The Risks and Opportunities in a Mobile Commerce Economy

The era of the electronic wallet is closer than you think. In fact, it’s here now and it’s red-hot.

When secure payments, real-time banking and highly targeted marketing comes to cell phones, BlackBerry® devices, iPod® digital media players and other connected devices, it will represent the biggest opportunity in the history of commerce. Which industry players win, which ones lose and which ones simply sit on the sidelines has everything to do with decisions being made and deals being forged right now.

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Author’s note

This paper is part of a series being presented by First Data on the ongoing development of mobile commerce solutions. First Data believes—and I personally believe—that the rapid proliferation of wirelessly connected mobile devices, primarily in the form of cell phones, is revolutionizing how people monitor their financial resources, make important purchasing decisions and pay for transactions in the field. But it is unlikely that First Data’s viewpoint as a company, or my personal thoughts as a commerce industry veteran, is completely accurate. With each new day, we learn a great deal more, we hear from new and sometimes previously unknown potential partners and we discover consumer patterns and behaviors previously unseen. So, if these papers do nothing more than stimulate thinking or even cause strong disagreement, they will be considered successful. It is my deepest hope that you will pick up the phone or write an e-mail message sharing your own thoughts and visions. And that you will begin the important planning and discussion within your organization and with your strategic partners that will position all of us for success. To sit by and wait while others define the standards, suggest common practices and divvy up revenue streams is to fail—that much we can be sure of.

This paper provides an overview of the mobile commerce landscape. Additional papers will offer more detail on the concepts discussed here.

Testing the Future of Mobile Commerce on the San Francisco Bay Area Rapid Transit System

Imagine for a minute that you are one of the 370,000 daily riders of the Bay Area Rapid Transit (BART) system that crisscrosses three counties in the San Francisco region. Only today, instead of swiping your monthly BART EZ-Rider Pass Card or purchasing another paper ticket, you simply pull out a special Sprint® cell phone and wave it at the turnstile at your local station. On the way to your train, you notice a billboard advertising the latest sandwiches at Jack in the Box® restaurants. Just tap your phone to the poster and download directions to the nearest location.

While riding into work under the San Francisco Bay, it’s easy to check your BART EZ-Rider account balance directly on the cell phone and, because it is getting low, transfer funds from your checking account to increase your balance. Then, switch over to view your Jack in the Box Jack Cash™ account balance (courtesy of a birthday gift card from Mom) and there you discover a sufficient balance remains to take a few co-workers to lunch.
On your way into the office, stop and get a coffee—again, simply by tapping your phone to the terminal (you are now one drink closer to that free latte). At lunch, you once again pull out your cell phone and touch it to the payment terminal. The cost of that lunch for you and your co-workers is deducted directly from the gift card balance from Mom, less a coupon you received overnight on your phone, and you are all on your way. Since you left the house this morning, you still haven’t had to reach for your wallet.

The reason I love to give this example of how mobile commerce might work in the future is because it actually just happened and quite successfully so. Through a partnership with several companies, including my own, 230 regular BART riders were, in fact, issued one of those special Sprint phones for a four-month trial. Using Near Field Communication (NFC) technology and secure provisioning, those phones became the payment method not just at BART stations, but Jack in the Box restaurants, as well. Multiple existing account types from multiple sources were all successfully working on a single device.

This one experiment taught us several things and served as proof-of-concept for a variety of mobile commerce services. But it only scratched the surface of a deep and almost unlimited sea of opportunity (and potential roadblocks) for merchants, for financial institutions, for advertising and marketing agencies, for wireless carriers, for technology developers and most importantly for consumers.

Cooperation and Partnership Are Critical for Mobile Commerce Success

If I had to identify the biggest challenge in executing the BART example above, I’d say it was in bringing the various technology, financial services, retail and public entities together to agree on the goals of the program and the methods by which things would happen. Training consumers was easy: if anything, they wondered why it had taken so long for this type of quick and efficient transaction. (BART officials reported 165–175 transactions took place per day with the NFC phones, indicating a high degree of use among the 230 program enrollees.)

So, many important things had to take place for this test to go smoothly and together they serve as a good foundation for the points I hope to make in this paper:

→ For the consumer, it was critical to establish that the system was secure and that any loss of the cell phone would not mean loss of account balances.
→ For BART and retail merchants such as Jack in the Box, it meant the investment in NFC (near-field communication) technology readers and programming, as well as the appropriate infrastructure to issue and redeem electronic coupons.
→ For Sprint, it meant embedding a special chip inside each phone and setting up an infrastructure that allowed third parties to send and receive financial information to and from that device.
→ For First Data, which processed the financial transactions, it meant tying together multiple account types on a phone.
→ For technology partners, it meant developing software and hardware solutions that could support the transactions and open new marketing opportunities.
→ And for the advertising and marketing firms supporting BART and Jack in the Box, it meant thinking of entirely new ways to reach consumers and leverage this exciting and highly personal communication vehicle.

We all know, however, that a limited and somewhat controlled test is not a guarantee that similar practices will translate to wider and even more complex markets. But so many things are coming together and critical mass for enabling technology is so close that the BART test serves, if nothing else, as a wake-up call to anyone who thinks banking, payments and marketing over mobile devices is something off in the distant future.
Rapid Technology Deployment Is Transforming Commerce at Breath-Taking Speed

One of the primary reasons so many of us in the financial services industry are excited about mobile commerce is the sheer size of the opportunity. By many estimates there are currently over three billion mobile handsets in use worldwide. This is considerably greater than the number of active credit/debit cards. So, as a method of cash-free commerce, these devices open entirely new populations. Several projections show that soon, the number of mobile handsets in the United States will actually exceed the population, as consumers adopt multiple connected devices.

Let’s think about that for a minute. I’m not suggesting, of course, that every cell phone user will automatically become a good credit risk or a highly qualified buyer. But that’s the point of mobile commerce initiatives—they can accommodate and streamline the existing credit/debit card systems in place but also reach entirely new markets in entirely new ways. Say your teenager needs lunch money for the school cafeteria or for taking the bus to an after-school job. Or, an out-of-town guest wants short-term access to local commerce without using a credit card or carrying around a lot of cash. Or, you want to clearly separate and track business and personal expenses, even at locations that don’t accept credit cards. The most likely common factor in all these situations is the existence of a cell phone.

The existence of billions and billions of mobile device handsets is only a small part of the equation. Yet it is the foundation of everything to come, and if you don’t accept that these devices can and will serve as the “electronic wallet” of the future, then the rest of this paper is going to be hard to swallow. Just look, though, at how mobile handsets have already become the calendar, photo album, address book, entertainment and music storage device and more in peoples’ lives. Doesn’t it seem clear that they will become the conduit to financial transactions, as well?

The major wireless carriers all think so and most have initiatives now underway to test and deploy mobile commerce technology and services on their customers’ handsets.

Two-Way Communication Is Coming Soon

Of course, for mobile handsets to work effectively as an electronic wallet, an infrastructure must be in place of devices that can securely read and process the information contained on those phones. These “contactless readers” are similar to the magnetic-stripe terminals in place at most retail locations today. It may seem like upgrading and installing new devices in the more than seven million merchants and businesses is going to be a long and arduous task. But let’s look at the adoption curves of some current technology and see how, with each round, the cycle gets shorter:

→ It took 28 years to reach 100 million mag-stripe credit card accounts.
→ It took 12 years to reach 100 million debit accounts.
→ It took seven years to reach 100 million PayPal® accounts.
→ It took six years to sell 100 million iPods.

Projections currently show that:

→ It will take only five years to reach 100 million contactless credit/debit cards.
→ It will take only two to three years to deploy 100 million NFC-enabled mobile handsets.
Perhaps more important, however, from a mobile commerce standpoint is not how many NFC terminal readers are entering the market but where they are going. If you look at the Standard Industry Classification (SIC) codes representing high-volume transactions (quick-service restaurants, convenience stores and drug stores) and match them to NFC device installation, it is likely, by the end of 2008, that over 40% of the transaction volume in these categories can take place using contactless terminals.

The 40 percent milestone is critical, because we learned during the rollout of Personal Identification Number (PIN) debit card payments that after that level of penetration, adoption speeds up significantly and the technology quickly becomes the norm. So, I believe we are no more than 12 to 18 months away from the sort of market adoption of contactless terminals that will raise consumer awareness and demand to "tipping point" levels.

Plus, it is always dangerous to underestimate the effect of consumer demand. In the first two weeks after launching its new iPhone™ App Store, Apple saw over 25 million downloads take place of third-party programs that extend the capabilities of the iPhone. This shows a keen interest among mobile device users to add new features, services and capabilities to their handsets. Mobile commerce is not something consumers are going to resist or that has to be forced upon them.

Several Stages of Mobile Commerce Adoption

I believe that to fully understand the likely roll-out of mobile commerce solutions and grasp the impact this new technology and lifestyle change will have on business models, you first have to break the process down into three somewhat distinct areas:

→ **Mobile banking and accounts.** This is the delivery of basic account information to the handset. It is the minimum requirement moving forward and likely the first to see implementation.

→ **Mobile payments.** This refers to the ability to use information stored on the handset to conduct valid, secure, real-time transactions.

→ **Mobile marketing.** This refers to leveraging the knowledge of consumers and the immediacy of handset delivery for true one-to-one opt-in marketing.
Enabling and overlapping technologies and practices affect all three of these areas and some pertain only to one of the three. In many cases, technology developments and consumer practices that start in one area are necessary foundations for spreading adoption and growth in the other areas. That’s why getting your head around the important stages and breakthroughs is tough—it’s a bit like a big jigsaw puzzle in which the final picture is only clear when enough pieces are in place.

Let’s look at a couple of examples:

→ Before a marketer can take advantage of new information about consumers’ purchasing patterns and target them with an opt-in text message to their cell phones—say, based on previous mobile purchases—a system must be in place for tracking, storing and instantly accessing that purchase history data. It is unlikely that that will fall into place before basic banking account information is flowing to the handset. So, the systems that financial institutions are establishing today to deliver account balance data are the bridges being built to more complex financial transactions and marketing in the future.

→ Suppose a start-up company has a brilliant idea of how to bring micro-payments to the handset in a way that is much more merchant friendly. Probably, because of existing systems in the marketplace, basic credit and debit card transactions will arrive to the mobile marketplace first.

→ And although new mobile handsets may soon contain all the appropriate hardware necessary to make NFC transactions, it may be that interim solutions (such as chip-embedded adhesive stickers placed on the handset) need to serve in a limited capacity during the handset-replacement cycle. Companies like First Data have already launched this technology under the brand “GO-Tag™ sticker.”

The important point is that many of the solutions being put in the marketplace today are important bridges to a full-blown mobile commerce landscape. The problem is, if these bridges aren’t strong enough, open enough and with enough regard for future capacity, they will fail and set back progress. Imagine if your electronic wallet were provided by your bank – but only allowed that bank’s information to be displayed, not all the other accounts important to you. Imagine if your mobile service provider managed your wallet and only allowed certain banks’ information to be displayed – but not your bank’s information. I would hate to see that happen and it is one of the reasons for speaking out now. Some of the proposals being floated and tests being currently conducted seem ill-suited toward anything but short-term gain. This is certainly an area in which consumers are unlikely to embrace proprietary systems and practices limited to certain devices or accounts.

There Is a Lot at Stake and Plenty of New Players

The deployment of truly secure mobile commerce solutions that deliver real-time account information, secure payment options and the ability to deliver dynamic and targeted marketing requires cooperation and partnering on a scale much greater than any previous commerce technology. Today’s consumers are not going to be satisfied with limited options, conflicting systems and opportunistic financial models. And neither are the vendors and beneficiaries of mobile commerce transactions:

→ Advertising and marketing agencies want systems that fairly provide access to clients across mobile platforms.

→ Carriers want to protect and monetize customer access but realize that they cannot deliver mobile commerce services completely on their own.

→ Financial institutions and associations have strict compliance issues that must be met and also want to be sure transaction revenue remains in-house.

→ Trusted service managers that will be necessary to make an electronic wallet succeed will only deploy large, secure data-processing facilities if access to customers is open and available across systems.
Technology developers recoup investment only after achieving scale and so are unlikely to favor proprietary relationships.

Merchants see mobile commerce as an opportunity to shift the payment landscape their way and at the same time promote brand and drive loyalty.

Clearly, we must discover solutions and deploy systems to consumers that meet as many of the above goals as possible. How these new business models emerge is critical. I have often, in presentations, compared what is going on today in mobile commerce to the early days of the World Wide Web. Yes, we must experiment, try out new partnerships and deliver a variety of solutions to consumers. But we shouldn’t do anything that destroys the basic ability of people to conduct business when they want, where they want and with whom they want. And just like the early days of the Web, standing on the sidelines will be a mistake.

Understanding the Mobile Commerce Ecosystem

Let’s look a bit more in-depth at the three areas of mobile commerce I mentioned above. I think that when you begin to understand those divisions and the opportunities ahead for each, the fundamentals start to fall into place.

Banking/Accounts

Most financial institutions would prefer to limit access to account data and use it to directly leverage customer relationships. But with over 7,000 financial institutions in the United States alone, that makes any sort of cross-bank agreements difficult.

Yet for mobile commerce to emerge, consumers must be able to gain access to account information and use it in a variety of situations, not just those that benefit their own institution. So major banks and other financial service providers simply must find a way to share customer account data.

This point is critical: Consumers will not remain loyal to financial institutions, credit card issuers or other financial partners that limit access to their accounts or make it difficult to use those accounts in the field.

So, before we can move ahead with any great speed toward universal mobile commerce solutions, the banking industry must take positions, develop partnerships and find ways to allow customer access across multiple institutions without compromising customer data or security.

Mobile Payments

For the electronic wallet to happen, payment options must become even easier than they are today. And they are already pretty easy—simply choose a card, swipe it, click a few buttons on a terminal and sign your name. Credit-card associations are actively working to bring this ease to mobile commerce and several interesting tests are currently underway. But clearly a couple of things have to happen.

First, systems have to be developed that can place and process multiple accounts all in one place. It is unlikely that consumers or the banking industry will accept a single master account scenario, so mobile devices must have the ability to store, retrieve and help process multiple accounts from multiple sources all in real time.

Second, there has to be a physical mechanism for securely provisioning this information to the device and it has to be lower cost than current provisioning mechanisms. Today, the provisioner puts much security and other data onto the magnetic stripe. Tomorrow, that information must instead get into the phone itself. This will likely take place over wireless networks, but in the short term, other solutions, such as pre-programmed add-on NFC devices, may be deployed.
Critical to mobile payments is a system that is secure, can win consumer confidence and ideally works efficiently enough so that even small, local merchants can join in. For any form of payment to work, it minimally has to:

1. Be in consumers’ hands.
2. Be accepted by consumers for use.
3. Be acceptable to and adopted by merchants.

Mobile Marketing

Much of the reason to invest in mobile commerce infrastructure is tied to possible revenue opportunities for advertising and promotion. The direct delivery of opt-in marketing to consumers based on purchasing habits, intent-to-buy analysis and even Global Positioning System (GPS) data is high-value stuff. If the industry allows over-the-handset marketing to go the way of e-mail spam, the game is not even worth playing.

So, a lively debate is likely to ensue as to who controls customer access, who delivers marketing and advertising messages and who pays for that delivery. If you thought it was tough finding the right advertising and marketing model for the Internet, then hang on.

But the prospects of mobile marketing are so profound that many large companies are jumping in now, even before all the commerce elements are in place. The ability to send a customer buying incentives immediately before, during and after the purchasing cycle is the holy grail of marketing.

So, I hope it is clear that none of this can happen in a vacuum and that there is inter-dependence in the mobile commerce ecosystem between many key players. If the systems being built don’t accommodate financial institutions, merchants, advertisers, technology developers, wireless carriers, device manufacturers, credit card associations and—most importantly—consumers, they won’t work and the United States will fall behind the rest of the world in modernizing retail commerce. In this scenario, everyone loses.

Of course, I believe that there is room for everyone in the game and plenty of opportunity to spread around. Yes, some companies and institutions that dominate commerce today may take a slightly different role in the future. And surely new companies not typically associated with commerce will play a new and perhaps even prominent role in the transactions of the future.

If you look at the music business as an example, there are several lessons to be learned. Many of the large music publishers were slow to acknowledge the impact that digital technology was having on music distribution and sales. First, consumers bypassed the system entirely through file sharing and other copyright-avoidance schemes. The music industry responded with expensive legal challenges but still did not provide a reasonable alternative, trying instead to hang on to old commerce models. Then, Apple opened its iTunes™ Music Store and within a few years became the largest retail provider of music in the world, much to the dismay of music publishers. Now, any attempt to go back and present an alternate plan is likely to fail or be many times more costly.

All of us who are vested in the retail-transaction process should think of ourselves as being in the same place music publishers were ten years ago. We may love our current roles and business models and we may even find plenty of reasons to suggest that these new transaction models will never work. But if we don’t get together and choose our own paths, then I can just about guarantee someone else will do what’s necessary and throw us all an unexpected curveball.
The Immediate and Not-So-Distant Future

The BART example I gave at the beginning of this paper proves that mobile commerce is already here and that many of these concepts can certainly work as imagined. Here’s how I see things unfolding over the next few months and I’ll also take my best stab at some future scenarios.

First—and we are already seeing this thanks to always-on Internet access using smart phones and devices like the Apple iPhone—consumers will begin seeing bank account and credit card data directly on the displays of their mobile devices. Any ability those people have at home to interact with financial institutions can now be carried with them into the field.

A persistent Apple iPhone user could, in fact, walk into a retail establishment today and pay for a purchase using a credit card, debit card or even a PayPal account directly over the Internet in real time, much as they would if ordering the item online. Of course, this is impractical, but it demonstrates that the connectivity needed for true mobile commerce is in place. I see the more controlled networks of the mobile carriers being the primary vehicle for mobile commerce, but wireless Internet connectivity is a definite factor in the equation.

After consumers become accustomed to checking account balances on their mobile devices, they are going to want to access them. So the first payment options likely to surface on mobile devices will be existing credit and stored-value accounts. In fact, using a product like First Data’s GO-Tag sticker (an NFC-enabled sticker that attaches to the back of an item such as a mobile device), companies are already transitioning customers from mag-stripe stored-value cards to NFC versions. Soon, many gift cards will come with both a mag-stripe and an NFC sticker, giving consumers the option.

Mobile commerce will, I believe, ultimately revolve around the mobile handset. Standardized chip sets are being built now that will enable future handsets to interact with NFC terminal devices. But even now, handheld NFC devices are entering the market in the form of key chains, wristbands and all sorts of other formats. I like to say that NFC capabilities will go through three stages:

- Outside the phone (we’re there today)
- On the phone (thanks to add-on stickers, chip-embedded cases, etc.)
- In the phone (thanks to chips embedded in the device)
Next, we’ll see the evolution of NFC payments from stored-value to credit and debit, after the banks get on board and NFC terminals reach critical mass. Then, we’ll start to see lots of innovation and new forms of payments enter the marketplace that do not necessarily rely on existing account types. Many of the three billion mobile phone users out there are not participating in existing payment systems, but they spend billions of dollars and represent perhaps the biggest opportunity in commerce in history.

And of course, along the way, the mobile device as a marketing vehicle will only become more and more powerful. But because it is a fully opt-in marketing vehicle, the challenge rests entirely with the merchant community to figure out what sorts of offers and opportunities will garner customer acceptance.

Yes, much of this will be hard work and we are likely as an industry to make some false steps and still learn a few lessons. Even if we figure out all the technical issues and present the market with a sound, workable solution, consumer behavior is not completely predictable. But imagine for a minute that everything I’ve discussed has gone smoothly: It’s a year or two in the future and once again you are on your way to work on the BART train. Only this time . . .

Walking out the door, you do a quick check on your iPhone to find the lowest-price gas station between your house and the commuter parking lot at the BART station. When you select the Shell® icon, a coupon appears that’s good for a free car wash with fill-up and a coupon for a free size upgrade on a cup of coffee. Because you’re running late today, you’ll take advantage of the car wash offer later, so just store the coupon in your phone and drive directly to the station. On almost every other day, you stop at the Starbucks down the street, paying with the Starbucks® Card stored in your phone. But not today, because you buy coffee at Shell with the free upgrade you received just moments ago.

After swiping your phone at the turnstile, you rush to the BART train, just making it before the doors close. About halfway to San Francisco, you get a text message from Starbucks (because you indicated your desire to receive these communications when you signed up). “We missed you this morning! When you get a minute, drop in to any Starbucks and use this coupon for a free size upgrade. If you would like to use GPS to find the closest outlet, just click here.”

On the BART train these days, the advertising is all interactive. So, before getting off at the downtown station, you make a few quick swipes with your phone to see what your favorite lunch spots are offering in the way of specials. Mmmm . . . 20 percent off the classic meatloaf sandwich at Max’s!

But today, you promised your wife that you’d pick up a new laptop computer for your daughter’s graduation present. At Best Buy, you’ve got it down to three different models. Now, just tap your phone to the display in front of each brand and see what incentives might be available. Sony is offering a $200 mail-in rebate, which, if you use your Best Buy account, will be credited instantly—no need to submit paperwork. HP will give you either a free printer or an extended three-year coverage plan. And Apple will give you nothing, but because you have an iPhone, they send you an e-mail telling you how cool you are.

You choose the HP® laptop, because the extended warranty sounds appealing as your daughter heads away for college. At the register, another offer comes through, this one from American Express. Use your Gold Card and get double points. Another quick pass of the iPhone and you’re on your way. You finally return home and see your leather wallet on the counter where you left it this morning. You suddenly realize that you don’t need it anymore.
Next Steps and a Request

So, what does all this mean to you and what should you be doing, right now, to make sure opportunity does not pass you by? Well, of course that depends on your business and the role you want to play in mobile commerce. But I can suggest a few important steps and encourage you to seek out more information.

→ If you carry customer account balances, the most important thing you can do is get "in the phone" with that information, even if it's in a rudimentary fashion. You need to show customers that you are mobile savvy and are working to provide them with access to their information when and where they want it.

→ If you are a retail merchant, start making plans for accepting NFC payments. You may not be able to do it overnight or all at once, but the best way to get there is to budget now and work the terminal upgrade fees into your business plan.

→ If you are a technology developer, look for established partners. It is unlikely that the existing financial community is going to take any big chances on unknowns. So, get out there and make allies.

→ If you are in marketing or advertising, start paying attention to how consumers interact with mobile devices and start thinking about how you are going to get them to check "Yes" when asked if they want to receive offers and communications from your client.

And for everyone, start talking up mobile commerce with your current partners and seeking out new partners. In the United States, we don’t have oversight bodies to make milestone decisions for us—we’re free to go with Blu-Ray or HD-DVD, with VHS or Beta, with MasterCard, Visa, American Express, Discover or STAR.

I hope you will seek out our other papers on mobile commerce, which go into much more depth on all these issues and take a much more direct look at the many options and obstacles we all face moving forward.
And now, the favor part: I really want to hear your thoughts on mobile commerce. Obviously, at First Data, we see an important role for our company as the world moves toward the electronic wallet. But we have no illusion that we will achieve success for our partners and ourselves by acting alone. The Mobile Commerce Solutions division at First Data, which I head, was set up specifically so that we could focus on this important area. Right now, that means reaching out, sharing our data and insights, learning from others and thinking a lot.

So please, contact me or any member of my team. We not only want to help, we want to listen. I can be reached directly at barry.mccarthy@firstdata.com.

For more information, look for these forthcoming white papers at http://www.firstdata.com/about/whitepapers.htm:

→ Mobile Payment—The Linchpin of the Mobile Commerce Economy
→ Going Direct with Mobile Marketing
→ Mobile Account Management—The Mobile Commerce Enabler
→ The Role of Trusted Service Managers in Mobile Commerce
About The Author

Barry McCarthy was appointed to lead the newly formed Mobile Commerce Solutions business unit of First Data in January 2008. He has responsibility for commercializing all First Data assets globally for use in mobile commerce. In this role, McCarthy and his team work closely with a variety of industry partners, from the largest wireless carriers to young start-ups, financial institutions, technology providers and terminal manufacturers.

Previously, McCarthy led Global Product and Business Development for First Data and before that, product development for the Commercial Services business unit. Prior to joining First Data, McCarthy was Vice President and General Manager of VeriSign’s Internet Payments & Risk Management business unit, a NASDAQ 100 technology company.

Before VeriSign, McCarthy co-founded and later sold MagnaCash, a Silicon Valley micro-payments company that is currently owned by Digital River (NASDAQ: DRV). Previously serving Wells Fargo (NYSE: WFC) as Vice President and General Manager of the ATM business, McCarthy had P&L responsibility for $110 billion in annual transaction volume and 14 million active ATM cards. McCarthy started his career at Procter and Gamble (NYSE: PG), where he spent 12 years in roles of increasing responsibility, first in sales and sales management and later in customer marketing and brand management. He earned a Masters in Business Administration from the Kellogg School of Management at Northwestern University and completed his undergraduate studies at the University of Illinois, Urbana.

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