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HUNGARIAN IT: COPING WITH ECONOMIC TRANSITION AND GLOBALISATION

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Abstract

This paper examines the impact of economic transition on the information technology industry in Hungary. It highlights some of the challenges faced by policy makers and businesses in their efforts to ensure that Hungarian technology capabilities survive the onslaught of fierce competition from abroad, and that the industry continues to grow and innovate in the context of a rapidly globalising economy. The paper is based on extensive field research conducted by the author in Hungary during 1998-2002.

Keywords: Hungary, IT industry, policy, globalisation, liberalisation.

1   INTRODUCTION

It is now over a decade since the process of economic transition from the command economy model to market-oriented economic policies began in Eastern European countries. The resultant changes have affected every social and economic sector in these countries, and the region's technology industries have been no exception (Dyker, 1997). This paper examines the impact of economic transition on the information technology (IT) industry in Hungary. It highlights some of the challenges faced by policy makers and businesses in their efforts to ensure that Hungarian technology capabilities survive the onslaught of fierce competition from abroad, and that the industry continues to grow and innovate in the context of a rapidly changing economy.

The paper draws from extensive field research conducted by the author in Hungary during 1998-2002. The field research consisted mainly of interviews with a variety of people involved with the Hungarian IT industry, including chief executive officers and managers of IT companies in the Budapest region, government officials, academics from research institutes, industry lobbies, as well as the media. In all 21 interviews were conducted in Hungarian organisations based in and around Budapest during 1998 and another 17 interviews were conducted (some follow up and others new) during 2002. A full list of these organisations is given in table 1 below.

Antenna Hungaria	Montana Inc.
Carnation	Morphologic
CoDesCo Hungaria Ltd	MrSoft Training & Trading Ltd
Compaq Hungary	MTA Sztaki
Eurotrend Informatikai Kft.	NJSZT (The John von Neumann Society for Computing Sciences)
Graphisoft	Prime Minister's Office, Government of Hungary
HMS Hypermedia Systems	Recognita
Hungarian Association of Content Industry	Synergon
IDC	Szamalk Systemhouse Ltd
IDG	T Systems Unisoftware/Debis IT Services
IVSZ (The Hungarian Association of IT Companies)	Unisys Hungary
KFKI Szamitastechnikai	Wang Global

Table 1   Hungarian IT firms and organisations in which interviews were conducted

2   CONTEXT OF THE RESEARCH

The main context in which this research has been undertaken is that of the development of national information infrastructure policy in a number of countries around the world (Kahin and Wilson, 1996), and more specifically, the role played by state policy in developing IT industries in many newly industrialised and industrialising countries (for instance, see Kraemer *et al*, 1992; King *et al*., 1994). In many of these countries, high technology industries such as IT have been seen as a driving force in economic development and growth, and state policy as the means to explicitly facilitate the development of these industries (Brown & Rushing, 1986; Gurbaxani *et al*, 1990a). However, the advent of economic liberalisation and globalisation as preferred economic strategies around the world since the 1990s has thrown open a variety of challenges to domestic IT industries in many countries (Bielli & Kraeva, 1997; Cassiolato & Baptista, 1996; Grundey & Heeks, 1998).

While the case for and against state policy liberalisation has been presented by the structuralist (see Chenery, 1975; Bardhan, 1988) and neo-liberal (see Coase, 1960; Stiglitz, 1992) schools of thought

respectively, by no means has this dichotomy gone unquestioned. Much of the research into East Asian economic development questions this very dichotomy (for instance, Amsden, 1989; Wade, 1990; Singh, 1992). This body of research has shown that that liberalisation in some policy areas has often been felt to go hand-in-hand with the need for greater government intervention in other areas, and that the nature of the relationship between the state and the market is complementary rather than confrontational, as often implied by the structuralist/neo-liberal divide.

It would thus be possible to argue that the state does retain its relevance as far as economic activity is concerned even under conditions of so-called policy liberalisation and globalisation; only the nature, rationale and extent of intervention may vary depending on particular circumstances. However, there are several studies that show that governments have continued to ignore such arguments and have embraced policy liberalisation as the key to the future growth of their IT sectors (for instance, see Cassiolato & Baptista, 1996; Bielli & Kraeva, 1997; Grundey & Heeks, 1998). The Hungarian IT industry and policy, seen within the context of economic transition in Eastern Europe from planned economic models to market economies, represents one such case.

3 ECONOMIC TRANSITION IN HUNGARY

Hungary, a nation of around 10 million people, was rated the most competitive nation in Central Europe by the 2000 World Competitiveness Report (IMD, 2000), and is considered the country best-prepared among the former Eastern European communist block for European Union (EU) accession. However, these laurels should not detract from the massive changes that the country has had to go through since economic and political transition began a decade ago. During 1989/1990, Hungary moved from a planned economy to a market-based one and from a communist one-party political system to a multiparty democracy. The economic effects of this change were substantial and could be felt in the very first year of transition. For instance during 1989/1990 itself, Hungary lost nearly 70% of its export markets in Eastern and Central Europe (NJSZT, 1993). The rest of the 1990s was characterised by a series of efforts at privatisation of state owned enterprises and large-scale liberalisation. This process of privatisation and liberalisation has also impacted the Hungarian hardware and software industries.

4 HUNGARIAN IT INDUSTRY IN TRANSITION

Hungary's IT sector is a small but growing industry with some very innovative local companies and a variety of multinational corporations (MNCs). The European Information Technology Observatory (EITO) has estimated the total Hungarian IT market at around EUR3.8 billion for 2002. The computer hardware and software markets were estimated at EUR 366 million and EUR 268 million respectively (www.eito.com). The number of Hungarian Internet subscribers per 100 inhabitants in 2001 was a low 3.0 compared to the EU average of 16.8 and an OECD average of 18.7 (OECD, 2003). Table 2 below shows the growth in the number of IT enterprises in Hungary during 1995-1998.

IT Sector	1995	1996	1997	1998	1999	2000#
Computer hardware assembly/manufacturing	105	134	157	125	141	300*
Computer hardware sales	99	134	184	235	NA	NA
Software development, services & consultancy	1141	1414	1721	1908	2280	5923**
Data processing	280	332	357	369	NA	NA
Computer maintenance	220	278	328	392	550	NA

Table 2   *Number of Hungarian IT firms by sector (Source: KSH, 2001; ITD, 2001; #OECD,*
2002a)   [includes office, accounting & computing machinery; ** includes*
software consultancy and supply]

4.1   The computer hardware industry in transition

The first (Soviet made) computer in Hungary was installed at the Hungarian Academy of Sciences in December 1959. In 1963, the Hungarian Ministry of Heavy Industry obtained the country's first Western manufactured computer. Under the framework of the Central Information Technology Development Program, hundreds of computers manufactured in the then communist Eastern European block as well as some Western made machines were allocated centrally to public administration agencies and the various sectors of the economy during 1969/970. In 1975, the COCOM restrictions by the West (on high technology exports to communist regimes) led to a ban on the import of high capacity computers and computer parts into Hungary from Western nations (MoEA, 1999). During this period, state owned IT firms and IT units within government institutions developed technology capabilities by disassembling older Western machines, especially DEC machines from the then Digital Equipment Corporation (DEC). Prior to economic transition in 1989/1990, there were mainly two types of players in the Hungarian IT industry: state owned research institutes like the Institute for Measurements and Computing Techniques (KFKI) and the Institute for Computer Research and Development (SzKI) that were involved in software and applications development, and IT units within larger state owned firms that mostly provided data processing facilities.

During 1982-1989, Hungary saw the entry of personal computers (PCs) in large numbers, imported, mainly from the Far East, by traders who bypassed COCOM restrictions and thus making exorbitant profits. During these years, some local Hungarian firms, like Albacomp, focused on research and development and the assembly of personal computer parts. This era ended in 1989 when imports were liberalised and COCOM restrictions removed. This was a very difficult period for Hungary's IT industry and they were now faced with the challenge of state-of-the-art technology competing with their own home grown and often obsolete technology (MoEA, 1999).

The hardware industry in Hungary that had been subject to a socialist policy regime for several decades went through a period of rapid consolidation and restructuring since economic transition began in 1989 (NJSZT, 1993). This period witnessed the death of most local assemblers due to obsolete technology and lack of economies of scale. However, the post-1989 period also saw some local firms entering into trade alliances with MNCs and some even merged with them (e.g. the 1990 take-over by DEC of a joint venture between DEC and KFKI). These firms primarily trade in imported or locally assembled foreign PCs. In a situation akin to that seen in post-economic transition Brazil (McKnight & Botelho, 1996) and India in the early 1990s (Harindranath & Liebenau, 1995), much of the Hungarian computer hardware market is now in the hands of MNCs. Unable to compete, a number of Hungarian hardware firms either closed down or moved into the manufacturing of components and peripherals (Interviews). As shown in table 3, the ownership pattern of Hungarian IT firms has moved steadily in favour of foreign capital during the nineties.

Type of ownership	1995	1996	1997	1998	1999
Domestic private ownership	28%	26%	35%	37%	29%
State ownership	18%	14%	6%	5%	3%
Foreign ownership	54%	60%	58%	58%	68%

Table 3   *Changing ownership patterns in the Hungarian IT industry (Source: ITD, 2001)*

Despite the increasing competition from MNCs, some local firms have been able to establish themselves in the highly competitive market for systems integration, and these include Synergon and KFKI ISYS. Synergon is one of the largest Hungarian IT firms with over 600 employees and a turnover of nearly EUR 79.8 million in 2003. Synergon was born in 1997 through the merger of two long-established firms, Optotrans and Rolintron, both of which played significant roles during the protectionist era. Synergon is a systems integration specialist and also undertakes applications development for the local market (for instance, it has developed applications for the local insurance sector). KFKI ISYS is an offshoot of KFKI, a former state owned research institute, and was established in 1998 by the merger of three KFKI firms. Its business focus includes applications development and systems integration. Table 4 lists the annual turnover and number of employees for some Hungarian hardware firms.

Hardware Company	Turnover in 2003 (Million EUR)	Number of employees in 2003
Synergon	79.8	600
KFKI	76.7*	600
Albacomp	52.6	300
Montana	24.1*	200

*Table 4   Hungarian IT companies (Hardware) (Source: www.synergon.hu; www.kkfki.hu; www.albacomp.hu; www.montana.hu)[*2002 figure]*

Perhaps, one of the most imaginative Hungarian firms that have established an unusual niche market for itself is Kurt, or European Data Recovery Service (EDRS) as it is known outside Hungary. Kurt has attracted a lot of publicity and media attention (see for instance, Business Week, 1995; Guardian, 1995; CEECS, 1996) for its highly specialised business built around the recovery of data from damaged computer hard disks. The COCOM import restrictions and the high cost of East European drives led to a market for repairing damaged mainframe disk packs in Hungary (CEECS, 1996), which Kurt has exploited successfully.

The economic and political changes that came with the transition of 1989/1990 also impacted state-funded research institutions. According to an official at MTA SZTAKI, the Computer and Automation Research Institute of the Hungarian Academy of Sciences, the government's investment in research and development (R&D) through the Government Fund for Technical Development has fallen considerably since the beginning of the economic transition, from EUR 40 million in 1988 to EUR 12 million in 1998 (Interviews). The various Soviet-style research institutions that played a major role in R&D during the communist era could no longer sustain their research activities in the new market economy conditions characterised by the availability of cheap and state-of-the-art hardware. However, some research institutions have gone on to generate successful private IT companies. For instance, KFKI ISYS, the systems integration company, was created as an offshoot of the Institute for Measurements and Computing Techniques (KFKI) (Interviews).

Overall, the impact of liberalisation and MNCs on the Hungarian computer hardware sector has been mixed, and this reflects similar impacts felt in certain developing economies that liberalised their IT sectors in the early 1990s, such as Brazil (see Cassiolato & Baptista, 1996; Tigre & Botelho, 2001) and India (Harindranath, 1995). The impact has been positive to the extent that the arrival of MNCs has brought state-of-the-art technology into Hungary and consumers have access to international quality products. MNCs such as IBM, Nokia and Philips have also set up very large export-oriented manufacturing facilities for components and peripherals in Hungary, thereby contributing to much needed employment generation and the development of Hungarian exports. The negative consequence can be seen in the impact MNCs have had on local computer hardware firms. Hungary's computer hardware manufacturing has died in all but name with local brands almost extinct. The demise of local manufacturing and the new dependency on MNCs may yet engender a loss of technical know-how

developed by local firms during the protectionist periods, through a process of 'learning by doing' seen as key to successful technical innovation (Arrow, 1962).

4.2   Hungary's software industry

Hungary's strength has always been its highly educated people and this worked to the country's advantage even during the socialist era (NJSZT, 1993; Business Week, 1995). The software sector of the Hungarian IT industry has always been in a stronger position due to the availability of such manpower. Prior to economic transition, contract programming was the mainstay of the software sector and much of the activity was based in neighbouring communist states, especially East Germany. Numerous skilled software workers were sent abroad on 'body shopping' contracts during this period (Interviews). State owned agencies and research institutes dominated the sector, and the period was characterised by poor access to the latest software development tools and platforms due to COCOM restrictions. However, this proved to be a blessing in disguise as Hungarian research institutes and IT firms became extremely skilful in developing applications on hardware of very low capacity (Computerworld, 1999).

During the pre-transition era, many of Hungary's government departments and ministries had their own IT services units, developing applications and providing maintenance facilities. From around 1982, unlike its neighbouring communist regimes, Hungary's socialist government permitted limited private enterprise by allowing the creation of 'semi-private' companies and many entrepreneurs from state-owned IT units and research institutes left to set up their own IT companies (Interviews). For instance, Graphisoft was established in 1982 by an entrepreneurial mathematician who left the Hungarian Geophysical Institute (Bojar, 1994; Business Week, 1995).

The post-1989 scenario is one of isolated attempts to develop original products amidst intense competition from MNCs. Economic transition brought with it increased competition and a struggle for survival amongst Hungary's many software firms. The period from 1989/1990 saw the creation of numerous new private sector software firms, of which the vast majority were small 'scale' in nature, offshoots from state owned institutes, and joint ventures with MNCs. Examples of software firms created from or hived off from state-owned research institutes include Unisoftware (now part of T Systems), established in 1994 in partnership with the Institute for Measurements and Computing Techniques (KFKI); Recognita (now part of ScanSoft), an offshoot of the Institute for Computer Research and Development (SzKI); and Szamalk, which was created out of the not-for-profit state-owned training company called Computing Applications Research Institute (Interviews). However bar a few exceptions, the small-scale nature of most Hungarian software firms has meant that MNCs have long since dominated this sector.

Remarkably, the post-transition period has also seen some local firms venturing successfully into innovative product development and entering niche markets in this highly competitive industry. Some of the more prominent local players in the Hungarian software market are Szamalk in IT training and education, Montana in the area of contract programming, Recognita in the area of optical character recognition (OCR), Graphisoft in the area of architectural software, HMS in applications development especially for banking and document management systems, and Morphologic in the highly specialised area of natural language processing. Indeed, these firms represent the range of challenges and opportunities facing Hungarian firms in the post-transition era.

For instance *Recognita*, set up during the time of economic transition in 1989, has since established a name worldwide for its optical character recognition software (OCR) sold in over 30 countries. Unable to find independent finance for further expansion in the late 1990s, Recognita was bought by an MNC in 1996, and has since become ScanSoft's Hungarian subsidiary. At the other end of the spectrum is the small but innovative *Morphologic*, established by three academics in 1991 and operating in the highly specialised area of natural language processing. Morphologic's innovations in this area have been licensed by many international IT firms such as IBM, Xerox and Microsoft. At present, the firm

is attempting to establish its own brand name in the international market, starting with new operations in Latin America.

Graphisoft is a relatively large Hungarian software firm that started operations in 1982. By establishing itself as a market leader in architectural software with its locally developed product called ArchiCAD, Graphisoft has shown the way forward for local IT firms attempting to enter the global market. ArchiCAD is now sold in over 80 countries and it has even been translated into 18 languages. *HMS*, which began operations in 1990 with contract programming work for Bertelsmann of Germany, is one of the few firms that have since moved successfully into product development. HMS has developed applications for electronic banking and document management systems, and has also entered the market for Hungarian content CD-ROMs and electronic publishing. HMS has also entered into alliances with local Hungarian companies such as IQSoft for implementing its ArchiWare document management systems at end user facilities in Hungary.

Thus the post-transition period has witnessed firms attempting a variety of survival strategies. Some have chosen to specialise in niche markets, while others have entered into relationships with MNCs, and yet others have been taken over by foreign companies. Table 5 lists some prominent players in the Hungarian software industry.

Software Company	Turnover in 2003 (Million EUR)	Number of employees in 1999
Szamalk	34.1*	400*
Graphisoft	27.2	300
T Systems Unisoftware	24.1	163
Scansoft Recognita	3.2*	85
Eurotrend	1.9	70
Morphologic	0.48	20

*Table 5   Hungarian IT companies (Software) (Source: ITD, 2000; IVSZ, 2001; www.ivsz.hu) [*1999 figure]*

5   CHALLENGES FACING THE HUNGARIAN SOFTWARE INDUSTRY

Against a background of intense competition from foreign IT companies, the strengthening of local firms and the need to develop an otherwise small domestic IT market were major concerns for many entrepreneurs within the Hungarian IT industry. Similar concerns have been raised in respect of India's IT industry, where years of export-oriented growth at least until the mid-nineties was seen to be at the expense of the domestic market (Bhatnagar & Madon, 1997). A viable and growing domestic market can provide an environment that facilitates the development of technological capability; indeed the ability to successfully innovate often requires the interaction between capable producers and users of technology (Rothwell, 1994). The role played by large-scale, and often state-sponsored, computerisation projects in developing the competencies of local firms cannot be underestimated. The experiences of countries like Korea and Singapore provide ample testimony to this (Dahlman, 1992; Gurbaxani *et al.*, 1990a & 1990b; Jeong & King, 1996). Here, Hungarian firms tended to lose out to MNCs according to many respondents, as government tenders often specified a very high annual turnover threshold as a requirement from all bidding vendors, a condition that inadvertently favoured MNCs.

The slow transition from contract programming is a further inhibitor to the growth and maturity of the Hungarian software industry. The experience of countries like India in this regard show that a nurturing policy framework can often enable entrepreneurial firms to use contract programming as a stepping stone towards higher value added software services (Bhatnagar & Madon, 1997). Moreover, many Hungarian firms needed to build business relationships beyond Germany and into the rest of Europe, as well as improve project management skills for continued growth.

New avenues for seed and venture capital and more funds to encourage small-scale firms to prepare for internationally recognised quality certification schemes were also seen as essential. Indeed, since new regulations were passed in 1998, a number of venture capital funds, such as the First Hungary Fund, the George Soros Fund and the Hungarian American Enterprise Fund, have been established targeting innovative Hungarian high technology firms (Business Week, 1995). Remarkably, although Hungary has a well-educated work force, some respondents claimed a shortage of skilled personnel, especially in software engineering. For instance, Recognita had to hire Romanians and CIB Bank hired Indians when faced with a shortage of local software engineers.

While none of the respondents wished a return to Soviet style planning and policies, there was concern at the apparent lack of any national agenda to help develop both the domestic and export performance of the industry. A revitalised relationship between the government and industry could help in this regard. The Hungarian Association of IT Companies (IVSZ), which was set up to lobby the government on behalf of the country's IT industry, now represents over 70% of the industry. IVSZ and the InfoCom Association, a group of around ten IT and telecommunications companies set up in 1998, have been at the forefront of lobbying activities aimed at establishing a legal framework for electronic commerce within Hungary, the creation of a flexible accreditation scheme for IT training institutes, and standards for IT security, among others (IVSZ, 2001).

Developments in the information society are increasingly dependent on the availability of, and access to, the Internet and other information and communications technologies (ICT). However despite the phenomenal growth in the telecommunications sector (both fixed and mobile) and cable television networks, Internet and PC penetration rates in Hungary are still well below EU average. By 2001, around 10 people in 100 had home computers and 3 in 100 had Internet subscriptions compared to the EU average of 34 and 16.8 respectively (GM 2002; OECD, 2003). Recent studies have shown that the cost of Internet access in Hungary is among the highest in the world mainly due to high telephony costs. Hungary has been ranked by the OECD in the lowest category among OECD countries in terms of its percentage of Internet subscribers (OECD 2001). The overpriced and uncompetitive market for Internet access is Hungary is partly due to the quasi-monopolistic telecommunications sector. Although Hungary's per capita spending on IT equals the EU average (remarkably, this is despite the OECD/Hungary GDP per capita ratio of 5/1), the unhealthy market structure weakens the effectiveness of this expenditure. Despite recent interventions by the Ministry of Informatics and Communications, the cost of Internet access in Hungary continues to be among the highest in Europe. This is likely to prove a major stumbling block on the way to nurturing the information society in Hungary.

The high tariffs on telephone and Internet access in Hungary have held back the rapid ICT diffusion not only in the home but also among businesses, and especially so among Hungary's small and medium enterprises (SMEs) that have had to face both intense competition and a variety of internationalisation challenges since economic transition (Soltesz, 2000). While 90% of EU business organisations have Internet access, in Hungary only 70% do and, among SMEs, only a third have access (IHM, 2003). While perhaps such problems may be addressed relatively quickly in Budapest and the industrially developed and prosperous western part of Hungary, slow technology diffusion along with relatively weak infrastructure developments in the less prosperous, rural eastern regions of the country may already be contributing to a domestic digital divide within Hungary. Again, the relatively high cost of access to the Internet and poor PC penetration will not help bridge this divide.

As Castells (2001) points out, the centrality of the Internet to much socio-economic and political activity today implies further marginalisation for those without, or with only limited, access to this new technological medium. The development of the domestic IT market and industry requires a growing IT literate population and better diffusion of ICT. Government sponsored projects like SULINET, which connects Hungarian schools, are now contributing towards this end, although there is still progress to be made with only 35% of elementary schools in Hungary having Internet access (IHM, 2003). As shown by experiences in East Asian countries like Singapore (Gurbaxani *et al*., 1990b), this should have a long-term beneficial impact on PC penetration in Hungary. It remains to be

seen as to how a range of more recent government-led information society and electronic government initiatives would help address at least some, if not all, of these concerns and help improve domestic ICT usage and diffusion (IHM, 2003; Harindranath & Magyar, 2003).

6   CONCLUSIONS

A striking feature of the IT scenario in Hungary is the apparent lack of any government policy to address the changing needs of the country's IT industry. Strengthening local technological capabilities, rapidly improving ICT literacy and diffusion, and securing a place for Hungary's IT industry in the global market, as well as a renewed relationship with the rest of Eastern and Central Europe are all issues of critical importance for the Hungarian IT industry in the current context of globalisation and economic liberalisation. Unlike the prescriptions of those that support a 'hands-off' approach by the state, all of the above activities aimed at promoting the Hungarian IT industry, its domestic base, and local IT diffusion, require strong and effective participation by the state. OECD (2002b) points to a range of policy efforts underway in a number of OECD countries in the area of ICT and these are summarised in table 6 below.

General policies: ICT policy environment and broad policy visions
Technology development: R&D programmes
Technology diffusion: diffusion to individuals, households and businesses; electronic government; SMEs; demonstrating the benefits of ICT use
IT environment: electronic settlement, authentication and security; intellectual property rights
Globalisation: international co-operation

Table 6   Main OECD country ICT policy areas (Source: OECD, 2002b)

In terms of general policies, while Hungary has made huge strides in creating an open and competitive market environment, issues still remain such as the high cost of telephony and Internet access due to a quasi-monopolistic telecoms sector. In terms of technology development, we have seen that R&D investments in Hungary have been steadily falling and this does not bode well for the development of an information society based on technology capability and innovation. In terms of ICT diffusion, recent initiatives such as Sulinet and other information society programmes are attempting to address the issue, but particular attention needs to be paid to the growing east-west digital divide within the country. Electronic commerce is still in its infancy in Hungary but new e-commerce and digital signature laws passed recently may help to improve this situation and create a more IT-friendly business environment. In terms of globalisation, we have seen how the Hungarian IT sector has been rapidly internationalised, albeit mainly through a steady increase in foreign ownership. While this in itself may not pose problems, policy should consider the impact of rapidly falling R&D investments and the increasingly difficult and competitive landscape for relatively small and innovative local Hungarian firms.

Indeed, while liberalisation can lead to integration with the global economy, and the restructuring and consolidation of firms is a necessary effect of this process, it can also lead to a significant weakening of local players and local technological capabilities, as seen previously in the case of several newly industrialising and developing economies and now also seen in Hungary. This is even more so in the context of an industry, in the wake of economic transition, attempting to find its niche within the global IT marketplace.

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