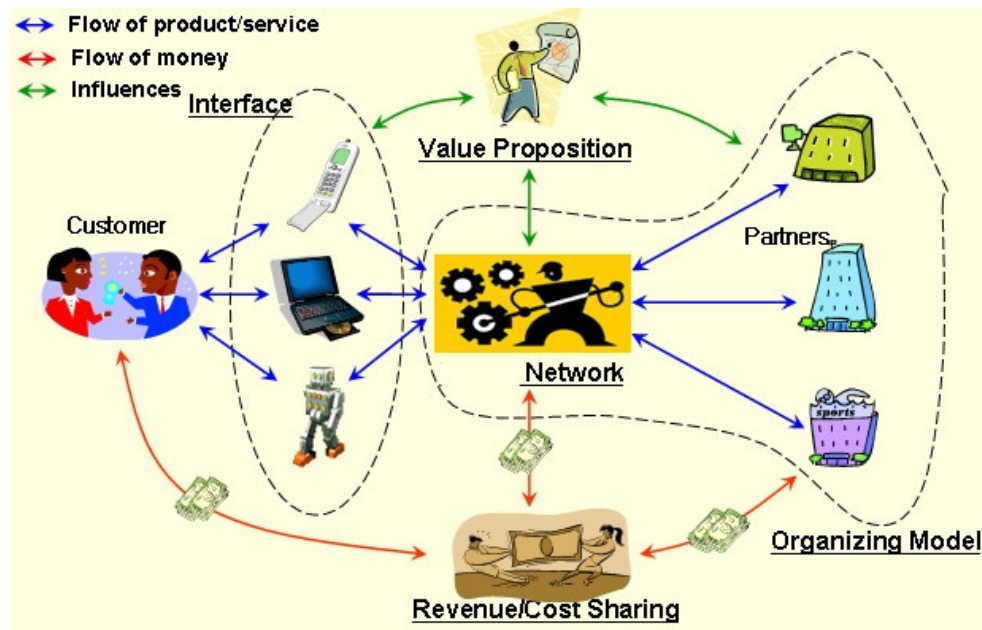


FIGURE 2: The Visor Model in the Digital Media Marketplace (Source: [16]).

The VISOR framework [16], first described by Professor Omar El Sawy and his co-workers at the Marshall School of Business (University of Southern California), is a business model framework developed to articulate how companies in the IDM space may react, evaluate and capitalize on the emergence of new technology or service offering. It consists of five variables that need to be considered by players: **V**alue Proposition, **I**nterface, **S**ervice Platform, **O**rganizing Model and **R**evenue/Cost Sharing. This is shown in Figure 2. More specifically, these parameters are defined as follows:

Value Proposition – The model should define the value that a player provides that will make customers willing to pay a premium price for them.

Interface – How the product or service offered by a player is going to be delivered to the customers? An easy to use, simple, convenient, user interface is required for a successful delivery of a product or service.

Service Platforms – The IT platform used to offer the service need to be clearly defined. Business processes and relationships needed to deliver the products and services must be supported by the IT platform.

Organizing Model – The distribution of product or service can be done in many ways involving many different parties. The relationships among the parties involved in the business processes and the nature of partnerships required to deliver the product or service must be clearly understood.

Revenue/Cost Sharing – In a good business model, the combination of the value proposition, the way that offerings are delivered, and the investments in IT platforms are such that revenues exceed costs and become attractive for all partners.

Hence the VISOR Framework posits that the value that is added to the marketplace is a function of the Interface to the Customer, Service Platform, Organising Model and Revenue Streams. Value creation is generated within a business network, which includes suppliers, consumers, substitutors, complementors, and the firm. The manner in which a firm decides to participate within its value network is a central ingredient of its business model [19].

Using the VISOR framework, we may analyze value creation within a marketplace described previously, which includes suppliers, consumers, substitutors, complementors, and the firm. These are synonymous with S, A, D. Value net analysis proposed by Brandenburger [29], [30] explores interdependencies in such a business network.

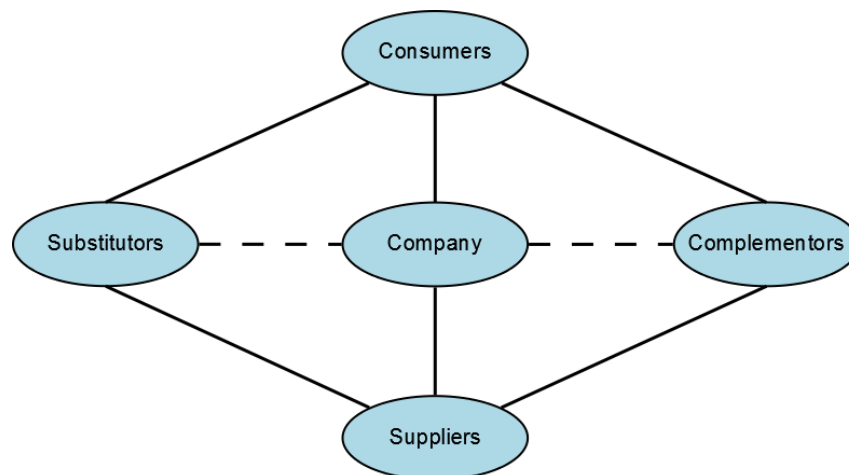


FIGURE 3: Game-Theoretic Value Net Analysis (Source: [29]).

The different players in the IDM marketplace and their interactions can be described using Value Net – a schematic map representing all the players in a marketplace and the interdependencies among them [29] as shown in Figure 3. Using the VISOR framework to define each player’s unique value to the market, a fair and stable revenue share may be determined.

Producers, syndicators, aggregators, distributors, and even consumers (for referrals and prosumer content) may play different roles, but are united in seeking fair return to their contribution in stable market relationships. Hence, by using a Value Net analysis, we may examine the value

brought by each player in the chain. Since the emergence of internet and the fast growth of technology, the process of value creation and value adding has increased in complexity as well as velocity [29]. Normann [31] argued that one of the keys of creating value is to co-produce offerings that mobilize consumers to create value for themselves. For example, Amazon.com uses its database of what consumers had bought to recommend what other products may be of interest to consumers and it also provides space for consumers to give review of products for potential consumers' consideration. Here, we see how Amazon co-creates values with consumers, who then also play the role of complementors.

Such a framework, we posit, is useful to understand the interactions among the different players in the market. But, in order to understand the extent of efficiency and fairness in the interaction among the different players, we need to define the criteria for efficiency and fairness. While it is clear that pricing and revenue sharing functions are key parameters in ascertaining the value relationship in the IDM market. There is no analytical framework that allows us to articulate how values accrue to players in the network. In order to do this, we introduce two simple notions from Game Theory in the following section.

4. Game Theory

The IDM marketplace is structured such that numerous players take on different roles (syndication, aggregation, distribution, production, consumption) at the same time. It may make no sense to limit the quantity of information goods as the Marginal Cost of Production is zero and Distribution Cost close to zero [32]. Consequently, the quantity of digital content that may be downloaded is potentially infinite. However, the syndication (placement), aggregation (marketing) and distribution (provisioned service platform) efforts – and hence the number of channels to consumers – are not infinite [33]. And a key challenge is how to allocate resources (such as revenues, profits, customer recognition and control) fairly and efficiently. From the input-output criteria, we can derive the notion of added value which is proposed by Brandenburger [30] and Brynjolfsson [34].

It has to be noted that the changing of elements in a game are meant to create an advantage over other players in the game. In other words, when a player changes an element of a game, it should increase its bargaining power in the game. This also means that the significance of a player in a game can be measured by the value that player adds to the game. It is not necessarily the value that player brings to the market (cf. [35]). A player should not receive more than the value it contributes to the game. Brandenburger [30] formalized the method to measure added values of a player as follows:

$$\text{Added value of a player} := \text{value created by all players} - \text{value created by all other players}$$

Brandenburger and his associates (op. cit.) have suggested a mechanism that may be used for the strategic analysis of the current marketplace for music, movies and games could proceed from an examination of the relationship that a player (along the SAD chain) has with suppliers, customers, substitutors and complementors. We conjecture that if the relationship is transitive (e.g. a content provider adds value to an aggregator who in turn adds value to a distributor), it will be stable. This stability would also hold in a symmetric relationship (i.e. win-win deal where players mutually benefit each others). This may seem counter-intuitive in a business that is known for its fickle and low-margin competition, but the point is that stability assures some semblance of profiting and contributing proportionately. Stability has to do with both fairness as well as efficiency.

Efficiency

Adam Smith's notion of an invisible hand argued that competition is the best way to achieve economic efficiency or welfare maximization. Competition leads to a Pareto Optimal Point which

is technical way of saying it is not possible to reallocate resources to improve the well-being of at least one firm without harming at least one other firm in a given value network. The idea is that if we could change the current allocation of the market's resources so as to make at least one firm better off without making another worse off, and then the current allocation of resources cannot be efficient: we could do better by effecting a reallocation of resources (and revenues) [36].

In the IDM marketplace, the concept of market efficiency is based on the economic theory of price equilibrium determined by the interactions between supply and demand. In an efficient market, the price equilibrium reflects the availability of information on products to all players in the marketplace at the same time, which means that there is no information asymmetry among the different players in the marketplace. The emergence of broadband Internet markets has dramatically reduced the cost of making information available and accessible instantly, which will in turn lead to a more perfect market competition (i.e. market efficiency). The perfect market competition has been defined as the convergence of price to the level of sellers' marginal cost. In other words, consumers will not face price dispersion (cf. [37]).

Efficiency in the online market has been created by intensive competition, content variety, availability, personalization (the so-called long tail effect), and information technology infrastructure [34]. Given the nature of information goods, they can, in turn, be divided into segments that allow fragmented distribution. These can, in turn, be standardized including business rules, such as, usage rights that can be passed between firms along with the content [38]. The previous elements permit limitless virtual inventory and convenient access, reduced search and transaction costs, greater hit rates or finding relevant content, and the elimination of manufacturing and shelf space costs. Hence the distribution of content over digital networks have an extremely reduced marginal cost and have made possible disintermediation [28], serve disperse audiences, and satisfy the needs of multiple niche markets. The criteria of profitability include not only popular content, but also those less appealing to the mass market [34] and have affected market size and the price that consumers are willing to pay [30].

Grover [39] argued that the dramatic reduction of information asymmetry has not led to price convergence. Some of the causes which allow the existence of price dispersions are brand loyalty, popularity of products, and consumers trust. Conversely, brand loyalty, popularity of products, and consumer trust are caused by the success of players in creating and adding value which differentiate themselves from other companies with the same types of offerings.

Fairness

The notion of fairness is usually meant to convey to all players whether specific interactions, agreements, or situations are in line with the principle of justice. Grandori [40] defined fairness as rules or criteria used to divide shares of valuable resources which will be allocated to different actors. However, it has to be noted that since the goal of fairness rules are to ensure that everyone gets a fair treat, it may conflict with the notion of efficiency.

Grandori [40] further suggested four rules that can be used to identify what should be the fair interactions and agreements in inter-firm relationship, with each rule capable of generating different outcomes.

1. Input-output criteria: this is among the most widely applied and analyzed fairness criteria. This rule defines fair as the correspondence between the pay-off received by each actor and the contribution it gives to the achievement of the total output. In other words, a player can only take as revenues what it limits in proportion as resources. It can be formalized as:

$$\frac{(Output - Input)}{Input} \text{ (for the actor)} = \frac{(Output - Input)}{Input} \text{ (all other players).}$$

2. Outcome-based criteria: this is a rule proposed by game theorists and economists. This rule, unlike other rules, does not conflict with the principle of Pareto efficiency. It

is based on outcomes according to actors' utility rather than on the value that they bring. The most used mechanism to exercise this rule is the Nash Bargaining Solution (NBS), which basically determines fairness based on calculation of the maximum product of the actors' utility. In short, a player take what the market determines is its value.

3. Need-based forms: this rule focuses on the actors' necessities and aspirations instead of maximizing the product of the actors' utility. The notion of necessities is constructed socially; hence resource allocation based on necessities is independent of the contribution and utility of each actor. However, this rule can only be applied when there is mutual acknowledgement from the various actors on what is essential for each actor so that the relationship and ecosystem (i.e. marketplace) may be sustained. This seem analogous to the Marxian from each according to abilities, to each according to needs or buyers relationships to create stability.

4. Fairness heuristics: this is usually applied in ambiguous and complex situations where the calculations for resources allocation are too costly or complex to be done feasibly. When this happens, fairness is perceived as absolute equality among partners regardless of their contributions, necessities, or utilities. Hence, fairness engages players to an eco-system.

In a Nash Equilibrium, no firm wants to change its strategy because none can obtain a higher payoff. NBS has been extended to three main derivations: the Cournot, Bertrand, and Stackelberg Leader-Follower models (cf. [37]). Cournot presumes that each firm operates autonomously and tries to maximize its profits by setting quantities (or exposure in terms of channels to consumers) available in the market. In the Cournot equilibrium, each firm puts to the market the quantity that maximizes its profits provided its (correct) convictions about its competitor's alternatives. In Bertrand's model, firms define prices rather than quantity, and the Bertrand equilibrium is the marginal cost. In the Stackelberg Leader-Follower, the leader firm chooses its production level and then the competitors are free to set their optimal quantities.

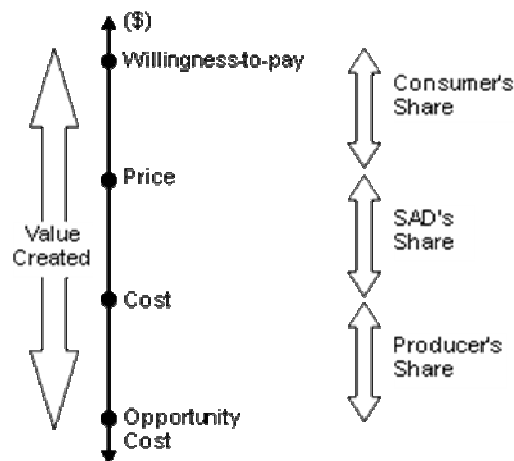


FIGURE 4: Division of Value in a Marketplace (Source: [30]).

The payoffs (such as revenues or brand recognition) should then be allocated based on the value brought to the marketplace by each actor [30]. Recalling some of the above rules that these actors or players in the IDM marketplace can be categorized into: content producers, consumers, and syndicators, aggregators, distributors (SAD) [9]. Syndicators, aggregators, and distributors include aggregator sites (such as Amazon, iTunes), e-malls (such as eBay, Wal-Mart) or even B2B portals. For example, in one pricing and revenue allocation scenario, the benefits that could be allocated to content consumers are the difference between the willingness to pay price and target selling price, while syndicators, aggregators, and distributors (SAD) could accrue the

difference between selling price and production cost or in some cases get commissions based on the difference. Finally, the content creators could be allocated the difference between production cost and opportunity cost. Such a scenario is summarized in Figure 4.

In the next section, we shall conclude how the concepts of value network, fairness, and efficiency may be applied to the IDM marketplace in order to investigate the interaction and dependability among the different players. We conjecture at this point that in a Nash Bargaining Solution (NBS) which promotes fairness over efficiency, the relationship among producers, consumers will be more stable. Making the perfect information assumption, a clear Value Network will emerge that convinces these players of their contributions and payoffs. Making the rationality assumption, players will therefore avoid value destroying moves and the IDM marketplace will grow for the benefit of its participants.

5. CONCLUSION & FUTURE WORK

The VISOR model has synthesized the basic elements required to conduct business in the IDM market: value proposition, service platform, interface interaction (customer), organizational model, and revenue/cost sharing. The traditional fee-based business models for the media industry have been disrupted [6], [14]. The business focus has shifted from the media industry to the consumer. Technology has empowered the user who increasingly demands personalized and diverse content [41]. The patterns of consumption are difficult to predict, and the techniques used in the past to predict them are useless in the new context [22]. Consumers desire to consume media content in pervasive platforms and devices - anywhere and anytime [3]. They want convenience, simplicity, a great experience, and transparency and trustworthiness in their transactions when they acquire digital media [4]. It takes little to conjecture that the business that could address the above issues will have a very attractive value proposition.

It is also well known that the convergence of service platforms and interfaces to consumers has enabled mass digital content to become ubiquitous and has further blurred the divisions among content providers, syndicators, aggregators, distributors and consumers [2], [4]. As well, it has detached content from a physical object into an omniscient commodity whereas content was traditionally associated with a specific physical object such as a song or movie linked to a CD or article to a magazine. When content is digital, its distribution has multiple channels, and both the reproduction and distribution costs are almost zero, creating a disruption in the value chain. This has created the need to better understand business model, and their value propositions.

We have attempted to understand the components of business models in the IDM marketplace and its structure. The IDM marketplace is an emerging space where it is not easy to serve audiences and customize products. In addition, this emerging marketplace is also characterized by easy duplication of content, the low costs of inventory of digital products, which will lead to multiple niche markets of products, such as the long-tail.

We have argued that in the IDM marketplace firms are no longer creating value as a part of a sequential process, but as a part of a value network [14], [31]. Firms are increasingly required to co-create value with other players in the marketplace through organizing models [42]. These relationships among different players in the marketplace may take place not only in the form of economic exchanges but also in the form of social exchanges where the relationships are based on reciprocity and trust [43], [44]. A firm typically forms partnerships with other companies to co-create value [31].

To get a more holistic picture of the significance of each actor, its relationships and its value proposition, it is important to understand the structure of the underlying business strategy. Some of the questions that are necessary to examine are: what does a firm have to offer so that consumers are willing to pay a premium price; what interface would a company have to use to deliver its products or services; and where is a firm in a value network [16], [18], [19], [45]. We

may hence conclude that the identification of value is the central step in allocating revenue and hence ensuring stability in the IDM market.

At this stage of our understanding, we conjecture that the usefulness of analyzing business models as a function of the value proposition, interface, service platform, organizing models and revenue streams. A key strategic insight is therefore how to improve efficiency, fairness, and find the equilibrium in the market place. It is also expected that the notions of fairness and efficiency are not mere theoretical constructs but also preconditions of stability for the online market ecosystem. Hence the message is clear. New media will require a level of added value like never before in the traditional markets. As such, producers, consumers, syndicators, aggregators and distributors have to be relentless in seeking out opportunities and being dynamic in their business relationships. In this paper, we have attempted to demonstrate a framework that may be used for such a purpose. In digital media networks, key value drivers that deserve attention are attractive content and its quality, consumer's appeal, convenience factors such as portability. Essentially, media providers have to identify the right content for the right consumer.

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