Taiwanese IT Pioneers:
Barry (Pak-Lee) Lam

Interviewed by: Ling-Fei Lin

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Ling-Fei Lin: I am Lin,Ling Fei, today is March second, 2011.This is the Taiwan Oral History Project conducted by the U.S. Computer History Museum. Throughout the course of this project, we will interview several pioneers from the semiconductor and computer industries in Taiwan. Our guest today is Lam Pak-Lee. Mr. Lam, can you tell us your Chinese and English name please?

Barry Lam: My name is Lam Pak-Lee, and my English name is Barry Lam. Why is it Lam? Because I grew up in Hong Kong, my last name is Lam (Cantonese).

Ling-Fei Lin: Would you please talk about your background, including your birthplace, year of birth, where you grew up, your parents, your family or childhood?

Barry Lam: I was born in 1949, a very historic year in Shanghai. Then, I moved to Hong Kong with my parents.

Ling-Fei Lin: Which part of Hong Kong?

Barry Lam: I lived in a rural part of Hong Kong called Tai Po, where I attended kindergarten and elementary school. Later I studied at De Ming School through middle and high school.

Ling-Fei Lin: What was the life style like in Hong Kong during that time?

Barry Lam: My father was a clerk, an accountant. He was an accountant who worked at a Hong Kong Club, so we had a very ordinary family life. But, my father wanted me to be a useful person, to study hard and to work hard. It was just a very simple family.

Ling-Fei Lin: Before you studied at De Ming Middle School, what was your best subject?

Barry Lam: It was probably Chinese. [Laughs] One really doesn't have a "best" or "worst" subject in elementary school. At that time, I was living in the countryside. There were trees, rice paddy fields, and many small animals for me to investigate. There was a seaport/harbor, so I got to see the ocean, mountains, and trees often. Perhaps this experience [of growing up in nature] helped me a lot in my cultural development because a person, gets a very important and valuable childhood experience when they are born in a nature-filled environment.

Ling-Fei Lin: Did you have any idols at the time?

Barry Lam: The first story that teachers told us kids was the one about Yue Fei. It's about a man who serves one's country with unreserved loyalty. Was Hong Kong even a country then? I was impressed by historical heroes because they were very important.

When I was in middle school, one day I needed to get a vaccine. My teacher said he didn't know who invented the vaccine. He said many people used to catch smallpox and die. Then, this man invented the vaccine, which provides you with protection against smallpox. It was very dangerous to have pockmarks...very scary, so he was a very important person. I was thinking then, maybe I wanted to become someone like this. That was a very profound experience for me, so this was the thing I found most impressive when I was young.

Later, however, I learnt that Thomas Edison was the man who invented the light bulb, but he never went to school. This caught my interest. When I was at elementary school, I was responsible for fixing the light bulbs, but I did much more harm than good. So I thought that Thomas Edison was also a very important person. He was able to invent the light bulb. Without him, we would have no light bulbs today. We would still be using oil lamps every day. As a kid, I listened to many stories about heroes and inventors, but I believed inventors were more important. I liked to observe things such as living creatures and physics, and then I developed a great interest in electricity. Back then, I thought radio was an incredible thing. It

had a few bulbs that would light up, and I wondered if there was a person living inside the radio who could sing. No. It was only a radio, but it could sing and tell stories. This is how I built my interest in light bulbs and radios when I was little.

Ling-Fei Lin: What made you decide to come to Taiwan for university? And why did you choose to study Electrical Engineering (EE) at The National Taiwan University (NTU)?

Barry Lam: Maybe because I liked to dream and was curious, so I often had trouble solving questions in the textbook. My score was not good, but it turned out to be a blessing in disguise. In Hong Kong, they had the National Examination in the 5th grade of middle school, and I failed both English and Chinese. I didn't like to read the textbooks, which were all boring to me. So I was in big trouble. The National Examination is like Taiwan's Joint College Entrance Examination, and no one wanted a student who had failed two subjects. My father said "Chinese universities will not accept you, and English universities will not accept you, so all you can do now is to learn some driving skills, and to become a taxi driver." But I said being a taxi driver was a hard job, so I decided to focus on my studies for a year. De Ming School was considered a KMT (Kuo-Min-Tang: a political party in Taiwan) school. What does this mean? Our diplomas were issued by the Ministry of Education, diploma of the overseas Chinese school, so…

Ling-Fei Lin: Did you mean Taiwan's Ministry of Education?

Barry Lam: Yes, Taiwan's Ministry of Education. At the time, students of our school had to sing the national anthem, the national anthem of the Republic of China. And our school had to raise the flag, the flag of the Republic of China. We had to bow to the portrait of Dr. Sun Yat-Sen, so it was very loyal. Many of my classmates wanted to go to study in Taiwan, so I focused on the examination for a year, and was accepted to my first choice for EE [Electrical Engineering] at NTU [National Taiwan University]. No one believed that I was accepted by this school, not even my father and my teachers. But the letter clearly stated EE at NTU, so then I went to study there. Wasn't that failure a blessing in disguise? Maybe this was destiny. Maybe I was lucky or maybe Taiwan was also lucky.

Ling-Fei Lin: Was EE at NTU considered the first choice for Bachelor of Science students? Was it also your first choice?

Barry Lam: It was the first choice for Bachelor of Science students. I think it ranked above the Physics Department. I'm not exactly sure whether the Physics department or EE ranked higher. They were probably about the same. Those who wanted to make money studied EE. Those who wanted to get the Nobel Prize studied Physics. This was how they were classified.

Ling-Fei Lin: So, at the time, you personally liked this subject the most as well?

Barry Lam: I wanted to study arts, but my family said arts could not guarantee you income. They said if I study EE, at least I can fix light bulbs or radios after graduation. So I chose EE.

Ling-Fei Lin: You liked arts back then already, right?

Barry Lam: I think it was more fun to study arts because if I failed EE, I would be very miserable.

Ling-Fei Lin: How about your classmates? So many people selected this subject, but did they really like EE? Why did so many people want to study engineering at the time?

Barry Lam: Back then, EE was the first choice and everyone chose this subject on their score cards. Making it or not didn't matter, at least your father would be happy to see you put EE on the score card. But if you could make it, then just go for it. It was very difficult to study EE because we were foreign students, but our classmates were either from Taipei Municipal Jianguo High School, National Taichung

First Senior High School, or other top tier schools. They were geniuses, who easily scored ninety-something in the exam, and we only scored sixty-something. We felt inferior.

Ling-Fei Lin: When did you go to NTU?

Barry Lam: In 1966, around Mid-Autumn Festival.

Ling-Fei Lin: But after you graduated, why didn't you study abroad just like most people did?

Barry Lam: I only scored sixty-something or seventy in exams. Others went to MIT, CIT (Caltech), Berkeley, or Princeton, but I could not…I decided not to take TOEFL or GRE, and just stay in Taiwan and attend the graduate school at NTU.

Ling-Fei Lin: So, you just went straight to graduate school to study EE. Can you talk about that time period, your research topics and any important friends that you made during your graduate studies?

Barry Lam: During graduate school, I liked computer science the most in the EE [department]. Because computer science was just about ones and zeros, then using the ones and zeros to solve problems. I could not understand those complicated mathematics or numbers. People who are good with numbers would study electromagnetic waves, and those who are good with physics would study semiconductors. Since I was not good at any of those, I only knew ones and zeros, so I picked computer science. That was simple. So I liked computers the most, from components to hardware. Later, I focused on researching minicomputers. My professor told me to study this minicomputer and to conduct an experiment on this, an experimental minicomputer. So I did this experiment with Mr. Sayling Wen and completed this project for the National Science Council.

Ling-Fei Lin: At that time, you designed the first computer in Taiwan? You and your professor?

Barry Lam: We made the first minicomputer in Taiwan.

Ling-Fei Lin: Were there any difficulties or challenges during the design phase?

Barry Lam: During the design stage, we lacked materials and components. Taiwan at the time was unfamiliar with those components, so there was no way to get them. It was quite difficult at the time. With a limited budget, we got parts from the U.S. or Hong Kong. I still remember that our department head was very helpful. He found a 4K, 4K of core memory, for that device. We thought it was incredible because it cost US$3,000. Three thousand dollars was a lot of money at the time, so the department head helped us tremendously.

Ling-Fei Lin: When was your first experience with computers? During college or in graduate school?

Barry Lam: We had some experience during college. We had an IBM 650 at the time. It had a big main frame and was made with transistors. A fan was needed to run the computer and it used the punch card input method. The computer was very important for the future, a very important [piece of] equipment. It helped human beings a lot. At that time, I built this strong interest in computers during my fourth year in college, and started to make the minicomputer during graduate school. At that time, minicomputers were the latest, newly released machine. In 1970, Digital Equipment just released the minicomputer. So, we were thinking, maybe we can manufacture minicomputers in Taiwan in the future.

Ling-Fei Lin: Did you copy the computer design from Digital or did you design everything yourselves?

Barry Lam: We copied it, but our structure was still simpler.

Ling-Fei Lin: And what happened to this computer?

Barry Lam: I don't know. We can't find it anymore.

Ling-Fei Lin: You can't find it; so you never gave it to industry to manufacture?

Barry Lam: No, no, this was just a school's prototype.

Ling-Fei Lin: But you received the Youth Award because of this, right?

Barry Lam: We also made a calculator and the school said this was a good example of how Taiwanese colleges are doing research studies, so the school nominated me for this Youth Art competition to demonstrate the new development of technology. Luckily, all the good students went to study abroad and there were only bad students like me left behind, so I had such an opportunity. Therefore I believe many things are prearranged by destiny, and you should capture opportunities when they are presented. Take me as an example, I failed the National Examination in Hong Kong, so I focused and passed the JCEE in Taiwan. Accepted by EE meant I was at the very top. After graduating from NTU, many people went abroad and I decided to stay. A mediocre person such as myself then became a good person.

Ling-Fei Lin: In your class, among the various specialties like semiconductors, computers, or electromagnetic something or others…?

Barry Lam: Electromagnetic waves.

Ling-Fei Lin: What did most people specialize in? Did most of them select semiconductors?

Barry Lam: For example, people good at math studied electromagnetic waves. People good at physics studied semiconductors. People who were not good at any subject, and only knew ones and zeros studied computer science. Just AND gate, N gate, one, zero…, it was so simple and I liked it.

Ling-Fei Lin: So what I meant to ask was, what subject did most people select?

Barry Lam: Electromagnetic waves and semiconductor. Electromagnetic waves was the most popular subject. Many of our classmates went to the U.S. to develop disc antennas. Many disc antennas were invented by our classmates. This was good. U.S. reconnaissance aircraft and the disc antennas were all difficult things. Luckily they did those things and I did mine.

Ling-Fei Lin: Then why did Mr. Wen, Mr. Sayling Wen, also select to specialize in computer science?

Barry Lam: He was with us. Others went to the U.S. and we did our own stuff. We only knew ones and zeros, we were about the same level.

Ling-Fei Lin: You mean Mr. Wen also used to score only sixty something and seventy something?

Barry Lam: He was better than me by about two grade points. We were almost at the same level.

Ling-Fei Lin: What about Mr. C.C. Leung? Would you like to talk about him?

Barry Lam: He studied physics and he was excellent at it.

Ling-Fei Lin: Did you two know each other in college?

Barry Lam: He studied physics and he was also an overseas student. We were roommates.

Ling-Fei Lin: During college and graduate school, Mr. Leung didn't make the computer with you?

Barry Lam: No, he was in the physics department, so he did experiments in physics.

Ling-Fei Lin: Can you talk about your earlier job? Your first job was at San Ai, right? When was that?

Barry Lam: It was in 1972. At the beginning, Wen and I were planning to set up a factory, but we didn't know how. So we met a man, the owner, Mr. Kao, said he had a broken calculator that needed to be repaired. He gave that to us and we re-soldered every solder point then it worked again. We returned the calculator to him and he said "you are good." He asked if we knew how to make a calculator and we said "of course". At that time making calculators was still okay because the digital circuit applications were just starting. We made some calculators and digital clocks. Those digital products were just beginning to take off…thanks for the help of semiconductor technologies…, it was the beginning of IC. Later, the product was defined and the whole circuit was embedded in an IC, so we could easily make a product and start to sell it. It was very easy to manufacturer a product and to commercialize it. At that time, the IC and semiconductor industry had just started growing. Based on that growth, we decided to develop a new business This is also the first time we had Taiwanese capital, Taiwanese technology and Taiwanese business, we could bring our business and industry to the rest of the world. Before 1970, foreigners only came to Taiwan to set up factories, much like how people now go to China to set up factories. Or to protect the domestic market, Japanese brands would manufacture products in Taiwan and sell to the Taiwan market, alternatively, they would go to Original Design Manufacturer (ODM) or Electronic Manufacturing Services (EMS). U.S. companies would also set up factories in Taiwan and produce TVs for RCA or Admiral Overseas Corporation (AOC), then export them overseas. In the 1970s, Taiwan started to have our own investments, our technology and we would also market our products. Take Kinpo, San Ai Electronics, Qualitron (Rong Tai) and Acer for example. Those companies were established during this period of time, and formed an independent industry.

Ling-Fei Lin: You just mentioned that you and Mr.. Sayling Wen went to Mr. Cong Fu Kao? Then Mr. Kao asked you to fix the calculator and you did it. Then Mr. Kao decided to go into this industry, right?

Barry Lam: Mr. Kao asked "should we set up a calculator factory"? And we said "sure"…and then we did.

Ling-Fei Lin: But where did you and Mr. Sayling Wen get the technology from?

Barry Lam: We knew how to design an IC and how to turn it into a product, and that was it.

Ling-Fei Lin: Did you go see some Japanese products, and make…

Barry Lam: Japan was a step ahead of us, but we were just starting. Japanese products were expensive and ours were cheaper. And we have better selling skills so we just started from there.

Ling-Fei Lin: Did you do any reverse engineering?

Barry Lam: There really was nothing to reverse. All those ICs…. the applications were already defined.

Ling-Fei Lin: Was the whole calculator industry already mature and those components…

Barry Lam: No, it was just at the beginning stage. We knew some companies, like MOStek and [another] Texas-based firm, and Texas Instruments that made IC designs for calculators. The calculator was an early IC application. It started from there.

Ling-Fei Lin: But you believed the application technology was not so difficult, so we...

Barry Lam: Because our concentration was in digital electronics. Because we are electrical engineers, but we didn't know how to make packaging…that was covered by the mechanical engineers. We didn't know about color molding, so we learnt it together. All we learnt in school was just theoretical and

experimental, but to make a product, you need to know about manufacturing, quality control, packaging, marketing…and all those new topics we needed to learn. And luckily… our foundation was very solid, so we adopted these fields of knowledge very quickly. And since we were not grade A students, we were willing to do some hands-on work. I had the best soldering skills at the time. Once you know the physics and chemistry in soldering, you can become the best.

Ling-Fei Lin: So, you mainly learnt from domestic factories?

Barry Lam: The factory in Taiwan was still behind, so we went to Hong Kong to visit some US companies' factories. It was very professional. NXP Semiconductors was making core memories, National Semiconductor (NS) was making LEDs, TI also had a factory in Hong Kong. Factories in Hong Kong were more advanced than those in Taiwan, during the early 1970s.

Ling-Fei Lin: Some of the basic manufacturing knowledge was learnt from U.S. companies in Hong Kong?

Barry Lam: The technology- intensive type of manufacturing knowledge was learnt in HK because they were more advanced. Knowledge learnt in Taiwan was more labor-intensive type.

Ling-Fei Lin: Can you talk about why you later left San Ai?

Barry Lam: Because later the owner said he liked stereos and I said I didn't know how to make stereos. I didn't know how to make stereos, I studied digital electronics not analog electronics. So he said OK and I left.

Ling-Fei Lin: Wasn't the calculator business already making a lot of money? Why did he want to…

Barry Lam: I didn't handle the finance part, I didn't understand investments. I was simply collecting a salary. Later, Mr. Wen said we should leave and build a new business together. Both of us didn't know how to make stereos, for we had studied digital. Back then, stereos were all analog. Now all stereos are digital. We only knew how to make digital type of stereos.

Ling-Fei Lin: Mr. Kao wanted to change from making calculators to stereos?

Barry Lam: He thought stereos were more artistic. It was true that stereos had its business opportunities, but we didn't know how.

Ling-Fei Lin: Did they close the calculator factory?

Barry Lam: They still manufactured some calculators, but later we left the firm and started working on calculators for Kinpo Electronics.

Ling-Fei Lin: Did they make a lot of money? From the calculator business?

Barry Lam: Not bad, the margin was pretty high at that time.

Ling-Fei Lin: Let's talk about Kinpo Electronics. Do you want to share how you and Mr. Wen established Kinpo?

Barry Lam: At Kinpo, we and Rock Hsu's father were saying that manufacturing calculators was a good business. He was very supportive and trusting. Then we started to manufacture calculators. During that time calculator technology was improving very rapidly, from fluorescent tubes display to LED display, then to LCD display…very rapidly. The transition was so fast that I still remember that the transition from LED to LCD only took three months. Once the technology advanced, no one used LED anymore, it was all

LCD. In 1974, everything was LCD. At the time LCD was made by Sharp. And because we converted to LCD so successfully, we took over a majority of the market share.

Ling-Fei Lin: I mean how did you convince, Mr. Chao Ying Hsu to [help fund] the establishment of Kinpo? Was there a story behind this?

Barry Lam: Mr. Wen was responsible for that part. You know he was an eloquent speaker and I was good at the engineering part.

Ling-Fei Lin: You established Kinpo, and Mr. Hsu listened to you guys and started manufacturing calculators, right? And because of your experience in San Ai, the calculator business grew very fast

Barry Lam: The technology was almost the same, we were just making new models.

Ling-Fei Lin: Did you receive a lot of orders from overseas?

Barry Lam: At that time, most people didn't know where Taiwan was. We went to many places to promote and sell our products. Talking about selling our products overseas was very heart-breaking. People said, 'Taiwan? Is it part of Thailand? The word "Tai-WAN" and the word "Thai-LAND", "LAND" should be bigger than "WAN", right?' And I said, "No, Taiwan is not part of Thailand". We had to explain it very clearly. It took a lot of effort to convince people to accept products made in Taiwan.

Ling-Fei Lin: Did you receive orders from Japan, for calculators?

Barry Lam: No, not from Japan. The popular Japanese brands were Sharp and Toshiba, the big brands. We had higher exposure to the U.S. market, then some in Europe.

Ling-Fei Lin: Did Kinpo start to develop monitors and terminals? Would you talk about this?

Barry Lam: By the 1980s, we had already grown the calculator business to a certain level of expertise. In order for our company to continue to grow, we thought we should start working in the computer industry. Computers were going to be a big business. But the computer business was just in the beginning stage, developing monitors and display terminals. We also worked with Qume and AT&T. At the time, monitors were using CRT technology and had pretty good gross profit. We transitioned from calculators to computers; it was a natural trend, they are all digital applications.

Ling-Fei Lin: In this transition, from calculators to monitors and terminals, were there any technical barriers?

Barry Lam: There were so many technical barriers, because they were different products. Luckily we had many new colleagues that joined us. There were lots of newcomers with excellent skills. And fewer students wanted to study abroad as Taiwan began to develop its own industry. Taiwan started to raise good engineers.

Ling-Fei Lin: You mentioned earlier that you received orders from TI and Qume? Did that help your business a lot?

Barry Lam: The orders from TI were for calculators. I remembered we went to TI to visit their manager, Mr. Morris Chang. He was in charge of calculators at TI. Respectfully, I explained to him why they should buy from us. It took him a while before he said yes.

Ling-Fei Lin: Have you known Morris for a long time?

Barry Lam: Yes, when he was at TI.

Ling-Fei Lin: Did he also give calculator orders to other people? His calculator…

Barry Lam: It is difficult, really hard to get his orders. Morris was very tough.

Ling-Fei Lin: He only placed orders with Kinpo?

Barry Lam: Slowly. With more understanding, slowly he began placing orders with us. But, why? Because we converted the models very fast, really rapidly…new models, really, really fast. You can say that advancement within U.S. companies…[they] were still behind at the time, so we were more competitive and our cost was cheaper.

Ling-Fei Lin: In this section, I would like to know, how you obtained such technologies, including the ability to mass produce products. How did you build that capability?

Barry Lam: NTU has an excellent EE Program. ITRI (Industrial Technology Research Institute) also offered us lots of support back then, providing us with new technologies such as soldering techniques, quality control, PCB layout, and CAD technology. We were lacking those technologies, but we have good engineers from my school, who were eager to learn new skills. It wasn't necessary to purchase these new technologies, we could develop those skills slowly. We actually had a lot of good engineers in Taiwan, they developed semiconductor technology and LCD technology, and gradually became the best in the world.

We had low employee turnover and we had a lot of talented engineers, who were focused and honest. So the team spirit was very high. This was the fundamental competitive edge of Taiwan. The foundation was strong. How should I put it? Employees are extremely loyal to companies they work for, due to the profound Confucian influence on Taiwanese people. We had tremendous motivation. We could accomplish anything we set our hearts on. In my opinion, many Taiwanese companies developed their technologies by themselves in the 1980s and 1990s.

Ling-Fei Lin: For example, people at Qume said they helped Kinpo to build the mass production capabilities for monitors, did you think this is a correct statement?

Barry Lam: They gave us a lot orders. I remember it was Mr. Lee Hsin Ling who helped us. Whatever he said, we would say "Yes".

Ling-Fei Lin: But you still think you were self-reliant, right? Not…

Barry Lam: Fifty-fifty; customers helped us and we also made improvements ourselves. If we didn't improve ourselves, then no one could help us during the early days. U.S. production methods and quality control methods helped us a lot. And then we made improvements by ourselves. If people helped you and you didn't show improvements, then no one could help you anymore. Taiwanese EMS business learnt many techniques from different countries, and we further improved those techniques to become our strength. This was especially the case when most companies in Taiwan were medium- or small-sized businesses.

This kind of innovative spirit contributed a lot to the development of our industry. It was instrumental for surviving in the harsh competitive [environment]. If you were not better than the rest of the players, then you would be replaced. Ever since 1980s, many good companies were formed. These entrepreneurs were very hard working people. But, I am not sure about the new generations. For the past 30 years, I witnessed history. In the 70s, our industry was just at its infancy, so it didn't count. Companies like UMC, TSMC, Acer, Quanta, and Delta were all founded in 1980s. We could view this past 30 years as a cycle. Each cycle has its own accomplishments and its own generation of talents [people]. This cycle has been

about 30 years long, plus or minus 10 years. At least we did the best we can for our country and our history.

Ling-Fei Lin: So, this theory about thirty years as a cycle, is this an observation from you?

Barry Lam: Yes. From 1980 to 2010, that's 30 years and it's a cycle. But, the next 30 years will be very different. We will be facing increasing competition from China, rapid societal changes in Taiwan, and new ideology from the new generation; everything will be different.

Ling-Fei Lin: Can you talk about why you left Kinpo and founded Quanta?

Barry Lam: We founded Quanta in 1988. As I always said, I was a student of computer science. In the 1980s, we started making monitors and terminals. But, it wasn't very innovative. Everything we did was considered a "me-too" products. Then I started thinking about PCs. I thought I should be a part of the PC industry. After I graduated from college, I told Mr. Sayling Wen that we should create our own business. We should found a good computer company. It was our vision and our dream. I told Mr. Wen that PCs were the right direction, but not desktop PCs. It should be laptops with mobility and portability and he agreed.

But at Kinpo, they didn't like PCs. I mentioned PCs, but they said I like PCs because I studied PCs, but no one else knew anything about PCs. They said I wanted to make PCs, but it doesn't mean the company also wants to. So I left Kinpo and worked with Mr. Wen to found Quanta. The vision we founded Quanta with was that PCs have to be mobile and portable. PCs are personal computers. Since they are personal, do most people spend the majority of their time at their desks or on the move? Of course the answer was on the move. Since we started by making calculators, we preferred our products to be small and light-weight. If a calculator can be portable, wouldn't it be better to have a computer that is portable as well? So, we established Quanta to make portable computers.

A portable stereo at the time was called a Walkman, and most calculators were palmtops rather than desktops. So, the mobile market was much larger than the desktop market. Therefore, we decided to dedicate our company to make notebooks. The term "notebooks" was introduced in later days. We used to call them "portable PCs".

Ling-Fei Lin: Chairman, what you just mentioned, the reason that you guys established Quanta was because you wanted to make PCs, but Kinpo and Compal didn't want to. Did the fire at Compal contribute as another factor?

Barry Lam: Yes, that was a disaster but it was an accident. Everyone felt depressed after the accident and…but I knew PCs were the way to grow. Since my background was in computers, making calculators was just a transition for me. Therefore, I said I would leave Kinpo to pursue my dream, so we established Quanta.

Ling-Fei Lin: So even before the fire, you already decided to make PCs?

Barry Lam: Yes, it had been a long dream of mine to make PCs. But if I said I wanted to make desktops then, it would have been wrong. Personally, I always believed it should be laptops, so I only manufactured laptops, not desktops.

Ling-Fei Lin: Were there some people from Kinpo and Compal who left with you and joined Quanta?

Barry Lam: Of course those who wanted to make PCs, followed my step. Mr. C.C. Leung and many others followed me to make computers.

Ling-Fei Lin: Rumor said you rented a small apartment at the time and started to work there, right?

Barry Lam: No. We resigned first. In the beginning, we were designing in a small apartment to save on costs. I remembered we packed and left before the Lunar New Year. After the Lunar New Year in 1988, we started to work in that apartment.

Ling-Fei Lin: At the time, you said you wanted to make a portable PC, but as to how to do it, did you have any idea?

Barry Lam: Toshiba and Zenith had similar products, but those were very heavy and expensive. At the time, we were thinking about using LCDs instead. So we made the first device with LCDs. We used components from desktops to make laptops with LCDs. It was portable, but heavy, only people who really needed portability would use it. It was still not a very mature product.

Ling-Fei Lin: None of them used LCDs at the time?

Barry Lam: The first laptop we made had a LCD display.

Ling-Fei Lin: And what did they use?

Barry Lam: Toshiba used plasma and Zenith used LCD.

Ling-Fei Lin: Yours came out earlier than theirs?

Barry Lam: No, we had a better relationship with Sharp. So we used LCDs from Sharp to make our first laptop.

Ling-Fei Lin: Can you tell us in detail how you designed and made this first portable computer? And, what were the challenges like?

Barry Lam: Many difficulties. The batteries available at that time were not designed for PCs. Disk drives were huge and not designed for shock resistance. The floppy disk drives were not suitable for mobility. CPUs then consumed a lot of power. Keyboards were very thick. Despite the difficulties we faced with components, we still managed to produce our products, because we had pretty good experience with digital computers.

Ling-Fei Lin: What was the biggest challenge? Was it with cooling or…?

Barry Lam: The components were not mature and quality was also unstable, especially when putting them all in that tiny space. It became hard to produce a spec with FCC approval, heat handling needed extreme caution, battery control also needed great deal of attention, otherwise it would cause big trouble. And because it was a portable device, the drop test was hard to pass. So, to successfully produce a portable PC device was very difficult at the time…

Ling-Fei Lin: You felt it was because of those experienced engineers you had that made it happen?

Barry Lam: People from EE at NTU are still better at computers because we are better, better at computers.

Ling-Fei Lin: Did you dismantle any of Toshiba's products?

Barry Lam: Of course we referenced their stuff, but we were already ahead of them.

Ling-Fei Lin: You said you were ahead of Toshiba at that time?

Barry Lam: Of course, we were ahead, we had faster, newer stuff, and we were way ahead of them. In the beginning, we only led them by a little, not a lot, but later on, we were ahead of them more and more.

Ling-Fei Lin: Were you very proud of this computer? Or…

Barry Lam: No, I just felt this was a product that developed very fast. Very soon it would need to be replaced with a new one. Nothing to be proud of, we are never arrogant.

Ling-Fei Lin: Because I asked C.C. before, he said, it was kind of coincidence that you guys made it. It was a little bit of genius…

Barry Lam: No, we are not geniuses, we were taking things step by step, matching parts here and there. We are not "A" students from NTU, we are just the mediocre ones. Honestly, that was all we've got, but we still won.

Ling-Fei Lin: But how long did it take you to make it?

Barry Lam: We made it in our second year.

Ling-Fei Lin: Second year? Established in 1988, then 1989…

Barry Lam: Around 1989 or 1990. I exhibited our product at CeBIT in 1990.

Ling-Fei Lin: Hadn't you already received orders at the time?

Barry Lam: Yes, some orders. We received orders very soon because we were the first. I received the first order from Siemens, it was an order for Nixdorf, which then became a part of Siemens. Pretty soon, we got orders from Philips.

Ling-Fei Lin: So, you made the first portable PC in 1989 and exhibited it at CeBIT in 1990?

Barry Lam: Yes, we made it in 1989, since Quanta was established in 1988. Then it took the whole year to develop the product. Then, at CeBIT in 1990, we went to exhibit the product.

Ling-Fei Lin: During the exhibition, was it considered an advanced product?

Barry Lam: Yes.

Ling-Fei Lin: Were most people impressed by the advanced computer technology from Taiwan? Did you also attend the show?

Barry Lam: I went there to sell the product. Each product was very heavy.

Ling-Fei Lin: Can you talk about what was it like when selling the product?

Barry Lam: Very difficult, a small company with no reputation. This was a new product, so it was not easy to earn trust. But, we successfully sold it to Philips and Nixdorf, those big companies.

Ling-Fei Lin: Yes, but how did you get connected with those two companies? Did they visit your booth?

Barry Lam: We went to their booths and asked for their manager to talk about this new product. After the show, we also visited their companies. Of course, we just made the first contact at the exhibit was, then we would visit their companies to talk further.

Ling-Fei Lin: Why did they place orders with you? What was the biggest reason?

Barry Lam: Because it was the first portable PC, the very first ..

Ling-Fei Lin: Was the cost also low? Or?

Barry Lam: Cost was not low at the time. But, price was not an issue. Product quality had to be good because many professionals have a need for portable PCs. For example, people working for oil drilling companies, they could not constantly stay in one location. For some businessmen, they couldn't use other people's PCs to retrieve data due to security concerns. Famous lawyers or accountants also cannot use other people's PCs, otherwise there would be big security issues. This was about mobility and security concerns.

Ling-Fei Lin: Regarding that portable PC you made, was there any innovative technology or did you only make incremental improvements?

Barry Lam: A lot. From the heat to cooling issue, and the whole issue with EMI shielding, and anti-shock and drop tests. There were many issues to be resolved, especially securing the hard drive in place, so that it would not be affected by movement. To resolve those issues, one needed to know the physics for each component, power consumption and cooling. It was very troublesome because those components were not made for mobile PCs or laptops.

Ling-Fei Lin: But, you only had ten-plus employees, right?

Barry Lam: Yes, each of us worked 12 hours shift every day.

Ling-Fei Lin: Which issues were you personally in charge of resolving?

Barry Lam: I was lazy because I didn't like to do detailed tasks. We had good engineers such as C.C. We had a team of good engineers. Let people who could do the job better do it, so I had to find more qualified people to work for me. Also, there were software issues and they were equally difficult. Software is the key to monitoring the LCD and battery. Those were all software issues.

Ling-Fei Lin: So, you were managing but didn't solve issues by yourself?

Barry Lam: Not really, we were overseeing the business to make sure that the product definition was right. The product definition must be correct first. The most challenging thing was to define the right product. Once the product definition was properly determined, then the execution would be smooth sailing from there. I have a very strong belief that general managers don't need to be in charge of the details. I normally don't manage the details.

Ling-Fei Lin: You mentioned Philips and Nixdorf, but didn't the Japanese also make lots of similar products? Why didn't they give orders to Japanese companies, but to you instead?

Barry Lam: The ODM and OEM business was not popular in Japan at that time. Toshiba had its own brand. But many companies and many customers didn't have laptops. The market was huge then, but are you capable of producing the product? Did you have a supply of those components? It was very difficult to get LCDs. LCD volume was low. Also, it was very difficult to get hard drives, those small hard drivers were hard to get.

Ling-Fei Lin: Almost no one was engaged in the ODM business at the time, right?

Barry Lam: Not that many; we were the first company to produce laptops. Inventec was also making one at the time. Inventec was making it for Zenith.

Ling-Fei Lin: Inventec was earlier than you?

Barry Lam: Inventec was about the same time.

Ling-Fei Lin: Yours were more portable, then…

Barry Lam: We were the first to manufacture notebooks.

Ling-Fei Lin: What else?

Barry Lam: Notebook at that time, we were so proud of this design. We were the first company with 400 cable solutions.

Ling-Fei Lin: Can you talk about your first notebook? Was it the first notebook ever produced in Taiwan?

Barry Lam: Correct, it was the first notebook ever made in Taiwan. We designed it ourselves, so we could introduce it to the market faster. The first laptop had 480 cable solutions, with a black and white LCD back light. It had a Super Twisted Neumatic Display (STN), a very advanced LCD technology back then. It had a 2.5" hard drive, the most advanced technology at the time. It used the [Intel] 286 chip, which was also the most advanced processor at the time. Then this one, it had solutions to many problems. It also had a smaller, more advanced high density battery, so it had higher density. We infused many breakthrough technologies into this machine. Here is the floppy drive. Here is the hard drive. Here are the I/O ports. It was considered compact in size back in the days, just the size of a file holder, this was the first notebook with such break-through technology and compact size. I remember Sharp had a similar product, but the display was smaller. Compaq also introduced one with a smaller display. This was the most advanced laptop at the time, known as the most practical and reasonable machine. And it was not heavy. It was during the year 1991.

Ling-Fei Lin: Created in 1991? But you said that the other portable PCs produced before this unit didn't make too much money. So, then, this unit let Quanta…

Barry Lam: The other portable PC I mentioned before was not very successful because it was too heavy. Only a few people bought it. But, this one I'm referring to now had more success because the hard drive was relatively more advanced during the time, compared to a 2.5" hard drive. The CPU in this device was 286, and the display had 400 cable solutions, so it was a machine that resembled a desktop.

Ling-Fei Lin: So you received many orders for this notebook?

Barry Lam: Yes, we made a lot of them. Many customers bought this model, and the price was pretty high. About US$2,000.

Ling-Fei Lin: So your price quote was at US$2,000?

Barry Lam: It should be more than that, maybe around US$2,500. I don't remember,it was a long time ago. In 1991, so it was 20 years ago.

Ling-Fei Lin: Was it mainly sold to the U.S. and Europe, or were there Japanese customers?

Barry Lam: We had customers around the world, but mostly in the U.S. and Europe.

Ling-Fei Lin: Please talk about some of the important products or orders that helped Quanta to build its foundation.

Barry Lam: Later in 1994, we started making notebooks in color in 1993, and it was also very challenging…because only products in color could solve many problems. At that time, there were only 7" displays and technology was evolving and components were advancing. Displays were changing, hard drives were changing, floppy disk drives were also changing, CPUs were changing, then batteries were also changing. There were so many components going through changes and advancement, but how do you define a product and make it the most advanced product on the market?

You received support from suppliers who provided you with parts. It was difficult with the new parts especially. So even after you received customer orders, there were still many components problems and supply chain problems that needed to be resolved. Luckily, we were the pioneering factory and our customers were much more well-known, so it was much easier for us and customers were willing to help us. So, in 1996, the industry became more mature and optical drives were also introduced.

Multimedia became available in 1996. It had optical drive on a 386 machine. At that time notebooks and desktops were more similar. It also had optical drive, hard drive, floppy disk drive, and decent battery. The battery used at the time was Ni-Cad type. And Microsoft also had software supporting notebooks, to make notebooks more power-efficient. Battery utilization could be managed by software, so battery management became part of the OS.

So at that time, in 1996, you could build a decent notebook using different combinations of available components. So, production volume started to pick up. I remember in 1996, many people wanted to use notebooks as their primary machine. Desktops were more popular then and notebooks were only used when needed. After 1996, people started feeling satisfied with just a laptop. So, our production volume was very large in '96, '97, and '98, because notebooks had become a nice product. Companies needed to provide this equipment to their managers. And in U.S. or Europe, where they did a lot of traveling, only notebooks could meet their mobile needs, so it was a very important development in history.

Ling-Fei Lin: So, year 1996 was a critical year?

Barry Lam: Very critical. At that time, we started to realize that it was important to convince Intel and Microsoft that the notebook was an important product.

Ling-Fei Lin: They didn't support notebooks before?

Barry Lam: Ah, maybe about 10%, that was it. But I said no, I told them that the notebook is going to replace the desktop. There had lots of debates among themselves. What I said then has now been proven to be right. There were many key aspects. Take Intel for example: Why did I think that the notebook would definitely replace the desktop? First was the display; it would eventually become thinner, cheaper and colorized. Sharp told me that the roadmap for displays showed that CRT technology would ultimately be replaced. Then it really happened. It consumed less material, less manufacturing processes, and the resolution became higher, but the cost would not double, so this was the evolution of display technology. So, I said if LCDs will replace CRTs, then the replacement of desktops by notebooks is an obvious result. It became even more obvious in the year 2000, because in the year 2000, pretty much all the monitors were LCD, and not CRT. It had already begun to happen, OK? Then comes the hard drive; There is a general consensus regarding hard drives, very similar to Moore's Law, that the recording density [of hard drives] will double every year or eighteen months. At the time I had a good friend in the disk head business, who told me that film to film disk head technology would evolved such that hard drives would go from tens of gigabytes to hundreds of gigabytes. Furthermore, if we referenced Moore's Law as it applies to the semiconductor industry, everyone who has studied EE can see that if ICs became more power efficient, displays became thinner, and hard drive size became larger, then why wouldn't notebooks surpass desktops? This would…even "C" grade EE students could understand this trend.

I like to think, if you make the product tiny and powerful then that should be a good product. But, what does it mean? What applications does it showcase? What business opportunities does it present? Business applications were very important. Having said that, the keyboard was also becoming thinner, then why wouldn't notebooks replace desktops? So in 2000, it became more obvious that cost was greatly decreased and many people wanted to manufacture notebooks. Taiwan was considered pretty good in the year 2000. 2000 was a turning point, where the cost of manufacturing notebooks became very cheap, then that…so this mega trend was observed in 1988 [by us], and it became more obvious, so we worked harder and kept on growing.

Ling-Fei Lin: Going back to an earlier time period, you mentioned that there were not that many people engaged in the ODM business when you first started. Why, then, did Quanta want to enter the ODM business? Why did you think of doing ODM at first instead of branding or OEM work like Acer or MiTAC?\

Barry Lam: It was because we started making calculators as an ODM service. Our strength is in manufacturing, product design, and production. We knew at the time that famous brands….calculators that could sell to department stores or trading companies. But, calculators were a cheap item costing just a few US dollars. But with notebooks, we felt more nervous about the business. IBM made its own computers, so did Compaq. Apple made its own computers. HP made its own computers. If they all make notebooks by themselves, then what opportunity do we have?

Then we realized that if the margin was going to become slim over time, then branding and manufacturing should be separated. Of course, we were saying this because we only knew how to manufacture. We didn't know about marketing. And we only knew about engineering. But we did regret that we didn't take courses at the business department of NTU, now we really regretted it…we lacked the right knowledge when we needed it. Business school was for smart people. We used to tell business students that we engineers were better, but then…I now would go back to tell my fellow classmates that you should get an MBA, otherwise you would experience difficulty when you became the boss. That was because… how do I put this? One area was with manufacturing, while the other one was with branding. We knew manufacturing better of course. As I said, manufacturing and marketing need to be separated. Why do they need to be separate? When you pick the right commodity then you *need* to separate manufacturing from marketing. After going back to Harvard Business School, I thought back to this earlier example and I realized that we made the right decision. Why? Because Intel and Microsoft became a common platform, so everyone's products became the the same. Notebooks from Acer, HP, and Dell were all the same. Why? So you should let an EMS or ODM manufacture products for you. Then you can focus on marketing the products. Because it was very competitive, if you combine manufacturing and marketing together in-house, then you will need a factory that is very efficient, coupled with effective marketing.

Manufacturing and marketing have different cultures, so you should only pick one. I chose production because I'm good at manufacturing. And others who are good with marketing would obviously choose to do marketing, right? To prove the brand "Acer" is right, then they should do marketing. That's why Acer later on focused on marketing its brand and let the EMS or ODM players handle the manufacturing. Separation of the two enabled rapid growth. That was the reason. You see, our profit margin was about the same level as Acer, which shows that separation is needed between marketing and manufacturing. Take ASUS as another example, they also wanted to separate the two, but why? Manufacturing needs to be more...since the software was the same, the CPU was the same, and the display was the same, then all that is left is is marketing.

Manufacturing needs to be affordable and flexible. The first requirement of manufacturing is to have an affordable pricing scheme. That's called "affordability". The second requirement is scalability, and for that you need volume. The third requirement is flexibility. Volume is volatile, where at times volume is up or down, that's why a factory serving only one brand can be very challenging. Because then the costs would be high. Since we manufactured for many brands, our cost was low. Cost becomes crucial when the

margin is slim. Of course, if you had something unique, that no one else had, then the decision was up to you. But, scalability was still very important. Like Apple, the production volume could very volatile over time, and it would have been very difficult for them to do all of the manufacturing by themselves.

Ling-Fei Lin: But that was in 1988. Now everything you just mentioned…of course we now know that separation is needed between branding and manufacturing. But wasn't the gross profit still very high for notebook OEMs at the time? Then, why did those big brands still want to give manufacturing orders to you? Why didn't they just manufacture things themselves?

Barry Lam: We were in the ODM business for some time and our technology kept on improving…we were doing pretty well. So we started to leverage our advanced technology to win orders. Later on, our volume started to pick up, so our cost was low, and our...we became more flexible with customer orders. We could also adjust accordingly to different seasonal demand, so they knew… our customers knew that we were the best choice.

Ling-Fei Lin: So, in the beginning, it was not price, but your technology that attracted customers?

Barry Lam: That was only the beginning. Our main selling point was our advanced technology. At that time, we were the only company with color. We were the only ones capable of doing multimedia.

Ling-Fei Lin: Why were [Taiwanese companies] always advanced, and even more advanced than companies in the U.S. or Japan?

Barry Lam: Maybe it was easier being small and medium businesses. Indeed, we were doing only one thing, so we could focus our attention on it.

Ling-Fei Lin: Since you mentioned Wintel, can you talk about how it affected the whole industry in Taiwan?

Barry Lam: Well, regarding the PC and the platform… I think the Wintel platform is a result of IBM exiting the PC industry. They believed they needed to provide solutions… hardware solutions. Margin for hardware was low and profit was low too. It was probably because Microsoft and Intel were most profitable in the business, but they deserve it. At first, we didn't have the PC industry, we were their upstream manufacturers. It didn't matter if you were making chips, connectors, motherboards, enclosures, or assembly. These were all upstream businesses.

Taiwan is a big manufacturing country. We started from simple things, such as Christmas tree light bulbs, then gradually we moved up to producing umbrellas, bicycles, tennis shoes and finally PCs. It is much like a business model, we gradually "upgraded" our technology. Actually, a different time period has different engineers who contribute to the period differently, and expand our business value differently. I think the biggest influence from the government was that. For instance, Mr. K.T. Li built the [Hsinchu] Science Park, and founded ITRI to develop semiconductor technologies. Thisled to the founding of UMC and TSMC. This was a great outcome for the industry. PC technologies were mostly owned by Microsoft and Intel and that's how the PC industry came about. Taiwan caught the opportunity to engage in the PC industry. Japanese were not good at the EMS business. They had their own brands. Many engineers from the digital field graduated in 1970 in Taiwan, and companies were willing to invest in the manufacturing business. There were many Chinese engineers working for American PC companies, so we invested a lot in it. In other words, we worked closely together. This business model was a perfect match between Taiwan and the U.S.A., but not Japan. We left the Japanese behind during our development in the manufacturing business. Japan had many analog engineers at the time, but not many digital engineers. Many of our digital engineers studied in America, and stayed there to work after graduation. When we went to visit the U.S. companies, we even spoke Taiwanese at Intel. They started to converse in Taiwanese over the phone…

Ling-Fei Lin: Do you speak Taiwanese?

Barry Lam: I'm pretty fluent at it. I've been speaking Taiwanese for 40 years. There were many Taiwanese engineers living in the U.S. In Taiwan, we learnt the manufacturing techniques, which we are already good at. Thus, U.S. companies would want to use Taiwan as an upstream manufacturer to make products for them.

Ling-Fei Lin: If there were a lack of dominating companies such as Wintel, do you still think we could develop our PC industry?

Barry Lam: Without Wintel, the PC industry would be slower and smaller. HP would have its own standards. IBM would have its own standards. Digital products would have their own standards. Others would all have their own standards. Nothing can be developed large enough otherwise. However, such standardization is inevitable, and it did not happen coincidentally. It was a combination of mega trends. Semiconductors, software, applications, LCDs and material science were all booming together.

The establishment of a common platform eliminated the barrier to entry to this industry. Everyone hopped onboard and manufacturing products became more affordable. This increased the market size, which attracted more people. So, it was a positive cycle, a good thing that happened to this industry…much like the American companies that used similar business models to build global businesses. Taiwan was playing the role of an EMS player in the industry. Mr. K.T. Li deserves full credit for making this happen, by building the Science Park Industrial Zone to develop the semiconductor industry in Taiwan. That was very visionary, but now things are different.

Ling-Fei Lin: So talking about the relationship between Wintel and Taiwan's PC industry, if we were to look at it a hundred years later, regardless the accomplishments or the mistakes…

Barry Lam: We don't need to wait that long. I can still talk ten years from now, but I probably cannot talk a hundred years later, and then the truth may be distorted.

Ling-Fei Lin: Many companies in the industry have a love-hate relationship with Wintel. What is your personal take on this part of the history?

Barry Lam: Intel and Microsoft created a common platform that standardized many components, which greatly reduced the costs. This is a universally accepted fact. Since the cost was greatly reduced…think about this, a complicated PC only costs consumers a few hundred dollars, almost the same cost as a TV or some clothes. No one could imagine this would happen ten years ago. The platform enabled everyone to enjoy the world with Internet. Then Internet became widely available. Notebooks were invented in the 1980s. The Internet was invented in the 1990s. Then in early 2000s, there was the concept of cloud computing, thanks to the development of World Wide Web. All these infrastructures were made possible because of affordable PCs.

The market was created and peoples' lifestyles and behavior were changed. It was a great contribution. I think Intel and Microsoft contributed a lot to mankind. And our contribution was in manufacturing. Our responsibility was to reach volume production, and we gained our prosperity through it. The results were good. This was an era that some of us could take part in, in Taiwan. I feel very lucky. Of course, there are many things that contributed to this achievement. In the '70s, many students who studied in digital technology graduated and became entrepreneurs. Many engineers studied in America, and then worked for R&D departments at American companies. Then, they formed good working relationships and inherited a wealth of knowledge from Taiwanese engineers.

Our Japanese competitors didn't have many students studying digital technology, and they didn't have many people studying in America. Therefore, they were slower to adopt digital technology compared to us.

They also didn't speak much English at the time. That's why they were behind. I remember that NEC Japan insisted on its own standard, 9800, which was not compatible with the rest of the world.

Then PCs were invented in the '80s or '90s. Internet was introduced in the 1990s. In the 2000s, the World Wide Web was introduced and it connected the IT world together. It then changed people's lifestyle. How people learn, how they interact, and how they manage social groups were all changed for good. All in all, Microsoft and Intel created this huge market of opportunities. Our expertise in assembling and component manufacturing generated great value. Such value propelled Taiwan to greater prosperity. The result is good, right? What's next? The most important thing now is to identify what is coming next.

Ling-Fei Lin: Then let's take a step back to the ODM part, because the ODM business is actually a very special business model in Taiwan, and Quanta is the leader in this industry. Did you take any OEM orders in the earlier days? Or was it always the ODM business?

Barry Lam: The term ODM stands for Original Design Manufacturer. Intel and Microsoft provide us with their product specifications. Then we would design many new products based on their spec and have our customers pick models of their preference. Customers could also customize models to their own specifications. So, our strengths are in designing and manufacturing. Since Microsoft and Intel already provided us with standardized technologies, we can then leverage our technology to make different prototypes. As a result, our customers would save on R&D expenses.

Ling-Fei Lin: Did you take any OEM orders?

Barry Lam: Yes, we did. Let me explain it for you. ODM is one concept and EMS is another. EMS companies don't design for their customers. EMS companies manufacture products according to customers' specifications with no design value added. This is called EMS. Actually, the term OEM is used incorrectly. In our industry, OEMs are our customers. When we refer to the term ODM, we meant companies with both design and manufacturing capability. So, there is no design value added from EMS companies. The EMS type of manufacturing is done according to customer specs. As the industry evolves however, both ODM and EMS companies are about the same cost and offer similar value.

Ling-Fei Lin: You mean the same price…

Barry Lam: Since all notebooks are now commoditized. Notebooks are standardized. Thus, there is no difference between ODM and EMS.

Ling-Fei Lin: You said in the earlier stage, you would design prototypes for customers to choose from, has the business model changed?

Barry Lam: Over time, Intel and Microsoft came to more fully define the standard specification, and we only made changes on notebook size and weight.

Ling-Fei Lin: Was there less design involved from your part then?

Barry Lam: The design characteristics were reduced and the value in our designs was also reduced.

Ling-Fei Lin: So was this the reason for the decrease in profits?

Barry Lam: It was caused by increased competition. The value we create is compressed by competition, so we leverage volume to boost profits. This was inevitable. The notebook industry has been in existence for 20 years. It has matured over the years and the changes were inevitable. Much like when the TV industry became standardized. Before standardization, a flat screen TV cost a lot of money. When LCD TVs were introduced, it was also very expensive. Now TVs are cheap due to increased competition.

Ling-Fei Lin: When we talk about "R&D" here in Taiwan, the term is often confused with design capability. Can you clarify what the difference is between in the usage of the term "R&D" in the U.S. and Taiwan? What about definition of "design" in ODM?

Barry Lam: About ten years ago, we ventured into the cloud computing business and started manufacturing servers. It was in year 2000, about 10 years ago, when we started making servers. That's when we realized that "research" work is for defining market opportunities three years in the future. Meanwhile, "development" is for defining products based on current market demand. Finally, "engineering" is pure engineering. Engineering is to simply create the product according to its specifications. As I mentioned earlier, research is for discovering new technologies or new UIs that could be used three years later. Sometimes research is also needed for discovering a particular type of material. Development is for defining a product based on market demand, technical capabilities, and cost analysis. Finally, there's "engineering." In Taiwan, engineering is also considered part of R&D. Because the product specifications have already been defined by Microsoft and Intel, there is nothing else to add to the design, meaning that the rest of it is simple engineering.

Ling-Fei Lin: You are saying that development and engineering are separated?

Barry Lam: Yes, for example, they are separated in the upcoming development of cloud computing projects. Our project with MIT started in 2004 and was for researching future technology to be used in ten years. Most research is for technology that can be developed in three years. Product definition is usually for technology in 18 months or 2 years. Engineering, on the other hand, is basically referring to molding, layout of motherboards, and testing. Some people would refer to these types of work as "engineering", but you can also call them R&D.

Ling-Fei Lin: So in earlier days, the letter "D" in ODM meant development and engineering?

Barry Lam: Yes.

Ling-Fei Lin: Were we closer to doing research in 2004?

Barry Lam: All the product definitions are set by Intel and Microsoft. They determine which CPU end users need. Which Windows 5, 6 or 7 is preferred. Intel and Microsoft already defined their products based on market research. What software works best for notebooks has all been pre-defined. Since everything was pre-defined, there is not much value we can add to it.

Ling-Fei Lin: Do you agree that Taiwanese companies are gradually entering into the basic research stage? What do you think about this….

Barry Lam: There are still very few people doing basic research. Many companies like TMSC or UMC are performing researching in material science. People like us who make machinery tend to do less basic research.

Ling-Fei Lin: What do you think about future advancement in basic research for Taiwanese companies?

Barry Lam: It should be done in schools. Actually, there should be separate research done amongst three sectors: private sector, academic and government. No, that is not right. The right order should be academic first, followed by government, then private sectors. So, academic research comes first, followed by governmental research institutions, then followed by the private sector. Right now, each sector is doing research independently, with no synchronized efforts. Conducting independent research amongst each sector is not an efficient way. Research done by…academics should be in advanced research, like MIT, Berkeley and Stanford University. The research they do is creative advanced research.

Governmental research projects should focus on product development. I sometimes doubt the function of governmental research institutes. It is quite impossible to please every industry. Perhaps, governmental agencies should do research across all sectors, should research technologies that are needed for the country, instead of industry-specific study. The industry itself also needs to be very aggressive with defining its own needs. Such research is very professional and government research institute may be able to achieve such objectives.

We have research institutes here in Taiwan called Academia Sinica and ITRI, as well as many other outstanding universities. How do we connect the dots and create an efficient and synchronized research pipeline among schools, Academia Sinica, ITRI, and III (Institute for Information Industry)? Our budget and resources are limited. It doesn't make sense to stay disorganized like things are now, does it? I frequently advise our government to be more synchronized and organized. I believe similar practices are also true in the U.S. But, the difference is that the U.S. government doesn't conduct research. Research is conducted only in universities and the private sector. So, in the U.S., many creative ideas came from schools and are later developed into their own industries. The U.S. doesn't have any official research institutions, did you know that? But, it makes sense. Many people started their own businesses after graduation. That is the right way to go.

Ling-Fei Lin: Companies like Microsoft and IBM all have their own research labs. Do you think they should not have such labs?

Barry Lam: No, no, they should have research labs because they are different. IBM has already made a lot of money. Microsoft already did a lot of research. They should do research because they have the money to support it. So they devote a lot into research and development. Doing research is a must for those companies. They also cooperate with many universities in the U.S. Since many schools in the U.S. are private, they need lot of sponsors from the private sector to support their research funding. Therefore, those schools develop good relationships with businesses and corporations. This is different from universities in Taiwan, where funding is provided by the government. Here, each school engages in their own research. This style is also fine, but it is not as effective.

Ling-Fei Lin: But Quanta is also a large enterprise, shouldn't you also be engaged in more basic research…

Barry Lam: We do, we have our own research institution. We also have our own innovation center and business units. We cooperate with universities. We have our own research institutions and our own innovation centers. We also have different business units with different focuses. We have our own strategy. Many companies have their own visions, but true research is in line with your company's strategies, planning and action plan. Otherwise, you would be doing research without objective. It wouldn't make sense otherwise.

Ling-Fei Lin: You mentioned earlier that research should be done in schools, then what about companies without sufficient financial capabilities or scale, what should they do?

Barry Lam: No, many innovative ideas came from academics. Even though some innovations do not mature until 10 years later, that's still OK. For instance, many innovations in computer technology came from MIT, then why can't we do the same in Taiwan? It can be done in fact. We just haven't lined them up together. We haven't defined our goals. We need a long term and cohesive research plan, not just writing research papers. It doesn't mean much otherwise.

Ling-Fei Lin: Can you talk about the designs [Taiwanese companies] did in the earlier days. It was the same Wintel platform, but why was the profit much higher then? We are using the same Wintel platform nowadays, but the profits are much lower.

Barry Lam: That's because everyone has learnt the technology. So everyone has similar technology with little differentiation.

Ling-Fei Lin: What technology did everyone learn?

Barry Lam: Everyone learnt the same type of technology. Everyone learnt the same technology from Microsoft and Intel. There were many uncertainties in the earlier days. There were many uncertain factors. For example, there were many changes with the LCDs and components. You could produce products with greater differentiation in the earlier days, but now, everyone is producing identical products. Notebooks have become a commodity now. Therefore, everything looks identical. So, this all… I'm not….this industry is reaching maturity and such transition is very common in any matured industry. It's unstoppable. Existing players must face such reality and changes in technology advancement in this era are very rapid. You cannot… this is not a complaint…just face the changes and adjust your own business accordingly. Adjust your company strategy, adjust your action plan, and that's it. I never thought the company could reach a trillion dollars revenue, I never thought it would reach the position it's in today. So far, I'm so happy with the things I've done in the past and I will be equally happy with the different things I'll do in the future.

Ling-Fei Lin: Chairman, can you please talk about the notebook industry, where D is for design and M is for manufacturing, can be highly integrated? Unlike some industries, such as semiconductors, where the two elements are separated?

Barry Lam: That's different. Completely different business models because the value in "Design" is not high.

Ling-Fei Lin: With notebooks?

Barry Lam: Yes, the D for design in notebooks does not have much value. Plus, there's only one kind of design. It's designing products. So, even if you put "D" and "M" together, the process is still locking screws and doing Surface Mount Technology (SMT). Manufacturing machines are not expensive and manufacturing skills are also not high. Thus, it's a good thing to put the "D" and "M" together. In fact, these two elements go hand in hand even in the earlier days.

But, it's different with the semiconductor industry because designing circuits is a know-how technology, so circuit design is an application. Good circuit design can define a product. The most challenging task MediaTek faces now is not design technology, but product definition. MediaTek can sell products well with the right product definition, but it would be very troublesome if the product definition is wrong. Therefore, MediaTek gives manufacturing to its fabs. Everyone has MediaTek's design technology, but the key with semiconductor industry is to have the right product definition. This is professional and key differentiation is the ability to define the right products.

Ling-Fei Lin: So, because the design value in notebooks or PCs is not high…

Barry Lam: Because there is no product definition in the notebook industry. Intel and Microsoft has done it already.

Ling-Fei Lin: OK, since Quanta is doing EMS type of manufacturing business, how did you find out the demand from end users? Or did you simply follow the requests from PC brands?

Barry Lam: No, we definitely did some research, like with user interfaces. How do wemake users feel more comfortable with the design and make the product easier to handle? Which color looks better? So, we changed colors to make products more attractive to users. Some consumers like red, some like green, and some like yellow. We could fulfill all their demands. So, we make minor changes to create added

value for our customers. This is what we do in the manufacturing business. We often work with every customer… different customers have different market segments. Each customer is unique. Some prefer this segment, while others prefer another segment. They are all different.

Ling-Fei Lin: So, we just follow whatever customers give to us?

Barry Lam: No, we also made some suggestions. For example, we make suggestions on casing technology, including how to make it using a new method, how to make it cheaper, or how to make it more appealing, more attractive, or easier to handle.

Ling-Fei Lin: So I would like to ask if you are more user-oriented or technology oriented?

Barry Lam: The technology is about the same. Technology is one driving force. But, user interface is also very important. For example, ASUS designs notebooks with many different textures, including leather covers, patterned fabric covers, or bamboo covers… these are all for different user interfaces.

Ling-Fei Lin: So, in fact, you also do your own market research with different users, instead of just following what the customers tell you to do?

Barry Lam: We also design interfaces with our customers. Customers can tell us what they like and we would make it for them. It was just like making a tailor-made suit. One would look for tailors with the most fabric choices, better looking suits and better quality. Just like this, much like making the tailor-made suits. This is an industry. The TV industry used to be so big, but now everyone knows how to do it. This is the challenge all players in pure hardware manufacturing will have to face. Pure hardware manufacturing eventually all turns into serious competition.

Barry Lam: Therefore, you shouldn't regard the notebook manufacturing business as a great industry, much like manufacturing TVs, sewing machines, or bicycles…they are all the same.

Ling-Fei Lin: Ten years ago, you were the "Stock King" [the stock had the highest value]. People were thinking….

Barry Lam: The "Stock King" can't reign that long, right? There are always stronger competitors ready to take over your current position. That is value. There will always be a new company taking over the top position in the stock market, so there are many possibilities. Changes in the big wave are much more important, compared to market rumors or speculations spread in the stock market or by the media. Actually, our revenue has doubled compared to what we had ten years ago. It's ok, right? Market rumor or speculation usually doesn't make too much sense.

Ling-Fei Lin: Then here is another question: how did Quanta convince so many big players to outsource their manufacturing work to you? Were they not afraid their product secrets or manufacturing know-how would be taken by competitors?

Barry Lam: It is because of the common platform, so they are all the same. Everyone leverages Intel's ICs and Windows 7. There're no differences. All designs have a few sockets, so there is no big difference. Production secrets are not a selling feature. Of course, we would separate the products in the early phase, but after the products are launched to the market, they are all the same. Everyone knows that.

Ling-Fei Lin: So you didn't really need to convince customers, right?

Barry Lam: Initially we still needed to convince customers because competitors were all at different levels. Now, everyone is the same. Everybody knows the game rules. Everyone knows what products you are launching to the market. If you go to retail stores, you will see that all the PCs look alike and there is

just a price difference of one thousand NT dollars. Only one thousand NT dollars difference. It is a great offering to end users.

Ling-Fei Lin: So was there any customer who would not give you the orders because you already manufactured for its competitors?

Barry Lam: No, initially we had many different business models and relied heavily on the supply chain. They gave us a great deal of assistance. Take HP for example, their orders came in lot by lot in the beginning and we would ship it lot by lot as well. Then I said no, we can offer flexible production. I told customers that orders can be produced and shipped in two days. Customers would ask if this could be done? We said yes and we delivered accordingly. As a result, our customer didn't have excess inventory. Otherwise, customers cannot handle all the logistics for their global locations in the U.S., England, France, and Germany. Their delivery period used to be thirty days. So, there would be situations where it took thirty days to deliver products to the Germany branch, but they could not process it all. Or, the French branch experienced great sales. Now, the situation is different, customers place orders and we can deliver it in two days. There are no more inventory issues for our customers and there's no more price erosion problems. Customers were really happy. Customers benefited from this supply chain model a lot.

Ling-Fei Lin: You meant HP?

Barry Lam: HP, yes, you can say that. Actually, each company has its unique product at the time and we had our own attractive characteristics. Later, when our supply chain became appealing to customers, it attracted their attention. So, we did a lot of product innovations and changes. We made changes to our supply chain and then moved to China. There were also changes to our volume, so greater flexibility was needed. That's why we gradually received more customer orders. But this business model is the same across the industry now. Customers would only pick a few companies for manufacturing. Every manufacturing player gets a share of customer orders.

Ling-Fei Lin: What you just mentioned, was it Build to Order (BTO) or Configured to Order (CTO)?

Barry Lam: It was in the past. One of the ways to increase our volume…

Ling-Fei Lin: So did Quanta suggest the idea to HP?

Barry Lam: Yes, we initiated it. We were the first to come up with this business model in supply chain management. We were the first.

Ling-Fei Lin: So it wasn't Dell? Didn't Dell persuade you to do this…Taiwan Direct Ship?

Barry Lam: No, not Dell. Dell agreed later to accept the concept of "Taiwan Direct Ship". They were afraid that we would know where their customers were located. I told Dell that we do not need to know their customer's locations, as long as their forwarders have the correct information. Later, with the whole PC… later, they felt comfortable with our handling in PCs and IT management. I don't need to know where their customers are located. At first, we shipped products to Dell without keyboards, just a basic machine. Then, they would do final assembly in the U.S. But, that was a waste of money. After we started to engage business with HP, we shipped directly to their customers. So, later Dell also agreed for us to ship directly to their customers. It took a while, but this was the best method.

Ling-Fei Lin: You said this innovative supply chain management [model] was proposed by Quanta to customers like HP. You meant HP before it merged with Compaq, right? About when did you propose this solution?

Barry Lam: I don't remember the exact time, but maybe around the year 2000 or so. Maybe after the year 2000.

Ling-Fei Lin: Dell was later?

Barry Lam: Later, Dell also accepted this direct ship concept.

Ling-Fei Lin: Didn't this happen in nineteen ninety-something?

Barry Lam: I don't think so, but I have to check. I forget the details.

Ling-Fei Lin: So, you'll need to double check the year…

Barry Lam: It's around that time frame, around the year 2000.

Ling-Fei Lin: Then I just wanted to say that between customers….

Barry Lam: Oh yes, before the year 2000. In 2000, we moved to China. You are right. You know more about the history than I do. We moved to China around that time and started shipping directly to customers. It was probably between 1999 and 2000 or thereabouts…

Ling-Fei Lin: This was with Dell?

Barry Lam: Yes.

Ling-Fei Lin: So Dell was earlier than HP?

Barry Lam: No, this was with HP. But, with Dell, we made basic models and shipped to their factories, and then they would make their modifications. It was a two-step process with Dell. We typically only needed a one-step process.

Ling-Fei Lin: We just talked about competition between customers and their fear of competition or business secrets exchanges between ODM customers. Then the relationship you have between you and each of your customers, does competition exist on your design or engineering?

Barry Lam: We separate research and development for different customers. Some parts of manufacturing were separated and some were not.

Ling-Fei Lin: But what I meant is that was there any competition between Quanta and each of your customers? Would your customers prevent you from learning their skills? Like you said, Dell didn't want you to know the locations of their customers, including…

Barry Lam: I don't know the locations of their customers. We only made machines for them. With Dell, their technology and customer list were separated.

Ling-Fei Lin: Since HP and Dell both have R&D departments and designing talent, and much of their work was replaced by people at Quanta, then I am wondering if, with this kind of relationship, would your customers do anything to prevent you from learning from them?

Barry Lam: We needed to learn in order to produce. Without learning, I could not manufacture for customers. Plus, the technology was commonly known.

Ling-Fei Lin: So you think they were open-minded when they…

Barry Lam: No, we were about the same. Everyone was about the same. There are only a limited number of moves that a top martial art master can use when they fight against one another. [laughs]…. It is more or less the same.

Ling-Fei Lin: So you don't think their design capability was better?

Barry Lam: They have a lot of innovation and they needed innovation. So, customers are really good at innovation. Customers would tell us their ideas and we would make it for them, it's not very challenging.

Ling-Fei Lin: Chairman, would you please tell us, from years of working with customers from the U.S., Japan, or Europe, was there any critical knowledge or techniques that you learnt from them? Anything that was most impressive to you?

Barry Lam: In the process of manufacturing for customers, we observed how customers do branding and marketing. Of course, the use of notebooks was becoming a part of people's daily lives. So, we also learnt about how to talk to end users and to develop interface for them. We also learnt a lot of computer techniques. Actually, it was in a mature phase. That's why notebooks or desktops are called computers. It should be called a device. A device we learnt to design, to manufacture it in large volume, to control quality standard. Those skills were very much matured. We learnt various techniques from product design to user interface, from co-cargo design and fast design for manufacturing to manufacturing management, and then to truly commercialize a product. We learnt a lot. Of course, demand for advanced technology continues to rise. There really is not much room for improvement with the technology, but we continue to advance. Not big improvements though.

Ling-Fei Lin: For example, we know that Dell was a big customer to you in the past. During the time, what did you learn from Dell? Or when you did EMS work for Apple, did you learn something as well?

Barry Lam: We learnt a lot, lots of product techniques and mechanical techniques. Customers requested that we make products better. The more customers requested, the greater the improvements that we could deliver. This was a good learning method. To me, this is very simple. Engineers fulfill customers' demands. If the customers are satisfied, then you are a good engineer. If the customers are not satisfied, then the engineers didn't get things done right. This is much simpler to me than if I were to own my own brand. I wouldn't know how to set up demand and requirements. So, either ODM or EMS is a good method to learn and a good way to manage. My customers are driving my engineers; in return, my engineers would drive my production. All I have to worry about is getting orders.

Ling-Fei Lin: Even with an EMS type of business, you still learnt a lot?

Barry Lam: Of course, the key difference between EMS and ODM is only technology. Very often their production methods are different from ODM. Each customer has different requests and needs.

Ling-Fei Lin: So, although some customers are pickier, they actually helped you to learn something different in production…

Barry Lam: Of course, customers are always demanding. They are not picky. Every customer has different spec requirements. Different specifications means different costs. This is good. We are like a restaurant and customers can order any dish in any style they like. Anything can be done. We are flexible. For example, TSMC serves their customers well. TSMC has different processes. Their customers are also demanding, but they offer more than what customers demand and do it better. This is a positive cycle. This is about management and it's also one of our advantages.

Ling-Fei Lin: People used to think that ODM created more value when the design element is added to manufacturing, but pure manufacturing without design creates less value. Is that the case for you then?

Barry Lam: No, there's technical value added to the ODM business, so you can earn a higher margin. The ODM business is more stable. However, EMS is a totally different business model. There's no difference in EMS players, and the switch cost is low for customers. Thus, the margin is lower and the business is not stable. There are many EMS companies, but they are just different in size. There's no differentiation among EMS companies, so there is very little value-added. So, Taiwanese companies should break free from this business model and upgrade ourselves to do branding and have our own technology and marketing. Once you have your own marketing and technology, having your own brand would then make sense. Otherwise there is no value in pure branding.

Ling-Fei Lin: As you have has just mentioned, EMS companies can easily be replaced, but how come companies such as Foxconn continue to receive orders from Apple? How come the relationship between Foxconn and Apple seems quite stable and loyal?

Barry Lam: It's also quite difficult. How should I discuss this? You should know about the situation better than I do. I don't want to comment on this. I am sixty-two years old now. I consider myself a good engineer and a good manager. I like to do things in innovative ways and not to repeat other people's steps. I want to use an innovative approach to contribute more value to the human race. This is my thought for the future. I will still be making money and making profit but in a smarter way, and contribute more value to mankind. I am sixty-two now. I can't keep doing the same things. I need to do something that is more meaningful, right? Either a college graduate or a Ph.D. graduate would contribute different things to the world. A company needs to upgrade its value chain. How employees upgrade themselves can assist your company to upgrade to different values and different fields. That is what a true leader needs to do.

Ling-Fei Lin: Then, this part is similar to what we talked about earlier. You said the design value is not high, but why is the manufacturing business continued to be taken by Taiwanese and not Americans, Japanese, or Europeans? Even though the value is not high, they should be able to do it equally well, so why is that the case?

Barry Lam: Because we are cheaper.

Ling-Fei Lin: Is this the only reason?

Barry Lam: We are more aggressive. We are faster. We are cheaper. We are faster and we are more flexible. That's the characteristic of Taiwanese workers, we are hard working. We study Confucianism, which taught us to be hardworking, responsible and have team spirit, right? Thus, our work delivery is almost impossible to compete anywhere else.

You may ask: why don't large companies in China want to do it? They are different because their domestic market is already too big. They wouldn't want to do ODM or OEM business. But, why? We Taiwanese are very hard working. When scolded by customers, we just smile and go back to work overtime. But for people in mainland China, workers quit if being yelled at. [laughs]... If they said they wanted to quit, then that's the end of the story. This is typical for people living on a continent. Their culture is still different from people living on an island. For example, Japanese people are also very hard working, right? Even though he may be angry on the inside, he would still say "yes" to you, right? This is the same concept. So, these types of companies tend to do ODM and OEM business. National characteristics and company culture are still unchangeable. Different land raises different groups of people. That's the way it is. Therefore, you cannot ignore the culture, education, and process of the organization. Those are unchangeable.

Ling-Fei Lin: OK, the following are more overall questions. Please talk about, from earlier days to now, what the contribution is from Taiwanese companies to the global notebook industry. Is there any company

or any person you believe made a great contribution to the industry? What is your company's contribution? Can you describe it briefly?

Barry Lam: The supply chain is very complete in Taiwan. We have semiconductor foundries here in Taiwan. We have good design houses. We have many good assembly houses. We also have many components, such as CD-ROM drive. We gave up on the hard drive business at the time, so we didn't catch the momentum when the industry was blooming. Assembly was done mostly in Thailand or Southeast Asia. We pretty much know how to make most components in mass production. So from components…that's why even when we make resistors and capacitors, our price is still very cheap. For components, from PCB boards to chips, we can make it all in Taiwan. So, we can even complete the design in Taipei. And, why? Because all the vendors are concentrated in Taipei. Taipei is not big, so it's easy to deal with everything in Taipei and everything can be done here. This is good, isn't it? It is very difficult to have such concentration in one place with all the vendors located in Taipei and most of them are in Northern Taipei. Later, China also played a significant role in the ODM industry. By the year 2000, everyone moved to Eastern China. The entire supply chain was duplicated from Taiwan to Eastern China. All PC vendors went to Eastern China, so the entire supply chain became complete and the production volume grew very fast. In the year 2000, the World Wide Web was also blooming, so there was a surge in demand for notebooks and smart phones. So, the entire industry depended on Taiwan.

Ling-Fei Lin: The contribution that Taiwan has made to the global notebook market or industry… What do you think of the cost down structure?

Barry Lam: When the volume gets bigger, cost down becomes necessary. With volume, affordability can be solved. Scalability can be solved. Then flexibility can also be solved. It was really hard to find one country or one place with a combination of all three advantages, complete supply chain, efficiency and low cost. How should I put it…ASF… Affordability, Scalability, and Flexibility.

Ling-Fei Lin: So you think, if Taiwanese companies didn't engage in the ODM or EMS business, then the notebook industry today would be very different?

Barry Lam: Um, yes or no. Who knows? Of course, Taiwan plays a very important role. There were cases in history when a hero rises at a time of need. During a time of need, will a hero rise to make a difference? It depends on his or her capability.

Ling-Fei Lin: You mentioned moving to China earlier, why did you move to China? Was the decision driven by your customers or was it your own idea?

Barry Lam: For three things: affordability, scalability and flexibility. We went to China to set up factories because none of the elements are available in Taiwan. Our factory, the one across the street from us, we used to produce a million notebook units per year at that factory. The volume was big at the time, but not anymore. Now, we need to produce fifty million units a year. That is impossible in Taiwan. Land is very expensive now, so it is difficult to build a factory site. It is also difficult to pass the environmental assessment. The operation environment in Taiwan is much tougher now. And there are problems with workers too. Even if we hire foreign labor, we are required to keep a certain ratio of foreign labor versus domestic labor. Staying in Taiwan is almost suicidal for a manufacturing business.

Ling-Fei Lin: So at the time, did you hire many workers from the Philippines and other countries?

Barry Lam: There was a set ratio for domestic workers, Filipino workers, and other foreign workers. But domestic laborers didn't want to work in a factory. So we had to move. Moving out of Taiwan was the right decision.

Ling-Fei Lin: So it was you who wanted to move to China, not your customers…

Barry Lam: Customers had to come with us to China too. Otherwise there was no production volume. Customers would give us orders, but our factory in Taiwan cannot handle the volume. It didn't have the capacity to fulfill the production volume needed. Therefore, we had to move to China.

Let me tell you a story. There used to be a lot of tech companies on Nanjing East Road in Taipei. Nanjing East Road used to be the electronic factory road. We, manufacturers, all competed with each other along that street. Later, we moved to Taoyuan (outside Taipei) to compete again. There were many factories in Taoyuan and Chungli. And then the competition continued in Eastern China. Now, we are going to Chongqing to compete instead. Businesses in this industry seem to be competing constantly in different locations, like how the martial arts masters have their sword fights, from one mountain in China to another. The sword fight happened every year to determine the ultimate master of Kung-Fu.

Ling-Fei Lin: You mentioned Nanjing East Road back in the days, what was it like then?

Barry Lam: Yes, in the earlier stage, Kinpo and Inventec were both on Nanjing East Road.

Ling-Fei Lin: Not in the Shihlin area?

Barry Lam: No, they moved to Shihlin area in the later days. Inventec was on Nanjing East Road in the beginning. I remember Compal went to Chungli. We were all at Linkou. That's how it was back then, and it is a lot of fun to think about it now. Every era has its own mode of competition. Very interesting.

Ling-Fei Lin: Then let's talk about your personal life and the future. Throughout your career, what made you feel the most acomplished or made you the most proud?

Barry Lam: There is nothing I am most proud of. There is nothing to be proud of.

Ling-Fei Lin: What about the most rewarding or most satisfying things?

Barry Lam: Well. The most satisfying thing…there was this one time, when I received an award. That was an award from Business Week Magazine. The award title was The World's Top 25 Managers. They have some information about me. We were in a recession at the time, 2003, but our revenue was still pretty good. This was a good thing. But it is actually no big deal. Not so important.

Ling-Fei Lin: You said Business Week, right?

Barry Lam: Yes, but honorary awards aren't really important to me. Actually, seeing so many computers being manufactured everyday for people around the world is rewarding. With that, I feel like I have made something for the world. I am happy every day. There are ups and downs with our revenue, but it is OK. Anyhow we continue to grow. I want to grow and most importantly, I want to make something new. At the end of the day, what an engineer really cares about is that s/he can make new things for others to accept and appreciate. That's all that I want.

Ling-Fei Lin: So you are most happy when you see others using products made by you?

Barry Lam: I was on an airplane once and noticed that the person in front of me was using Apple computer, the one on my left was using Dell, and the person behind me was using HP. So I told them "I made this and this and this." They replied, "What? Who is Quanta?" I said, "Yeah, I made all of those". That was very interesting.

Ling-Fei Lin: When was this?

Barry Lam: It was many years ago. But so many machines sold in Taiwan are made by us nowadays. But, I don't remember it all. [laughs]

Ling-Fei Lin: So you are happy when you see people using your products. Could you talk about some of the turning points in your life?

Barry Lam: When I was…it was the year 1988. We won Apple's order in 1997. Then, we also won Dell's orders. I was so happy at the time because it was very difficult to win orders from Apple. At the time, Apple leveraged one of our designs. It was a multimedia notebook design that was used by both Dell and Apple. And we produced them in an old factory we built, but everything was running smoothly and mass production was achievable. Apple became…Apple at the time was considered the best seller, So was Dell. They were both selling this particular model we designed. I was so happy at the time because it proved the company was improving. Things weren't as exciting anymore after that point because we knew everything would be OK. We weren't sure if we could succeed at the time, but then Apple started using my design and Dell was also using my design. They did really well, they marketed the product very well. This proved that our company is qualified and the company was improving. Hence, we went public in 1999.

Ling-Fei Lin: So year 1997 was meaningful to you because Apple and Dell placed orders with you for the first time?

Barry Lam: Yes.

Ling-Fei Lin: Was the volume large at first?

Barry Lam: They were doing very well. Their quality was good. They sold a lot of laptops. Actually, this was a part of the progress…and those products weren't very innovative, they were mostly "me-too" products. The most important thing now is to develop new inventions.

Ling-Fei Lin: OK, if you could redo one thing you did in life or re-make one decision you made in the past, what would it be?

Barry Lam: When I went to Harvard Business School, it taught me that statistic based on past thirty years data shows that the beverage industry has the highest ROI- Return On Investment. I did a blind test of tasting three different brands of soda. I couldn't tell the difference amongst Coca Cola, Pepsi and RC Cola. Yet, some of them are more expensive than others. The difference is all in marketing and advertisements. It is truly remarkable. In the same study, the industry with the worst ROI is computer hardware ironically. So I picked the wrong field, I should have gone to business school.

Ling-Fei Lin: What's the time-frame for the study? From what year to what year?

Barry Lam: Thirty years, the past thirty years.

Ling-Fei Lin: Was computer hardware really that bad in the past thirty years?

Barry Lam: Computer hardware is the worst industry indeed otherwise why would Taiwanese companies want to do it? [laughs]… Did you know that the richest man in China is the CEO of Wahaha, owner of a soft drink company? Not the ones who make computer hardware. Not Lenovo, no. That's why we were in the hardest place in life. If I could go back in time, I would want to be a painter. A couple of sketches here and there, then you get to make a lot of money. Many painters in China are flying private jets. [laughs]…It is unbelievable how a painting can be worth several million U.S. dollars.

Ling-Fei Lin: So if you could choose again, you'd want to be a painter?

Barry Lam: I could be a decent painter.

Ling-Fei Lin: Are you still self-learning or practicing painting?

Barry Lam: No, I'm too old. Old money doesn't learn new tricks. Painting is something you need to start doing at a young age.

Ling-Fei Lin: Did you learn it when you were young?

Barry Lam: No, no. I'm already tainted by the real world. I don't have such creativity or much aesthetic sense anymore.

Ling-Fei Lin: Since you mentioned paintings, could you talk about your collection of Chinese paintings? Is there any connection between painting and technology in innovation, technology, or culture?

Barry Lam: They are not related. Yet, since I am very interested in human behavior and beauty of things, I devised a principle that technology supports and enables human behavior, which in turn supports business development. If you have the technology, you need to first understand human behavior, then create a solution. Finally, you can turn it into a business model and make profits.

For example, Facebook started with a human behavior-centric idea. Then, the technology enabled the development of Facebook. The kid who introduced Facebook knows a lot about human behaviors. OK. Later, he decided he had to go to the Bay Area to understand how the business model works. Then he could start talking about business. Every industry in the future will possess technology. Once you understand human behaviors, you can talk about businesses. There's currently no company in Taiwan with such vision. Otherwise, we'll always be stuck with the ODM and EMS businesses. Stuck with manufacturing forever. The future paradigm of the industry is not going to stay the same. Electronic devices will become very cheap in the future. Maybe in the future, a single component factory may be able to produce all the electronic devices. This is a really big challenge for Taiwan. We cannot move to the next level if we cannot adapt to the paradigm shift.

Ling-Fei Lin: So you think that behavior is very important, right? Knowing how humans behave?

Barry Lam: It is the key to success. Apple understands human behaviors and business, that's why they can succeed. Their success was not technology, but their understanding of human behaviors and the business. And other people cannot repeat Apple's success. Sony's TV business can be replicated by Samsung or LG. But, Apple's success cannot be easily replicated, why? Because they know human behaviors and business models.

Ling-Fei Lin: Let's go back to your collection of Chinese paintings. Why do many owners of technology companies like to collect artworks? Is it because most owners of technology companies have an engineering background or something?

Barry Lam: No, no. It's totally different. There is a difference between collecting artworks for the sake of collection and collecting artworks for art appreciation. Of course, you need to be wealthy in either case. I grew up in Hong Kong, a city filled of beautiful designs. You can visit the Central District, where I lived for many years. The Central District of Hong Kong has many beautiful things. The HSBC Headquarters in Central is a beautiful building. There were many Victorian style buildings in Hong Kong. They are very pretty. You could see many beautiful cars in Hong Kong. But, there were not that many cars in Taiwan at the time. Most cars were made by Yulon at the time and they were uninspiring. I once took a boat ride from the Central District of Hong Kong to Keelung, Taiwan, and I thought, "wow, this is Taiwan." Taiwanese people have very little aesthetic taste because the country was built by the military government. Only some buildings left by the Japanese were well designed. The rest lack artistic design.

If a kid grew up in a city without beauty, then he or she could not develop appreciation for arts. Taiwanese have a low level of aesthetic taste. That's why most people get overexcited about relatively unremarkable artworks. Hong Kong offers the best of everything for people to enjoy. I like to observe. I like using my

eyes to see, using my ears to listen, using my nose to smell, and using my mouth to taste. That's why I like Chinese music as well as Western music. I also developed appreciation for musicians, art performances, and musical performances. That's why we built Quanta Hall here at Quanta to host art performances regularly. I like to go to museums to see different cultures and read about their history to make comparisons. I like to think about how different cultures are formed.

Well, an engineer is…Taiwanese give too much respect to engineers. Engineers are the ones making things for others. Like blacksmiths in the past who did metal works; we have "computersmiths" in the modern age. That's all there is to it, right? But many hardware companies in Taiwan pay a lot of taxes to help the economy. So, it is not good to move Taiwan to higher culture. Culture is the final thing of civilization, right? One day, I went to see Chinese opera and press asked me "why do you come to see a Chinese opera?" I said "Why not? Everyone should see Chinese operas." Everyone should appreciate traditional Chinese art and music performances. Everyone should see ballet. It's a beautiful thing to see, right? In Paris, in France, that's part of the culture, a part of education. If you start developing an appreciation for ballet and receiving art education at a young age, then your life would become more beautiful. Why not enjoy your life more? We used to live under authority and power, but now we have overcome the economic difficulties. We need to start developing our culture. There is no need to discuss unnecessary things everyday. The entire education system and the society should move to higher culture.

Ling-Fei Lin: So, what do you think we need to do to encourage people to pay more attention to culture?

Barry Lam: It stems from education, the most basic level of education. I appreciate Chinese Arts and Western Arts. So, I understand why houses should be built beautifully. Why should life be… Why do you dress yourself in beautiful clothing? Why does everyone wear a tie? Can I not wear one? Sure you can, as long as you dress neatly. You can't say that I look sloppy because I didn't wear a tie. No, not at all. You need to have your elegant style. This is part of our five-thousand-years of history in China.

Ling-Fei Lin: I'd like to ask one more question about art. Many people were interested in learning your reasons for collecting paintings by Chang Dai Chien, why him in particular?

Barry Lam: No, it is a misunderstanding by the media that I only collect paintings from Chang Dai Chien and female figure paintings. No, the media made this up as a hot topic. I have collections of paintings from Chang Dai Chien and I have a lot of them. My collection spans across five hundred years of Chinese history. From the Song Dynasty to modern period, that's about seven or eight hundred years. I have a rather complete collection of Chinese painting and calligraphy. Why? In Chinese art, painting and calligraphy are considered the finest artwork. Emperor Qianlong had an art gallery called "San Hsi Tang" which contained three rare and valuable pieces of calligraphy. I believe Chinese paintings are way better than Western paintings.

I taught Chinese calligraphy at MIT before. After the first lecture, students were impressed by the greatness of Chinese calligraphy. I showed them a video of "Eternal Eight" from Mr. Lin Hwai-Min. Students were impressed and said that Chinese writing is so incredible. In the second lecture, I discussed the differences between Chinese paintings and Western paintings. Chinese painting has two thousand years of history and Western painting only has five hundred years of history. Not a long history. Students couldn't understand why there are poems in Chinese paintings or why there are pieces of calligraphy in Chinese paintings. I said "of course you can't understand, the two cultures are way too different." They were very surprised.

Why didn't Chinese educate our children about arts and the history? That's because our long history of low self-esteem in our culture. We put too much emphasis on admiring the Western culture. But if you think again now, China was right. The Chinese culture is very far reaching. Many people are interested in the Chinese culture. That is why the National Palace Museum attracts 3.5 million visitors every year. People are starting to notice the importance of our culture because the Chinese culture is so far reaching.

Our thoughts and philosophies are infused in our art. You find these elements in different types of artworks including calligraphy, china and jade. Western cultures cannot infuse their philosophy, literature or authenticity into their painting. The Chinese can. The Chinese combines painting, literature and calligraphy into a single form of art. Students I taught cannot understand this but we, Chinese, have to know.

I don't understand why kids in France would visit the Louvre, Versailles, and all the other art museums at a young age. We Chinese don't do that. You don't see any kids in the National Palace Museum here. It is too high, it's out of our reach. No! We need to build up our national self-esteem. What should we have confidence in? Can we build our confidence level? China is making many computers, right? And Taiwan is also part of the Chinese culture. Taiwan needs Chinese people's characteristics to be successful.

We already proved that we could produce semiconductors better than anyone else could. That's because we are hard working. We are focused. We insisted on what we believe in, right? Then our national identity becomes a part of our culture, it then became some form of industry. But, we also need to understand where we stand in the global competitive market. We need to understand that what we achieved did not happen by chance.

Many stories in the history or cultural achievement are gradually formed, not a coincidence. From Greece to Rome, to Paris, to London and to New York. These achievements are results of time. It didn't happen coincidentally, right? We need to understand the root cause. We need to understand the reasons. We need someone to explain it. We cannot just look at superficial phenomena. It's not the real source or root cause of the event. So we need to understand the reason. Why do we need to understand? So you can decide what to do next and what your next steps are.

Our country needs a vision. Our company needs a vision. Our country needs a strategy. Our company needs a strategy. We then need to define an action plan. This is common sense. We were not trained to think like this. But, how come I learnt a lot in Hong Kong? Not academically speaking, but the way I think is so different from the thought processes of Taiwanese students. That's why there are so many variations and changes. Once it became standard, anyone could learn it easily. It would be difficult to be the first one doing something different. But, it is easier for people who follow in the footprints of the industry leader. It takes a lot of effort to be a leader and remain the leading position. Being a follower is easy. I often think about what would happen to Taiwan in the next thirty years. This is what I think about everyday.

Ling-Fei Lin: Can you talk about what your primary focus is now? Are you planning anything in particular?

Barry Lam: Our company is shifting its focus to a cloud computing business. How do we go about doing this? We are a hardware manufacturer. How do we increase our current value and create new business value? This is what I need to do now. How do we do research? How do we turn long-term research investment into tomorrow's new products? How do we turn tomorrow's new product into today's profit?

Ling-Fei Lin: Quanta's development in cloud computing will heavily rely on software and applications, so the company will….

Barry Lam: Yes, but it involves a lot of things... we also talk about being a solution provider. IBM didn't produce everything they sell. You don't necessarily need to make everything to be successful…no. You want to be a solution provider, but how? You need to redefine your position. Our company needs to redefine its position. It needs re-engineering and re-organization in order to define a new business model. In other words, the business model is the most important key to success. For example, Liu Bei recruited his army to reclaim his dynasty. Having an army to reclaim his dynasty is like having a lot of hardware in PC industry. Liu Bei recruited Zhang Fei and Guan Yu, who only knew about fighting. Without Kong Ming,

Liu Bei could not succeed. He could not win the battle. Hence, this is like having a business model in war. Many Taiwanese companies don't have a sound business model.

Ling-Fei Lin: Are you working on a business model for cloud computing?

Barry Lam: Every business needs a business model. TSMC's success relies more on its business model than technology.

Ling-Fei Lin: Are you saying that you don't necessarily need to develop software and applications by yourselves, but instead just need to develop a business model?

Barry Lam: But how do you define your business model? How do you define your resources? How do you define your processes? How do you redefine the company's culture, resources, and then processes? A successful company depends on its business model. If we kept on hanging onto technology, technology, and technology then, we should make components because those products are all the same. Many companies know how to make components now. Semiconductors are difficult to manufacture, but everyone is doing it now. LCDs are difficult to manufacture, but still many companies have the know-how to do it nowadays. Right? Technology used to be the driving force behind everything, but not anymore. Technology is not the only key to success nowadays, although it is necessary, but technology is not everything.

Therefore, many Taiwanese companies like to rush into an industry without really understanding the business model. It is not a very effective way or a very smart way to run a business. On the other hand, the U.S. companies are strong in this part. Americans are good at making excellent business models and so are the British…But many countries are not so good at it. Therefore, application of a business models is the key to success for many industries.

Ling-Fei Lin: What is the next big event in the computer industry? What are the challenges?

Barry Lam: The hardware development is reaching its limit. There is very little differentiation now. The next step is how to leverage IT technology to provide services. Although IT service is still in its infancy, IT service will play a very important role in human society in the future…[there will be] more reliance on IT services. This is just the beginning. OK? So, where is the market? The U.S. is one market. China is another and so is Europe. Which region offers the best advantage for Taiwanese companies? We need to figure this out by ourselves.

Of course, hardware is just a tool that will enable companies to provide IT services in the future. A television manufacturer can't make big money. The TV entertainment industry, including broadcast companies, can. Their revenue is in the billions. Making television sets is not going to generate a billion dollars for the company. But, service offerings in the "Digital Knowledge Economy" are very big. Hardware is only a small portion of it.

Taiwan needs to upgrade itself to this new era. We should be providing services and not just producing hardware. We are still making hardware, but we should upgrade ourselves to the next level. The process is not going to be easy. The whole mindset needs to be changed,people's way of thinking needs to be changed. We can't make pure servers and hardware with the hope of becoming a dominant force in cloud computing. No. It's far away from that. Our government is pushing for cloud computing development. But, cloud computing is only a tool.

How do we create a Digital Knowledge Economy? This is an entirely new field. I don't believe that our government or industries are ready for this now. How much room can our manufacturing business grow? We've probably reached the ceiling already. What role will our country play in the global community in the future? Where do we stand? What is our global position? We need to know our country's vision and

strategy first. What kind of professional talent can our county cultivate? Americans already defined this industry thirty years ago and the industry is matured. That's about it. What is our next step? No one is defining the vision. No one cares about the vision. People are just doing pieces here and pieces there. This is not right. OK?

Taiwan needs to manage its own Digital Knowledge Economy. But, we currently lack vision and strategy. There is no timetable for digital television, Telecom Triple Play and Long Term Evolution (LTE). Many countries are very eager to enable the services and very aggressive in pushing these agendas. Television will be fully digitalized in 2012 and analog broadcasts will be terminated. This is happening everywhere and yet we don't have a timetable for this in Taiwan. The transition is not just about making TV programs visually more appealing, it is about making TVs smarter. The whole value is different. The younger generation, Generation N, has a very different behaviorial pattern. For people under thirty, the first thing they learnt is computers. The first monitor they see is a LCD screen, right? Their learning and knowledge acquisition came from the Internet, not from books or teachers. Their interpersonal interactions came from Facebook. Their friends communicate and their opinions are exchanged via online forums. They write blogs. They tweet or utilize other forms of communication. They generate the content themselves. Our whole system will be changed accordingly. No matter whether you like it or not, things are changing.

Our society will be influenced by the Internet and the Web. If we don't have a proper platform, information superhighway, or basic infrastructure, to enable the changes in communication, if we don't change ourselves, then we can only rely on others' platform. It will be very challenging and frightening. I was so shocked when I visited Eastern Europe countries. They jump directly to LTE and said "we don't need airplanes anymore." This infrastructure change is a very important economic development. The government should build important infrastructure, otherwise the government will fail their citizens. They are very serious about this.

On the other hand, people here in Taiwan are too focused on manufacturing. We made so many televisions, phones, and PCs for the rest of the world, but we never really put them to good use for our own country and society. We failed to develop our culture through the process and propagate the knowledge to the entire education system. We failed to take advantage of applying such knowledge to the society. Didn't we fail ourselves then? If we don't talk so much about the economy, then changes in the society.... What I worry about the most is changes in the society if we don't catch up with the rest of the world. Businessmen and companies will find ways to survive, but they may not be in sync with the rest of society. We produced a lot of digital televisions, but there's no use for them. Sure, there are digital televisions. TV is digital but not radio. We still continuously need to rely on others' platforms. So, I think such change is the next thing we must do here in Taiwan.

Ling-Fei Lin: Chairman, what would you say to our young aspiring engineers and scientists? What words of advice could you provide?

Barry Lam: When we were young… When I was studying in college in 1966. In 1960, I was in high school. We thought we needed to serve our country faithfully much like Dr. Sun Yatsen, who started the revolution for freedom. He dedicated himself completely to fight for freedom and the abolishment of monarchy. Many scientists do studies to make a better world. Edison invented the light bulb and gramophone. But he ended up becoming deaf. We admire these people because of what they accomplished, not because how much money they made, or how famous they were. As an engineer, I enjoy it when people say "I made a lot of computers for people to use", but not about how much money I made. Maybe it's because we were born at the time when resources were scarce. Even though life was difficult, I never expected to make a fortune. I just wanted to have a car that would satisfy my needs. All our value is built on achievement. Now everyone has his or her basic needs fulfilled. But, the information we receive from the press is about who made what money or who is rich. Taiwan is not as bad. Hong Kong is even worse. There is a problem with that value proposition.

That value proposition is that personal interests are more important than society at large. Such value may be acceptable in dominating countries. However, it is [particularly] unacceptable for people living in a small country. If people living in small countries are selfish with their own needs, then there's no team spirit or sharing the same ideal world. That is very dangerous. OK? Will companies continue to grow in the future to as big as they are now? I don't even know. Whatever happened in the U.S., we can get firsthand information right away. We don't acquire our knowledge from books anymore. We acquire them from Google or some other websites. We are in sync with the rest of the world.

We live in a small environment, where the market is very small. One of the richest men in China became rich through picking up garbage. Since the market is so big, people could make a fortune out of forage. Why? Their market is just too big. But, not in Taiwan. What should we do? If everyone only cares for themselves in Taiwan, then it is... unless you have innovations to influence the world. Otherwise, all you can influence is a very small group of people. You cannot have a strong competitive edge.

Why didn't Facebook happen in Taiwan? Why doesn't Twitter work in Taiwan? Strategy. It is obvious, you know. What can you do? There is no fixed answer to this problem. There is one thing we can do is to get things done. Once you get the things done, your rewards will follow. It is very simple. If you are only going after rewards, then it is like putting the cart before the horse. If you get things done however and have good values, you become competitive and then naturally your rewards will follow. It is easy to look at someone's success, but it's very hard to replicate the success by yourself. Everyone has a hard working story behind his or her success. But you cannot repeat others' success because repeating the same step is wrong. Because your business model is wrong.

Every era has its own opportunities. It cannot be replicated. This is a very hard question to answer, and you don't have to listen to what I have to say. If Bill Gates were to tell you his secret to success, you shouldn't repeat it because it wouldn't work, right? If you follow the steps to develop Facebook now, it would be wrong since you cannot clone the same success.

To be honest, I realized a principle recently. I've only realized it recently, that technology does not purely come from books. Technology can be obtained in many different ways. Other ways include deriving technology from human behaviors and from businesses. In the U.S., if you want to become an entrepreneur, there are many opportunities in America, in China, and in Japan. Can the entrepreneurial opportunities be repeated in Taiwan? There are clues to be followed. This is also another way. Whether it's right or wrong I don't know.

Ling-Fei Lin: Finally, is there anything you would like to add to the previous questions or some additional thoughts?

Barry Lam: Anyway, I am very worried that there is too much individualism in society nowadays. The lack of team spirit is making it difficult for us to succeed. When there's only one person, you can do everything by yourself and it is fine. Taiwan is still pretty good. Many people are contributing to the community. If I say I don't want to work now and I want to become a community volunteer, this is still fine. This is a kind of life. For as long as you do something for the world, do something for other people, do something to change the people, and do something to help the people, then you should be happy. This is value. Don't say something like "this person made billions of dollars, then why didn't you?" It doesn't make sense. This is not the most meaningful thing.

Thank You.

END OF INTERVIEW