Quantifying the Impacts of Technology Evolution on B2B Buyer's Contract Length Decision in Technology Service Market

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Both the buyer's contractual decision and the service-related technology evolution play important roles in the Business-to-Business technology service market. However, no empirical research has been done to quantify the relationship between the technology evolution and the buyer's choices of service contract length. We leverage both the service manager's practical consideration and the B2B buyer's service transaction data to understand the effects of technology evolution on the buyer's contractual length decision. We empirically prove that the technology evolution exhibits multi-dimensional effects on the buyer's contractual decision. The service providers should strategically manage the technology evolution to optimize the buyer's service contract length.

INTRODUCTION

Contract is a common and prevalent phenomenon in the service market. For example, the home rental service has monthly, six months and one-year contracts. The contract-associated service makes a remarkable contribution to the U.S. economy. According to the IBISWorld (IBISWorld, 2017), the revenue of the apartment rental service alone is $163 billion in 2017. To both increase customer satisfaction and maintain advantages in the market, the service provider needs to keep on providing more valuable offers to the consumers. One important way to achieve this goal is by continuously improving the service-related technology. For example, within twenty years, the mobile service providers, such as the Verizon and AT&T, have upgraded their wireless mobile telecommunication technology from 2G to 4G so that the users can expand the smartphone applications from simple text-message to almost all kinds of online activities.

According to the famous Moore's law (Moore, 1965), most of the technology related devices, such as CPU speed, hardware size, and memory capacity etc, show exponential improvement rate over year. In recent decades, the speed of innovation in the technology market creates turbulence in not only people's everyday life but also in the global business environment. Enterprises find few opportunities to grow or even survive without applying the most advanced technology to their own networks. The inevitable consequence of rapid innovation in the technology market is that not only does the IT person's burden become heavier, but also the resources that firms have to spend on the IT department grows significantly.

Under such situation, cloud computing service walks into the B2B technology service market. Defined by Techopedia[1], the technology service aims at expediting the technology usage by enterprises through providing the technology-oriented solutions, such as software, hardware, networking, information security, web applications etc. Our study focuses on an emerging technology service of cloud

computing. Summarized by AeroFS (Harrell, 2014), the cloud started with virtual machines for sharing resources between users in 1970s, and now can integrate data storage, computation solution, applications, business models, IT infrastructure and security etc. into the service platform. In the B2B context, the cloud service aims at helping the buyers maintain and improve their internal IT performance through shifting the heavy internal IT burden to the service provider. More than 80% of the Fortune 500 companies become the cloud service buyers from multiple industries including airlines, cars, financing, insurance and supermarket etc. (Tomasco, 2011). The global market size is predicted to reach 160 Billion by 2020 according to Statista[2]. Despite the purchase incentive, cloud buyers address the technical concerns, such as security, capability, privacy and integrity etc. (Abadi, 2009). Therefore, the service-related technology evolution is a necessity to influence the buyer's purchase decisions.

Both the buyer's contractual decision and the service-related technology evolution play more important role in the Business-to-Business marketing environment. There is no doubt that the success of a technology service is strongly tied to a B2B buyer's contract length decision. The service provider prefers a long contract from the buyer as it not only brings in more revenue but also reduces the cost and efforts of frequently signing a new contract. In B2B market, the buyers have the power and freedom on choosing a preferable length of contract. This is different from the B2C service market where the choice is not in customer's hand, because the sellers offer limited options of the contract lengths to the customers. Consequently, the contract length is a continuous decision variable in B2B context. The soaring technology evolution is a distinctive feature of technology service market, and the B2B buyer's contract length decision will be influenced by the service-related technology evolution. Intuitively, cloud buyers should prefer an advanced-level technology and few of them are willing to observe their service get outdated very fast. Therefore, both the overall technology level and the technology evolution speed can impact the B2B buyer's contract length decision.

In this paper, we leverage both the service manager's practical consideration and the B2B buyer's service transaction data to understand the effects of technology evolution on the buyer's contractual length decision. Given the unique and novel phenomena in the B2B technology service market, we highlight our research questions as following: How would the evolved technology influence B2B buyers' choices of contract length? Specifically, what is the relationship between overall technology level and the buyer's contract length decision? When facing a fast/slow evolution speed, the buyers tend to choose a longer or shorter contract? Our study quantitatively evaluate the impacts of service-related technology evolution on the B2B buyer's contract length decision. We attempt to improve the service provider's strategical decision making on how to manage the adoption of technology in the service.

LITERATURE REVIEW

Since the focus of this research is to identify the influences of technology evolution on the customer's choices of cloud service contract length, the following literature streams are relevant to our study: (1) service contract; 2) technology innovation and 3) cloud computing.

Service Contract

A rich stream of contract-related research dedicated to improving the contract design or strategies for profit-maximization from the firm's perspective. Murthy and Yeung (1995) utilized game-theory model to optimize both user and service provider's expected profits from the maintenance service contracts. Later researches aim at improving the optimal contract strategies by incorporating profit-related factors into the theoretical models. Ashgarizadeh and Murthy (2000) highlighted the important factors of contract terms, equipment reliability and the number of customers being serviced. DellaVigna and Malmendier (2004) considered both the time-inconsistent preference from the customer's perspective and the cost of service from the firm perspective. Rahman and Chattopadhyay (2007) pointed out the importance of including planned preventive maintenance (PM) actions, which was ignored by previous studies, in the contract strategies. NG et. al (2010) introduced the concept of outcome-based contracting (OBC) which allowed customers to pay after the service was delivered.

Studies on the service buyer's contract length decision are very limited and mainly focused on exploring the possible determinants of contract length. A number of determinants have been documented in franchise, utility and labor market, such as relationship-specific investment between buyer and seller (Joskow, 1987; Kerkvliet and Shogren, 2001), adaptation of the contract to the external changes (Crocker and Mansten, 1988), the contracting experience of the franchisors (Brickley et. al., 2006; Vazquez, 2007), and the serial correlation in the market demand (Nannicini, 2006) etc.. However, few study show quantitatively analysis on the factors influencing the buyer's choices of contract length in technology service market.

Technology Innovation

In the marketing literature, a large body of studies focus on improving the theories in technology innovation. For example, Ettlie and Rubenstein (1987) pointed out the necessity of differentiation between radical and incremental technology when investigating the relationship between firm size and successfulness of innovation. Chandy and Tellis (1998, 2000) found that, given the fact of cannibalization, today's technology firms, especially large firms, are still willing to invest on radical innovation. Although technological innovation brings remarkable growth to the firms (Sood and Tellis, 2005), the actual performance of an innovation is tied to many factors, such as the firm's strategic orientation (Zhou et. al, 2005), resource base (Sorescu et. al, 2003), creative idea in the innovation (Im and Workman, 2004) etc. Another group of studies aim at discovering the pattern of technology evolution. Exponential shape (Moore, 2003; Walter 2005), S-curve (Foster 1988), Bass diffusion model (Bass 1969; Young, 1993), SAW shape (Sood et. al, 2012) and step function (Sood and Tellis, 2005) etc. have been proposed in the existing literatures to simulate the technology evolution. Some researchers evaluate the impacts of innovation from firm's perspective, such as the relationship between innovation and the firm's financial reward (Sorescu et. al, 2003) or performance (Zhou et. al, 2005) etc.. However, few studies consider the effects of technology innovation from the customer's perspective, for example, how the technology innovation influences the customer's service contract length decision.

Cloud Computing

Hoberg et. al (2012) provided a comprehensive literature review on the current cloud computing research. He pointed out that, although the studies of cloud computing has already expanded from technological characteristics to broader areas such as business impacts, there still lacks empirical evidences on the determinants of cloud service adoption (Hoberg et. al, 2012). According to the authors' summary (Hoberg et. al, 2012), service-related technology, such as security and privacy (Sarkar and Young, 2011), capability (Abadi, 2009), accessibility and scalability (Saya et al., 2010), adoption uncertainty (Belian, 2009; Benlian et. al., 2009) etc. are the major concerns when the cloud buyers decide on purchasing the service. Although the existing literatures pointed out the importance of technology on influencing the cloud service adoption, they mainly relied on the exploratory research to identify the technological factors. Our study utilizes the actual service buyer's transactional data to quantify the impacts of technology evolution on the cloud buyer's contract length decision.

A more recent study (Schelreth and Kihal, 2013) developed a theoretical model to explore the factors influencing the service provider's profit when offering both contract and single period service. Although this paper has similarity with our study as they take into account the customer's decision-making process, its primary focus is still the firm's perspective of profit maximization instead of the buyer's choices of service contract length.

While the previous studies have been proposed in each of three relevant areas, there is no empirical evidence that is available on evaluating the impacts of technology evolution on the buyer's choice of contract length. Our research is the first study to quantitatively analyze the relationship between technology evolution and the cloud buyer's contractual decision. Our proposed study fills in the following research gaps. First, we utilizes the actual customer transactional data to understand the service buyer's continuous contractual decision. Second, we identify the multi-dimensional effects of technology evolution, e.g. overall technology level and technology evolution speed on the buyer's choices of service

contract length. Third, we extend both the cloud computing studies and service contract research into the B2B technology service market.

DATA DESCRIPTION

Our data comes from a global Fortune 500 technology service company (service provider). The company provides a comprehensive technology-oriented solution to its B2B customers including software, server hardware, global business and technology services, computing system etc. With the well-established brand reputation, the company has cultivated a strong and loyal relationship with nearly 2,000 customers in both industrial and scientific areas in the U.S. market.

During our sample period from 2009 to 2011, the company launched the cloud service in their loyal B2B customer group. We observe in total 218 cloud buyers in our data sample. All the sampling buyers are carefully selected by the service provider to focus on their intrinsic tendency on purchasing the newly developed cloud service. Each buyer has a long-term and in-depth collaboration with the focal company to develop the appropriate technology services, such as hardware, software, networking, information security etc. for his/her business model. Because these buyers have spent massive investment on integrating the existing technology service into their internal system, our focal company believes that they have few opportunities to switch to another service provider. The service managers are interested in understanding how their business customers choose the length of the service contract and what would be a good strategy to manage the technology evolution of the cloud service.

Our data includes both the cloud buyer's service transaction information and the technology-related news publicized by the service provider. Both service transaction and news data were available at the monthly level. The service transaction data were collected from January 2009 to September 2011 and includes the service purchase time (year & month), the service contract length (in unit of months), and the monthly payment (e.g. cost) of the service for each cloud buyer.

The news announced by the service provider are used to represent the technology evolution of the cloud service. In the cloud service market, there is a lack of standardized format of how the cloud service should be technically deployed. The necessary technological components, such as hardware, architectures, infrastructure, data interchange format, virtual machine platform, application programming interface etc. are differentiated between cloud providers (Ferry et. al, 2014; Silva et. al, 2013; Opara-Martins et. al, 2016). Without a widely-acceptable standard, the same cloud service can be implemented very differently. In our context, both the service managers and their cloud buyers addressed that, the most accurate way to evaluate the technology evolution of the cloud service is reading the official news publicized by the service provider.

In our study, the service provider released news corresponding to each step of their technology evolution. We researched all of the news (more than 500) from January 2009 to December 2011 on service provider's official website. Each step of technology update is reflected on the news platform although not all of the news we researched are related to the cloud service. If the news is related to the technology update of the cloud service, there always are clear statements in the news content, such as building new data center, new cloud-based software, cloud technology breakthroughs, adding new computing capabilities etc. Therefore, the process of identifying the cloud-related news is manageable. With the help from the professionals in the firm, we identified in total 142 news that are relevant to the technology evolution of the cloud service. This research will use those news to represent the cloud-related technology evolution. Specifically, we will use the cumulative number of news from the first month to the current month (t) to represent the overall technology level, and the number of news released in month (t) to indicate the technology evolution speed. Confirmed with the service provider, although we can't quantify the relative importance of each individual news, the number of news is a reliable measurement of the technology evolution.

DATA ANALYSIS

We present both the graphical illustration and descriptive statistics to understand the data structure. In addition, the correlation analysis is used to show the interactions between all the variables. Last, we choose a linear regression model to demonstrate the effects of technology evolution on the cloud buyer's choice of service contract length (Equation 1). Although the contract length is a count variable, we use the OLS approach for the following reasons. First, in our study context, the B2B buyer's contract length decision is continuous with no theoretical upper limit. Modelling approach designed for count variable, such as Poisson regression, normally requires a limited categories of the variable. Second, we don't use the linear regression as predictive model but to explore the relationship between the dependent variable and covariates. Not only the parameter estimations of the OLS approach is highly consistent with Poisson regression, but also it is straightforward to interpret the OLS result.

$$Y = \alpha + \beta_1(\Delta Tech) + \beta_2(Tech) + \beta_3(\Delta Tech)^2 + \beta_4(Tech)^2 + \beta_5(MP) + \varepsilon \quad (1)$$

where Y is the dependent variable, which is the cloud buyer's service contract length.

$Tech$ represents the overall technology level, i.e. the cumulative number of news from the first month to the current month.

$\Delta Tech$ is the technology evolution speed, i.e. the number of news released in the current month

We include the quadratic forms of both $Tech$ and $\Delta Tech$ to capture the potential non-linear relationship between the buyer's contract length and technology evolution.

MP is the cost of the service, i.e. the monthly payment of the service. We use the monthly payment as the control variable in the model.

RESULTS

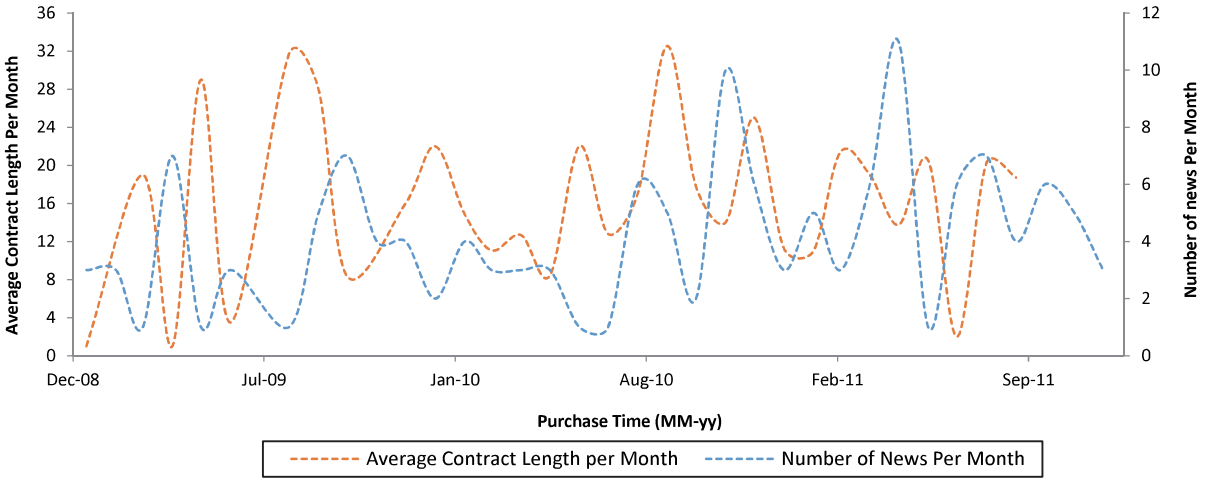
As shown in Table 1, the mean and standard deviations were calculated for each of the variables including: the buyer's contract length (Y), overall technology level ($Tech$), technology evolution speed ($\Delta Tech$) and monthly payment (MP). On average, the cloud buyers purchase the service for 18 months, which is about one and a half years. The range of contract length can be from 1 month to 36 months (Table 1). The number of news released every month is used as the indicator of technology evolution speed. We observed that, the average number of news is 3.95 per month, with the minimum of 1 and maximum of 11 (Table 1). We also noticed the large variation in the monthly payment of the service. The median payment is $1,500 per month but the heaviest users can pay up to $471,394 per month. This is because, in our context, the technology service is not standardized but designed according to each individual B2B buyer's need. The service provider has a variety of buyers whose company size, business area and needs of the technology service are significantly diversified. The customized service results in a broad variation in the cost of service between buyers because the service cost is strongly tied to the individual buyer's need.

The longitudinal patterns of both the contract length and the number of news are shown in Figure 1. We found that, in general, when the number of news per month is high, the contract length tends to be low (Figure 1). Recall that number of news per month captures the speed of technology evolution. This finding implies that when technology improves faster, the buyers tend to prefer a shorter contract.

TABLE 1
SUMMARY STATISTICS OF VARIABLES

Variables	Mean	Std	Median	Min	Max
Y	18.04	12.16	12	1	36
$Tech$	71.33	48.55	61	2	154
$\Delta Tech$	3.95	2.42	3	1	11
MP	14,358	49,295	1,500	17	471,394

FIGURE 1
GRAPHICAL ILLUSTRATION OF THE MONTHLY BASIS CONTRACT LENGTH AND NEWS-COUNT PER MONTH



Next, we used the Pearson Correlation Coefficients to show the potential interactions between the variables (Table 2). The result showed that the dependent variable Y (e.g. buyer's contract length) is significantly correlated with all the independent variables except for the $(Tech)^2$, i.e. the quadratic-form of overall technology level. Specifically, there is a significantly positive correlation between the contract length (Y) and the overall technology level $(Tech)$. This means that, the cloud buyers tend to sign a longer contract if the overall technology level is higher. We observed that the contract length (Y) is positively correlated with the $(\Delta Tech)$ and negatively correlated with $(\Delta Tech)^2$. This finding suggests a concave relationship between the buyer's contract length (Y) and the $\Delta Tech$, i.e. technology evolution speed. Finally, the correlations between $\Delta Tech$, $(\Delta Tech)^2$, $Tech$ and $(Tech)^2$ are statistically significant, which is reasonable because all of these variables are calculated from the number of news released by the service provider.

TABLE 2
CORRELATION COEFFICIENT BETWEEN EACH PAIR OF THE VARIABLES

	$Contract\ Length\ (Y)$	$\Delta Tech$	$Tech$	$(\Delta Tech)^2$	$(Tech)^2$	MP
$Contract\ Length\ (Y)$	1					
$\Delta Tech$	0.242*	1				
$Tech$	0.224*	0.502*	1			
$(\Delta Tech)^2$	-0.233*	0.948*	0.443*	1		
$(Tech)^2$	0.107	0.501*	0.980*	0.439*	1	
MP	-0.359*	-0.003	-0.104	0.029	-0.099	1

*The correlation is statistically significant at the 5% significance level.

The finding of the OLS estimation further confirms the relationship between the contract lengths (Y) and the technology evolution. The coefficient of $Tech$ is positive and that of $(Tech)^2$ is non-significant. The contract length is monotonically lengthening as the overall technology level increases. This result suggests that the elevation of overall technology level incites the buyers to sign a longer contract. The coefficients of $\Delta Tech$ and $(\Delta Tech)^2$ demonstrate a concave relationship between the contract length (Y) and technology evolution speed ($\Delta Tech$). As the technology evolution speed becomes faster, the buyers prefer a longer contract first and then switch to a shorter one. This is because the technology evolution speed can create two effects: one is elevating the overall technology level, the other is making the current technology obsoleted. With a moderate evolution speed, the elevation of the overall technology level promotes a longer contract. When observing a fast evolution speed, the buyers prefer a shorter contract because they don't want to be bonded with an outdated service. Based on the parameter estimations, we are able to calculate an optimal value of $\Delta Tech = 6$ which gives the longest contract length.

Our results provide managerial implication to the service providers. We address that, the service firm should strategically manage their technology evolution to gain optimal outcomes from the contract. It is acknowledged that a longer contract not only brings more revenues but also reduce the cost of frequently signing a short contract (Josow, 1987). We empirically prove the monotonically positive relationship between the overall technology level and the buyer's contract length. Therefore, the service providers should realize that, overall technology level is critical to incite the buyers to sign a longer contract. On the other hand, we should also pay attention to the quadratic relationship between the technology evolution speed and the buyer's contract length. The service providers should strategically manage the technology evolution speed to optimize the buyer's contract length decision. Neither too slow nor too fast evolution speed is a good option. Buyers form perception about the technology evolution speed through the number of news publicized on the service provider's official website. Based on our results, we would recommend the service provider in our study context to publish six news per month to maximize the buyer's service contract length.

TABLE 3
OLS PARAMETER ESTIMATIONS FOR CONTRACT LENGTH

Parameters	Coefficients	Standard Error	t-stat	p-value
Intercept	3.328	1.939	1.716	0.0876
$\Delta Tech$	2.763	0.846	3.264	0.0013
$Tech$	0.137	0.036	3.817	0.0002
$(\Delta Tech)^2$	-0.244	0.068	-3.586	0.0004
$(Tech)^2$	1.782E-05	0.001	0.017	0.9868
MP	-9.237E-05	3.303E-05	-2.797	0.0056

CONCLUSION

This study aims at identifying the relationship between the buyer's contract length and the service-related technology evolution in B2B cloud service market. We shed a light on how we can link technology evolution to the cloud buyer's contractual decision. The results reveal that the length of contract increases with the overall technology level, and there is a concave relationship between the contract length and the technology evolution speed. We addressed that the service provider should strategically manage the technology evolution to gain maximum benefits from the buyer's service contract. Our findings suggest an optimal number of six news per month to optimize the service contract length from the cloud buyers.

LIMITATIONS

Our study still has several development spaces for future research. First, our study used the number of official released news as indicator of technology evolution. Future studies can improve such measurement by refining the design of the news content so that we could also evaluate the quality of each news. Second, our study only focuses on the U.S. market. However, in emerging market such as China and India, people show even stronger thirst for technology innovation. It will be very interesting and unique to demonstrate how the buyers in emerging market respond to the technology evolution in their contractual decision process. Third, we don't consider competition in our model because of both the specialty of our study context and data limitation. If data is available, future studies can consider add in the competition to improve the understanding of the impacts of technology evolution on the buyers' choice of contract length.

ENDNOTES

1. https://www.techopedia.com/definition/5569/technology-services
2. https://www.statista.com/statistics/510350/worldwide-public-cloud-computing/

REFERENCES

Abadi, D. J. (2009). Data Management in the Cloud: Limitations and Opportunities. *IEEE Data Eng. Bull.,* 32(1), 3-12.

Ashgarizadeh, E., & Murthy, D. N. (2000). Service contracts: A stochastic model. *Mathematical and Computer Modelling: An International Journal*, 31(10-12), 11-20.

Bass, F. M. (1969). A new product growth for model consumer durables. *Management science*, 15(5), 215-227.

Benlian, A. (2009). A transaction cost theoretical analysis of software-as-a-service (SAAS)-based sourcing in SMBs and enterprises. In *ECIS* (pp. 25-36).

Benlian, A., Hess, T., & Buxmann, P. (2009). Drivers of SaaS-adoption–an empirical study of different application types. *Business & Information Systems Engineering*, 1(5), 357.

Brickley, J. A., Misra, S., & Horn, R. L. V. (2006). Contract duration: Evidence from franchising. *The Journal of Law and Economics*, 49(1), 173-196.

Chandy, R. K., & Tellis, G. J. (1998). Organizing for radical product innovation: The overlooked role of willingness to cannibalize. *Journal of marketing research*, 474-487.

Chandy, R. K., & Tellis, G. J. (2000). The incumbent's curse? Incumbency, size, and radical product innovation. *Journal of marketing*, 64(3), 1-17.

Crocker, K. J., & Masten, S. E. (1988). Mitigating contractual hazards: Unilateral options and contract length. *The RAND journal of economics*, 327-343.

DellaVigna, S., & Malmendier, U. (2004). Contract design and self-control: Theory and evidence. *The Quarterly Journal of Economics*, 119(2), 353-402.

Ettlie, J. E., & Rubenstein, A. H. (1987). Firm size and product innovation. *Journal of Product Innovation Management: an International Publication of the Product Development & Management Association*, 4(2), 89-108.
Ferry, N., H. Song, A. Chauvel & F. Solberg (2014). CloudMF: Applying MDE to Tame the Complexity of Managing Multi-Cloud Applications, in Utility and Cloud Computing (UCC). *2014 IEEE/ACM 7th International Conference on*, 269-277
Foster, R. N. (1988). *Innovation: The attacker's advantage*. Summit books.
Harrell, Jeff (2014). The History and Development of Cloud Computing. *https://www.aerofs.com/the-history-and-development-of-cloud-computing-md/*; last access: Aug.27, 2018
Hoberg, P., Wollersheim, J., & Krcmar, H. (2012). The business perspective on cloud computing-a literature review of research on cloud computing.
IBISWorld (2017). Apartment Rental - US Market Research Report. Retrieved August 27, 2018, from https://www.ibisworld.com/industry-trends/market-research-reports/real-estate-rental-leasing/apartment-rental.html
Im, S., & Workman Jr., J. P. (2004). Market orientation, creativity, and new product performance in high-technology firms. *Journal of marketing*, 68(2), 114-132.
Joskow, P. L. (1987). Contract duration and relationship-specific investments: Empirical evidence from coal markets. *The American Economic Review*, 168-185.
Kerkvliet, J., & Shogren, J. F. (2001). The determinants of coal contract duration for the Powder River Basin. *Journal of Institutional and Theoretical Economics JITE*, 157(4), 608-622.
Moore, G. (1965). Moore's law. *Electronics Magazine*, 38(8), 114.
Moore, G. E. (2003, February). No exponential is forever: but" Forever" can be delayed![semiconductor industry]. In *Solid-State Circuits Conference, 2003. Digest of Technical Papers. ISSCC. 2003 IEEE International* (pp. 20-23). IEEE.
Murthy, D. N. P., & Yeung, V. (1995). Modelling and analysis of maintenance service contracts. *Mathematical and computer modelling*, 22(10-12), 219-225.
Nannicini, T. (2006). The determinants of contract length in temporary help employment. *Labour*, 20(3), 453-474.
Ng, I. C., Nudurupati, S. S., & Tasker, P. (2010). Value co-creation in the delivery of outcome-based contracts for business-to-business service.
Opara-Martins, J., Sahandi, R., & Tian, F. (2016). Critical Analysis of Vendor Lock-in and its Impact on Cloud Computing Migration: A Business Perspective. *Journal of Cloud Computing: Advances, System and Application*, 5(4), 1-18
Rahman, A., & Chattopadhyay, G. (2007). Optimal service contract policies for outsourcing maintenance service of assets to the service providers. *International Journal of Reliability and Applications*, 8(2), 183.
Sarkar, P. K., & Young, L. W. (2011, June). Sailing the cloud: a case study of perceptions and changing roles in an australian university. In *ECIS* (p. 124).
Saya, S., Pee, L. G., & Kankanhalli, A. (2010, January). The Impact of Institutional Influences on Perceived Technological Characteristics and Real Options in Cloud Computing Adoption. In *ICIS* (Vol. 24).
Schlereth, C., & El Kihal, S. (2013). Profit Maximising Contract Plans For Cloud Computing Services. In *ECIS* (p. 69).
Silva, G., M.Louis, & C. Radu (2013). A systematic Review of Cloud Lock-in Solutions. *Cloud Computing Technology and Science (CloudCorn), IEEE 5th International Conference on*. Vol.2, IEEE
Sood, A., James, G. M., Tellis, G. J., & Zhu, J. (2012). Predicting the path of technological innovation: SAW vs. Moore, Bass, Gompertz, and Kryder. *Marketing Science*, 31(6), 964-979.
Sood, A., & Tellis, G. J. (2005). Technological evolution and radical innovation. *Journal of Marketing*, 69(3), 152-168.

Sorescu, A. B., Chandy, R. K., & Prabhu, J. C. (2003). Sources and financial consequences of radical innovation: Insights from pharmaceuticals. *Journal of marketing*, 67(4), 82-102.

Tomasco, Steven (2011), Industry Leaders Worldwide Embrace IBM Clouds to Transform Business Processes. Retrieved August 27, 2018, from http://www-03.ibm.com/press/us/en/pressrelease/34201.wss

Vazquez, L. (2007). Determinants of contract length in franchise contracts. *Economics Letters*, 97(2), 145-150.

Walter, C. (2005). Kryder's law. *Scientific American*, 293(2), 32-33.

Young, P. (1993). Technological growth curves: a competition of forecasting models. *Technological forecasting and social change*, 44(4), 375-389.

Zhou, K. Z., Yim, C. K., & Tse, D. K. (2005). The effects of strategic orientations on technology-and market-based breakthrough innovations. *Journal of marketing*, 69(2), 42-60.