

Business of Intelligent Services

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1 Internet Era in 1990s

During the Internet era in the 1990s, new services were developed and provided for public access. Online shopping became a new way of selling products and services. It was then named the *electronic commerce*. Roughly speaking, those services could be summarized in the following categories.

1. Web portal: Yahoo.com.
2. Application services for personal use: PayPal.
3. Application services for enterprise: Ariba, CommerceOne, mySAP, VerticalNet.
4. Electronic marketplaces (B2B): Ariba, CommerceOne, mySAP, VerticalNet.
5. Electronic marketplaces (B2C/C2C): Amazon, eBay.

Note that many platforms have been defunct.

2 1990s Application Service Provider (ASP)

Advancing web technology in the 1990s was enable a number of application software (resp. systems) to be accessed and used over the Internet. As long as a user computer had been connected to the Internet, the user was able to login his/her user account registered in a *platform* which provides those *remote* software or systems. The tech firm maintaining such platforms was called *application service provider*. The software and systems leased for use are collectively named as *application services*.

2.1 Application services

Generally speaking, application services embrace a large number of services, ranging from simple *search service* to *enterprise information management*. Below lists a number of these online services.

1. Search service.
2. Email service.
3. News search.
4. Word processing, database management and file management.
5. Flight ticket booking, car rental and hotel room reservation service.
6. Stock price search and exchange rate search.
7. Payment services.

8. Web hosting services.
9. Supplier search service.
10. Enterprise information management: Accounting information management, financial information management, human resource information management, supply chain information management and customer relationship information management.

Some of these application services were developed for personal use. Some of them were developed for streamlining business operations of an enterprise. With these application services providers, many online shopping sites were launched to sell their services or products over the Internet. Some of these websites were launched by existing firms as a new channel for services or products sell. Some of these websites were launched by startups to sell services and products.

2.2 Business application services

Clearly, these services were provided by multiple platforms. The ASPs in the 1990s were normally referred to those firms providing services mainly for use in business administration, instead of personal use.

1. Word processing, database management and file management.
2. Payment services.
3. Web hosting services.
4. Supplier search service.
5. Enterprise information management: Accounting information management, financial information management, human resource information management, supply chain information management and customer relationship information management.

An advantage of using these online services is that a firm does not have to *maintain* multiple information systems in-house. Thus, a firm could focus more on her core competence.

2.3 Service supply chain

One point should be noted. Many small and medium size tech firms do not develop any core technology for those services. They simply license from other leading tech firms for those services. Clearly, giant ASPs, like SAP and IBM, played important roles in this service supply chain. After all, the business environment of the application services industry could be in analog to *franchising* or *authorized dealing*.

Figure 1 shows a simple picture for this service supply chain. An SME ASP licenses the technologies together with systems from a giant ASP to deliver

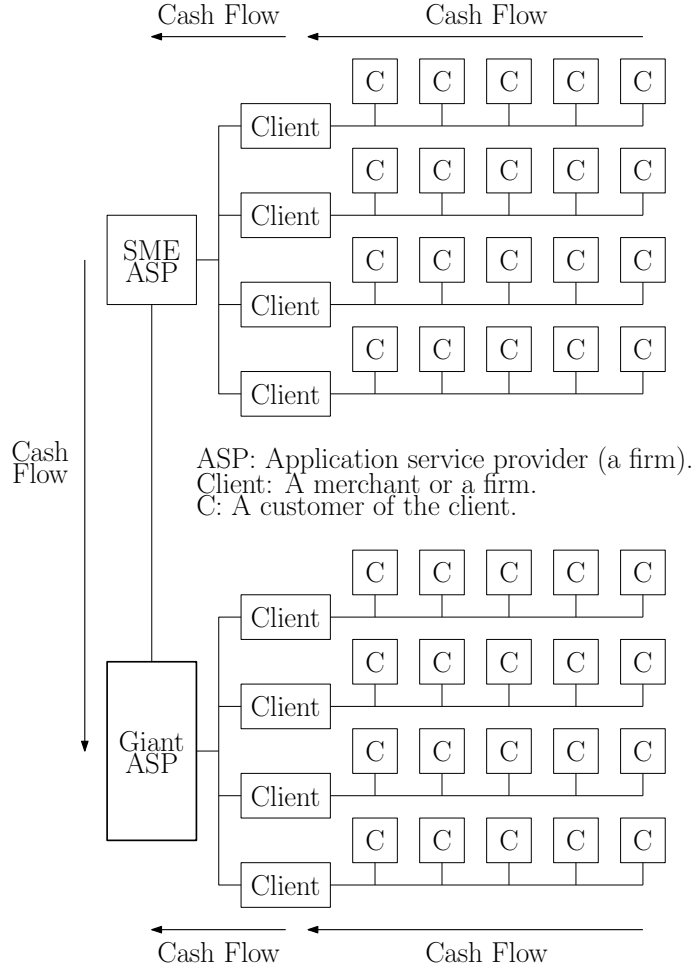


Figure 1: Typical (a) cash flow and (b) service flow in the 1990s application service provider (ASP) ecosystem. Application services included (i) memory space for data and file storage, (ii) application systems for administration (including documentation, accounting, finance and HR), (iii) supply chain management (SCM) systems, (iv) customer relationship management (CRM) systems, (v) competitive intelligent systems and others.

application services to her clients. Normally, a client is a merchant or a firm. The client and her customers interact via the services provided by the ASP.

Let say, a customer A has placed an order for buying a book from the client X. The order information is entered and stored in the platform of the ASP Z. A staff of the client X is able to know the order information once the staff has login the platform. Then, the staff packs the book and delivers it via a 3PL to the customer A. If customer A has any comment about this transaction, he/she is able to enter the comment via the platform and let the staff of the client X to read and response.

Roughly speaking, the flow of the service starts from the giant ASP and ends in the customer A. The cash flow is in the reverse direction, starting from the customer A and ending in the giant ASP, as shown in Figure 1.

Question: Which party is profitable from this service supply?

3 2010s Intelligent Service Provider (ISP)

As a lot more AI systems have been developed and launched, many AI tech firms have been founded and licensed their technologies for their clients or other tech firms. No wonder, the practise is similar to the practise of the 1990s ASP. Both of them provide application services for the clients. However, there are at least three key differences in them.

1. In the 1990s, the platform delivering the application services was constituted by *file servers*, *database servers* and many *application servers*. Today, the platform delivering the application services is supported by a *cloud*.
2. In the 1990s, the computational resource allocated for a client was fixed. If there is a sudden raise on the demand of resource, the platform is not flexible to make the change. Today, the computational resource allocated for a client is dynamic. It is a kind of on-demand basis.
3. In the 1990s, the application systems were not so intelligent. Today, many application systems have embedded with intelligent models in them. The system for customer support is an example.

In the Web 3.0 era, some application services could also be developed by integrating intelligent services and blockchain.

3.1 Cash/Service flow

Figure 2 shows a typical (a) cash flow and (b) service flow in an intelligent service provider (ISP) ecosystem. Intelligent services included (i) memory space for data and file storage from the cloud, (ii) the intelligent services supported by the generative AI models and (iii) the intelligent services supported by other AI models.

Giant ISPs, like Google and Microsoft, play important roles in this service supply chain. On one side, they developed various intelligent services for use. On the other hand, they license the intelligent services for other tech firms to provide services locally. From the cash flow point of view, giant ISPs are the points of cash-in only. The cash is from their clients and the SME ISPs which license the intelligent services.

Question: What are the charges for the use of their intelligent services? What are the licensing fee, if any, for their intelligent technologies and services?

Question: Which party is profitable from this service supply?

3.2 2020s Intelligent services for sales and marketing

Figure 3 shows a typical *intelligent service supply chain*, in which the end users are *customers*. Similar to that of the service supply chains manifested in the ASP network and ISP network, the giant intelligent service provider (ISP) and the information infrastructure provider (IFSP) play key roles in the chain. As today intelligent service like ChatGPT requires to use a large amount of computational resource, many intelligent services have to be delivered based on a cloud platform. In this regard, many ISP and IFSP are indeed the same provider, like Google and Microsoft. They provide information infrastructures via their clouds. On their clouds, intelligent services are delivered as application softwares or simply APPs for the clients. If an client is a merchant, an customer of the merchant is able to get service support via the intelligent services together with the customer service provided by the merchant.

3.3 2025 Intelligent services for business administration

Figure 4 shows a typical *intelligent service supply chain*, in which the end users are *employees*. The giant intelligent service provider (ISP) and the information infrastructure provider (IFSP) play key roles in the chain. As today intelligent service like ChatGPT requires to use a large amount of computational resource, many intelligent services have to be delivered based on a cloud platform. In this regard, many ISP and IFSP are indeed the same provider, like Google and Microsoft. They provide information infrastructures via their clouds. On their clouds, intelligent services are delivered as application softwares or simply APPs for the employees in the clients.

4 Intelligent Services for E-Markets

Figure 6 shows typical platform-oriented organization structures for software e-markets like Apple App Store and product e-markets like Shopee, Alibaba and Amazon. Alibaba and Amazon have to maintain at least eight platforms. Four of them are for their cloud services and four of them are for their marketplaces.

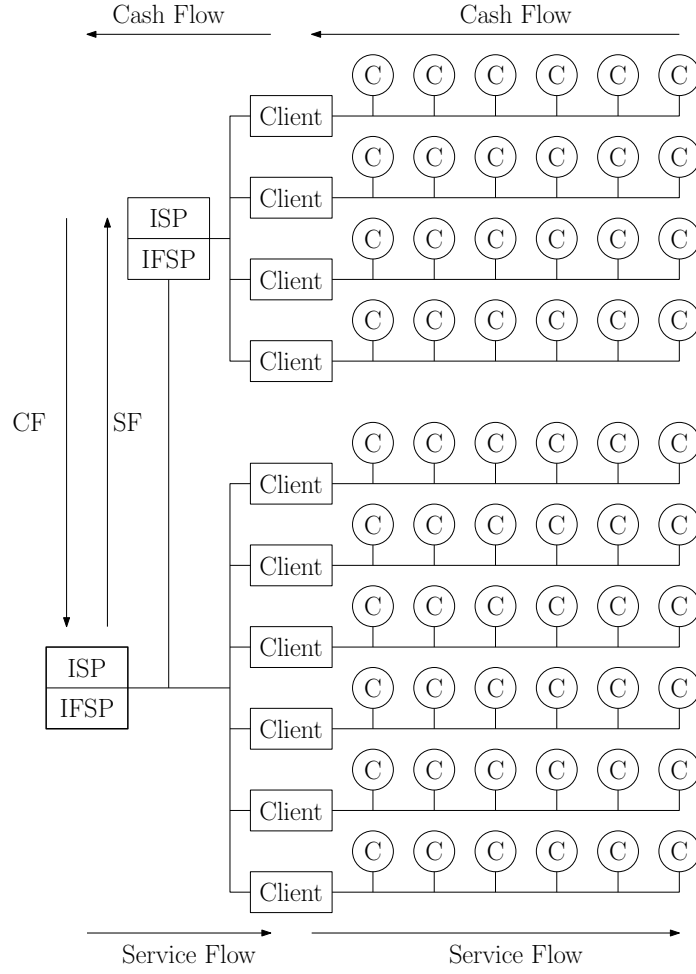


Figure 3: Typical *intelligent service supply chain*, in which the end users are *customers*. Here, IFSP stands for information infrastructure service provider.

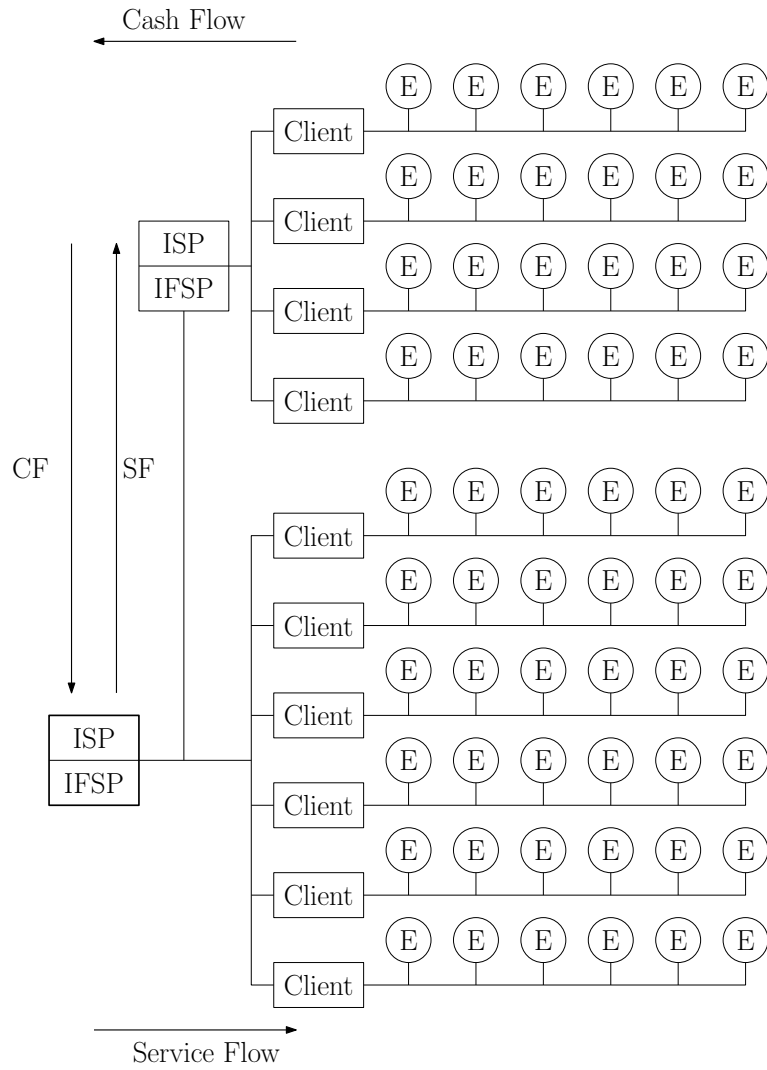


Figure 4: Typical *intelligent service supply chain*, in which the end users are *employees*. Here, IFSP stands for information infrastructure service provider.

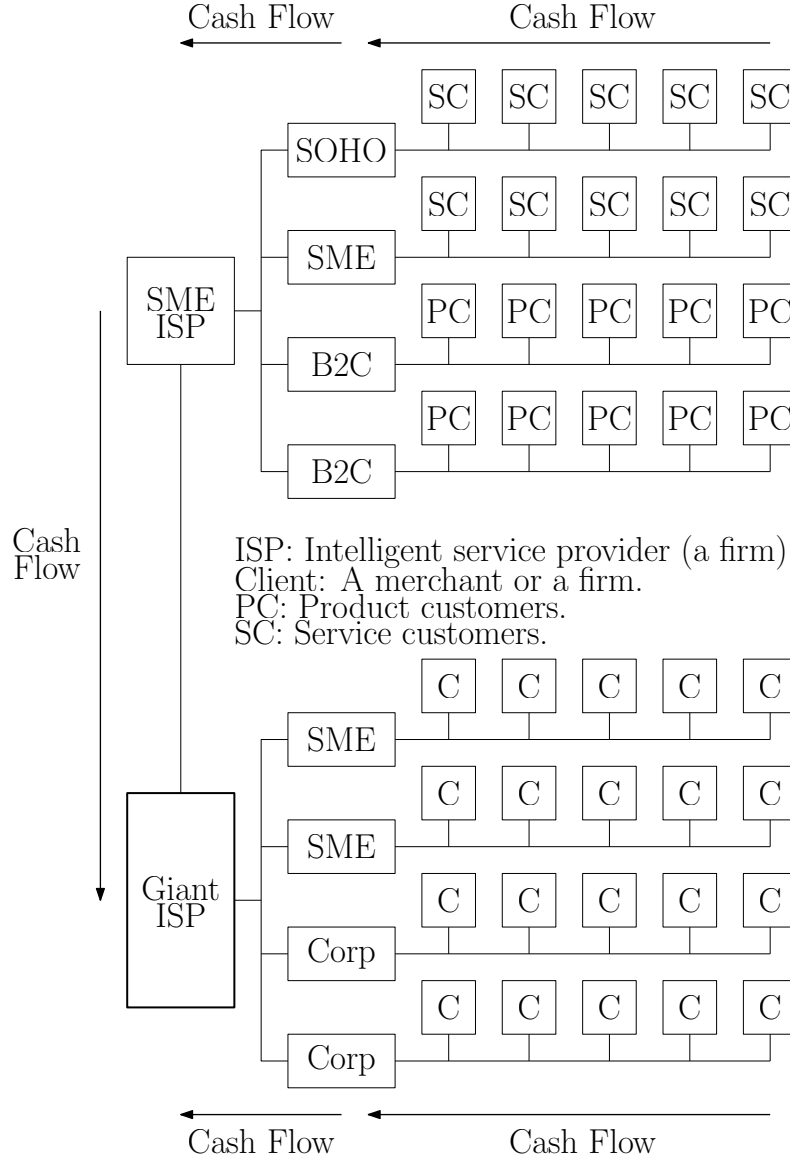


Figure 5: Yet another typical *intelligent service supply chain*. The end users could be the *employees* of a corporation or the product customers who buy the products from a SOHO, SME or a corporation. Here, IFSP stands for information infrastructure service provider.

1. The online marketplace (equi. e-market) is for the sellers to sell their products.
2. The payment platform facilitates the cash flow between the buyers and the sellers.
3. The logistic platform is the infrastructure for delivering physical products to the buyers.
4. The cloud acts as a virtual management information system for the sellers to manage information. Besides, a seller is able to purchase an APP from the APP market for business management.
5. The developer platform acts as a support among the developers and the cloud engineers so as to facilitate the developers to develop new application software.

4.1 For market makers

For the market makers, it is clear that those LLM-based intelligent services could streamline document (resp. report) preparation for the internal operations. It is no difference from the use of the LLM-based intelligent services in an enterprise.

4.2 For sellers

Besides, intelligent services could be beneficial to the participants of these platforms. Buyers might not be beneficial much. For a seller, at least three tasks can likely be beneficial from the use of intelligent services like text/image/video generation. They are respectively the *new product design*, the *advertising material design* and *market surveys*.

5 Other Factors to Concern

In the year of 2026, many intelligent services are LLM-based. Those services can help to generate text or document, images, videos, audio files and program codes.

5.1 Labor cost

Some LLM-based services can do logical reasoning and procedure design; and thus reduce the labor workload putting in those administrative works. For instance, a monthly sales report can now be drafted by an LLM with minimal human involvement. Strategic plan can be compiled by an LLM for reference in a top management meeting. By that, operational cost can definitely be reduced. However, cost down is not the only concern. Revenue gain is another concern.

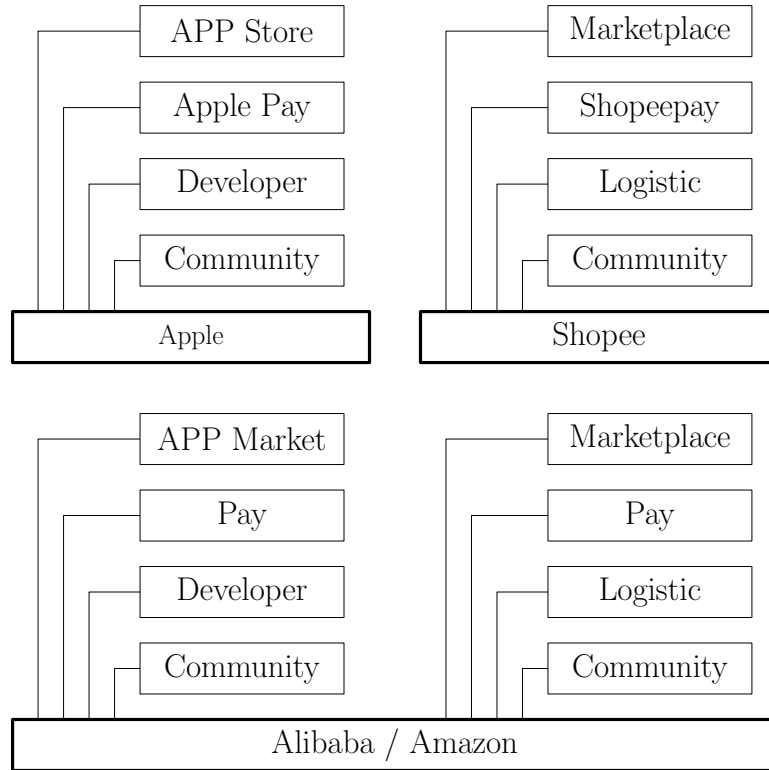


Figure 6: Platform-oriented organization structure for software e-markets and product e-markets. To support App Store, Apple needs to maintain four platforms. Shopee maintains four platforms to support its marketplace. Alibaba and Amazon both maintain eight platforms. Four of them are for their cloud services and four of them are for their marketplaces. One challenge is how AI tools can be beneficial to the market makers and participants on the e-markets (i.e. the sellers and the buyers). For a seller, at least three tasks can likely be beneficial from the use of AI tools – new product design, advertising material design and market survey.

5.2 Revenue gain

An incentive for the use of a new technology or service is also based on its capability in making additional revenue for a firm. To do so, two aspects have to consider. One problem is to figure out if the new technology/service is able to get more customers to buy the existing products or services. The other problem is to figure out if new product or service can be developed to attract customers to pay for them. For new product/service design, those LLM-based services might have difficulty and this is an open problem for the LLM-based intelligent services.

5.3 Subscription fee

Today, many LLM-based intelligent services are bundled with specialized platforms. For instance, Microsoft Co-Pilot provides only OpenAI ChatGPT and associated AI tools for the enterprise users. For another example, an iPhone user can only access OpenAI ChatGPT unless the user has installed other LLM app in the iPhone. Therefore, the coverage (resp. revenue gain) of an intelligent service depends on which platform (resp. operating system), as depicted in Table 1, it is bundled.

For Microsoft Co-Pilot, Microsoft can mandate an enterprise to subscribe. For an iPhone user, the fee for the ChatGPT app should have been included in the selling price of the iPhone. That is to say, the use of ChatGPT is not free of charge.

5.4 Platforms for user access

As depicted in Table 1, there are at least 31 network-of-device platforms. These platforms are directly facing the users. Their sizes are then depended on the number of users on the platforms. Basically, each of these platform has at least three fundamental functions.

1. A platform can act as a media for advertising. Merchant can advertise on via a platform for its product or service.
2. A platform can act as an interface for a user to access an intelligent service. Intelligent service can be technically designed to bind with a single platform.
3. A platform can act as an interface for a user to buy (resp. subscribe) a product (resp. service).

Except for the Windows PC its end user includes both corporate and personal user segments, all other platforms cover entirely the personal or family-based user segment. For corporate users, intelligent service like AI agent is definitely useful as it can automate certain information tasks. For personal or family-based users, AI agent might not be so useful. A free-of-charge LLM, such as ChatGPT and Google Gemini, is already good enough.

Table 1: Network-of-device (NoD) platforms and their corresponding operating system families. Here, electric vehicle is considered as a device. Wearable devices and Internet TV devices are not included in the table. Each $\checkmark$ corresponds to an NoD platform. Therefore, 31 NoD platforms are listed. Excluding *Browser*, *Home Auto*, *Vehicle* and *Game Console*, there are 12 platforms listed. Each platform is a channel for product sell. The users associated with a platform are the potential customers a product (resp. intelligent service) if it is advertised (resp. solely supported) over the platform.

Device/APP	(OS Families)			
	MacOS	Unix/Linux	Windows	Harmony
(Cell Phone)				
Android ^a Phone	–	$\checkmark$	–	–
Apple iPhone	$\checkmark$	–	–	–
Huawei Phone	–	–	–	$\checkmark$
(Tablet)				
Amazon Fire	–	$\checkmark$	–	–
Apple iPad	$\checkmark$	–	–	–
Google Pixel	–	$\checkmark$	–	–
Huawei MatePad	–	–	–	$\checkmark$
Microsoft Surface	–	–	$\checkmark$	–
(Computer)				
Apple Macbook	$\checkmark$	–	–	–
Huawei Matebook	–	–	$\checkmark$	$\checkmark$
Windows PC	–	–	$\checkmark$	–
(Browser)				
Apple Safari	$\checkmark$	$\checkmark$	$\checkmark$	–
Google Chrome	$\checkmark$	$\checkmark$	$\checkmark$	–
Huawei Browser	–	–	$\checkmark$	$\checkmark$
Microsoft Edge	$\checkmark$	$\checkmark$	$\checkmark$	–
(Home Auto)				
Amazon Echo	–	$\checkmark$	–	–
Apple Home	$\checkmark$	–	–	–
Google Nest (Home)	–	$\checkmark$	–	–
(Vehicle)				
BYD	–	$\checkmark$	–	–
Huawei	–	–	–	$\checkmark$
Telsa	–	$\checkmark$	–	–
Xiaomi	–	$\checkmark$	–	–
(Game Console)				
Microsoft Xbox	–	–	$\checkmark$	–
Nintendo Switch	–	$\checkmark$	–	–
Sony PlayStation	–	$\checkmark$	–	–

^aIt covers the smartphones manufactured by Google, Oppa, Samsung, Vivo, Xiaomi and others. You can check out the long list on Wikipedia : https://en.wikipedia.org/wiki/List_of_Android_smartphones.

5.5 Business process re-engineering (BPR) 2.0

With the advancement of the LLM-based intelligent services, the business processes (equi. operations) could be re-engineered just like in the era of 1990s. It is especially true for those business processes which rely solely on information processing.

5.5.1 ERP AI

From this point, I would like to highlight three enterprise resource planning (ERP) system providers, namely SAP, Oracle and Microsoft. These tech firms have already developed ERP AI applications: SAP AI Core, Oracle NetSuite Next and Microsoft Dynamic 365 Co-Pilot.

5.5.2 Knowledge management

For the past three decades (around 2000 to 2026), knowledge management has been an inevitable work in many enterprise. The knowledge management platform is a place for the employees to exchange ideas and to learn new knowledge. With the advancement in LLMs, a knowledge management platform could be re-designed with integrating an LLM. The LLM can then be act as an interface and the interpreter for the user to interact with the knowledge management system via natural language.