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# Walmart, Inc. (WMT)

KeyBanc Technology Leadership Forum

## CORPORATE PARTICIPANTS

### Suresh Kumar

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

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## OTHER PARTICIPANTS

### Edward Yruma

*Analyst, KeyBanc Capital Markets, Inc.*

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## MANAGEMENT DISCUSSION SECTION

### Edward Yruma

*Analyst, KeyBanc Capital Markets, Inc.*

Good afternoon, everybody. Thanks for joining us. My name is Edward Yruma. I'm KeyBanc's Internet retailing analyst. We're really excited today to have this fireside chat with Suresh Kumar, the Chief Technology Officer and Chief Development Officer for Walmart.

I know many of you are familiar with Walmart, but I think this is a fascinating business that really has been about innovation since its inception. They've innovated with concepts like the superstore, with innovations internationally, and now really, in our opinion, becoming a real innovator in use of technology and being an omni-channel leader.

Suresh has a fascinating background, and I think, as you guys are going to hear with this fireside chat, can bring a lot of energy to the business. There is the standard disclaimer that's provided. I think that is also on the IR website. And just as a note, we will be taking some questions via Q&A using the Zoom chat feature. We would ask, though, that this is really a technology-focused discussion today and that we not touch on the quarter right now.

So, with that, Suresh, thank you very much for joining us.

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### Suresh Kumar

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

Ed, thank you so much for having me. Really excited to be with you virtually.

## QUESTION AND ANSWER SECTION

**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

Yes, it's great. Would love to hear a little bit about your background. I know we saw you at Analyst Day and I've heard your background. But maybe for the broader audience, I think your background as a technologist at heart is super interesting and an important asset to Walmart. Would love to hear a little bit about it.

**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

Sure. I've been with Walmart now for about 2.5 years, really loving it out here. I've been in technology all of my career. I actually did my PhD in aerospace engineering and then been on the – on – in computer science ever since then, started off first with IBM, then spent a bunch of time at Amazon. Then, I managed the cloud infrastructure for Microsoft for a few years, for about five years, and then I was at Google. And when the Walmart opportunity came by, it was so compelling and so interesting that I decided to come be at Walmart and I've been here ever since. I manage all of the technology for Walmart across all of its segments.

**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

I guess just to start, and certainly, I think it is a good segue from your background. You guys have made some significant shifts, you moved to cloud. Can you talk about your overall data lake and cloud strategy? And then kind of broadly speaking, how should we think about your data center footprint?

**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

Absolutely. So, look, the cloud is central to our digital strategy. It's the foundation on which we are building our customer experiences, it's foundational to our data and analytics, and it's the base on which we are building all of our ML and AI models, which are really impacting every aspect of our business.

So if you actually take a step back, there is a lot of changes that are happening in retail, many of them are disruptive. In fact, I like to think of this as sort of the third innings or the third disruptive cycle in retail, and it's technology set. And we really want technology, we want [indiscernible] (00:03:43) technology so that Walmart is a leader in this retail disruption. That's not only already happening, it's actually accelerating because of COVID. And cloud really becomes a central part of that. It's the foundation like I said.

We have actually built a very unique hybrid cloud. We have got our own private cloud and we combine that with sort of the best of public cloud, and we have also got a very extensive edge network, and we bring it all together in this layer that we call WCNP, the Walmart Cloud-Native Platform that allows us to be able to take workload and to be able to seamlessly move them around this mix of public and private cloud. And so we believe that this is something that gives Walmart a very unique edge because its purpose-built for what we are trying to do.

We talked a little bit about data. We have actually moved over 150 petabytes of data into the cloud, and this is allowing us not just to go a lot faster and to get deeper insight, but it's also allowing us to unleash the potential of AI and ML on all aspects of the business. So it's very, very exciting. Cloud is really the underpinnings of all the digital transformation that we are pushing through.

**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*



[indiscernible] (00:05:18) that a little bit more and kind of thoughts around public versus private cloud? And then maybe just stepping back, I think you guys have publicly disclosed that Sam's and e-comm have moved to cloud. I guess what's still left for international and US superstores?

**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*



Right. So the way to think about public and private cloud is that ultimately, we want to create an environment where we take our workloads, whether they're data-intensive workloads, whether they're ML workloads, whether they're customer-facing workloads, and we want to put them in those environments that are best suited for that particular type of a system or that particular type of a workload.

So we use the best of the public cloud for things like elastic capacity to be able to burst up and down. We are actually getting into the holiday season. So we need a lot more capacity. We use the public cloud to be able to do that. We also use the public cloud for a lot of the best-of-breed SaaS capabilities like specialized hardware for ML and AI as an example. And then we use our own private cloud to be able to run a lot of the steady-state workloads, the static workloads, and we use edge to be able to push all of the latency-sensitive workloads. So that's how we think about sort of the difference between edge, private and public.

And in terms of migration, it's an ongoing process. You're right. All of our e-commerce today runs on the cloud. All of Sam's runs on the cloud. The main focus really is to start building out a lot of new capabilities on the stack. And that's why we're really focused on making sure that our entire data estate lives on the cloud, because we can then use that to run advanced analytics, we can use that to run ML and AI. That whole thing is going to be done by the end of the year. And then beyond that, we are going to be looking at opportunistically what are the things that really need to [indiscernible] (00:07:43) because we don't necessarily want to move everything just for the sake of moving it.

**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*



To that end, I believe at Analyst Day, you were kind of highlighting some of the early wins in machine learning. I think you talked about markdown optimization. I think you highlighted facilities maintenance.

**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*



Right.

**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*



I guess just stepping back from that, though, how can you create a more personalized consumer experience with machine learning? And then over time, do you think that, that more personal experience will drive better sales and profitability for the business?

**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*



Yeah. Ed, there's absolutely no doubt about it. I think ML and AI are going to profoundly change the way in which we not only serve our customers and the customer experiences, but it's also profoundly changing the way in which we actually do business on the back end. So for those of you who were not there, the two examples that I talked about around using ML for markdowns, that one particular effort alone saved us over \$30 million. And that is really an example of ML and AI helping us do our business better. Same thing with facilities maintenance also, and that particular thing actually saved us over \$40 million a year.

But when it comes to personalization, I think one of the power of ML and AI is that it can allow you to create personalized experiences at scale, something that, in fact, we had not been able to do even just a few years ago, right, the kind of things that we are now able to do using an ML and AI, using the models, this would have been unbelievable even just 5 or 10 years ago.

But I think, really speaking, what makes it possible is not just the models, right? So we can – I'll give some examples about sort of personalized experiences that we are able to create. We do something like predictive baskets. So grocery customers, typically they go – they buy 30-plus items, right? So sometimes when I go to a shop, I forget a few things and then my wife says, hey, you forgot avocado. I actually don't eat avocado, but my daughter does. But this is where ML and AI actually come in, because we can look at your history, we can look at the preferences, we can know the fact that you typically shop for avocados and then predictably, we create like this quick add-on experience.

It's all possible not just because of models, but it's possible because of the power of the data. And Walmart is uniquely positioned more than anybody else because we have sort of an end-to-end view of the data, right? So we know you are the customer, your shopping habits, not just online, but also inside the store, and we are in a unique position to be able to pull all of that to create a personalized experience that is tailored for you that actually cuts across all of these different channels. That is where really the power actually comes in.

But it's the models also, for example, we just announced that we bought a company that is into virtual fitting. So just think about it. You can take a piece of clothing or an apparel, and using ML, we can virtually drape it on different types of models. And in fact, you can put your own photo and ML will actually drape the cloth on you. It uses similar technology to terrain mapping. But it becomes powerful because you combine that with Walmart data. And I think that is the exciting part of it. It's going to have a very profound effect. Now, it's already having that, and it's going to continue to have that going forward.

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### Edward Yruma

*Analyst, KeyBanc Capital Markets, Inc.*



Doug has always impressed us with his embrace of technology and being kind of forward-thinking. But as a technologist, is it hard to get buy-in from your other operating partners, given that so many of them are merchants that have worked their way up the ranks, like how do you help them balance kind of the art of retailing versus the science and particularly as you start thinking about things like AI?

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### Suresh Kumar

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*



Yeah. I think, Ed, the power of AI is to actually help you, whether you're a merchandiser or whether you're operator, make your job that much more effective and that much more efficient. So I'll give you an example. We are starting to build out the ability to be able to do assortment planning in an omni way across – just think about the complexity of this problem, right? So hundreds of thousands, in fact millions of SKUs that you now have to figure out which product needs to be in which location, how many of them for phasing, and how do you manage that in a much more dynamic way?

Of course, there is the art of retailing. But what ML and AI allows you to do is to bring all of that information together and to be able to synthesize this and to be able to gain insights into that, that you can act on. And I think that makes our merchandisers that much more effective and that much better, I think, at what they're doing. And they love it. We are starting to roll out tools and experiences. We rolled out something called Me@Walmart for our associates. We are doing something very similar for other corporate associates as well. And as people start seeing the power that these systems can bring them, they just become better at the jobs that they're doing.

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**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

Zooming out a little bit and thinking about it from a senior management perspective, how do you think technology and data tools have enabled you and the other senior managers to better manage the business? And I guess we think a lot about agility. Do you think that this is helping Walmart become more agile?

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**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

Absolutely. I think we have been able to unleash the power of data, not just to better serve our customers, we are able to make a lot more decisions faster. Ultimately, we have a lot more – we operate a lot more efficiently. I told you about the Me@Walmart, this is an all-in-one mobile app, that we have rolled out for our store associates. It combines email, it combines voice, it includes camera and vision. And it basically simplifies tasks for our associates, so that they can spend more time helping our customers.

So this is out in the field and this is one example of how we can – we were using technology to go faster. But it's not just over there. It's in areas that normally you would not think of. We are now closing our financial goals in three days, almost half the time that it used to take us before. And you can imagine the amount of complexity that we have gotten across Walmart. So being able to pull all of that together and to be able to close our books [indiscernible] (00:15:31) that we get better insights into our business and we're able to make decisions a whole lot faster. So efficiency, productivity leading to better insights, I think ultimately is making us be a lot more nimble and we can react and we can serve our customers a whole lot better than what we were able to do before.

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**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

Let's dive down a little bit into the tech stack. I would love your perspective on e-commerce software strategy, in particular as it relates to kind of what you want to do in-house versus your partnerships and examples like using [ph] ATT (00:16:08) or VTEX in LatAm. And then kind of broadly speaking, your push to integrate other e-commerce providers, some proprietors in the Walmart marketplace, Shopify, BigCommerce, Adobe Commerce?

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**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

Right. Exactly. So, look, we have built a world-class tech team. We want to make sure that we build all the strategic parts of the technology all by ourselves, because we believe that that competing – that's a competitive differentiator for us. So as a part of leading the retail disruption, we have been building out our technology organization, all of our US e-commerce business is on our own platform, we talked about the whole product platform.

So this whole notion of our build versus partner, it really comes down to a few things, right? So given our scale we want to build and we want to focus our tech on areas that are core to our business. Their ownership actually gives

us the agility to be able to embed the software to our business needs. And especially where there are really no good commercial [indiscernible] (00:17:18).

So the converse is that then rolling out our own software is prohibitively expensive in some areas of our markets, because we've got some very, very specific market requirements. Then we leverage commercial software. And assuming of course that the software can actually scale to what we need. So – but having said all of that, where we are taking the technology stack, is that we are building a software in such a way that we build these as reusable services that can be leveraged in multiple markets, so Smart Shopper is one example. This was built as a software as a service, it was actually deployed in Mexico first, and then it was used in the US.

We have now rolled out a brand new customer-facing app that combines sort of the traditional e-commerce shopping with the online grocery shopping and pickup, all in a very seamless way. And that platform, that foundation is now going to be reused and leveraged and customized for Mexico and for Canada.

So the technology stack that we are starting to build out is more around modular services. And by the way, you've talked about external partners, that is what allows us to actually take our technology and now offer it for others as well. The Adobe partnership that we announced, very, very exciting, it's something that I'm particularly very excited about. It's not only the brand new revenue stream for us, because we are now taking our technology and we are now offering it for others, but we have done it in such a way that through the Adobe partnership, not only other retailers can make use of the technology that we have built for order online, pick up inside the store and those types of omni solutions, but that also allows other retailers to quickly come on Walmart marketplace and to participate in the Walmart product marketplace. So it's not just about building our technology, and it's not just about taking the technology, modularizing it, [ph] servicifying it (00:19:47) and making it available for others. But it's also about kind of creating this overall ecosystem. So everything kind of builds on itself and everybody ends up benefiting from that.

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**Edward Yruma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

Clearly COVID has changed all of our behaviors, so many of us are working, shopping from home. I guess what are some of your priorities in transforming your consumer experience management systems? Are you trying to engage with consumers more through social media? And then how do you gauge kind of consumer sentiment and usage of digital services?

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**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

Absolutely COVID has changed a lot of things. As we – but our focus really in terms of listening to our customers that has not changed. And clearly, what has happened as we went through, as we have been going through COVID actually is that the things that our customers particularly care about whether it is around great merchandise, value, convenience, those things don't change, right? Whether it's COVID or no COVID, customers really want great merchandise, great value and they want convenience.

The thing that has become more important as we have gone through COVID is that customers also care about safety. And they want to make sure that the place where they shop and the base in which they shop, safety becomes an important part of it. So our focus and through technology has really been in terms of listening to our customers also to provide them mechanisms where the safety aspect of convenience also gets highlighted, right. So whether it is using the payment capabilities for our – for the fuel farms we rolled out more Scan & Go in the Sam's Clubs. All of these things we have put our capability to be able to do – pick up for pharmacy. These are all

stuff that we have heard from our customers in terms of things that are important for them. And so we keep constantly listening to our customer and we use that to close the loop in terms of the features that we roll off.

And we do that every place, right so it's not just listening to customers, then they shop online. It's not just about listening to customers when they shop inside our stores or our clubs. We look at what's going on outside of Walmart properties as well. We look at trends inside social media. And again, it's a part of data. So we collect all of that. We synthesize it. You got models that run over it. And that informs us in terms of what the next thing to do is.

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**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

No other questions we received from the audience and you could talk a little about your data commercialization initiatives and how you can monetize the data. And maybe just zooming out even a little bit more, advertising, that was a big deal for the business [indiscernible] (00:23:08) couple about that a lot. And how does the relationship with Trade Desk work?

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**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

Absolutely. So advertising is a key component of our flywheel. Our strategy is actually to offer performance driven advertising that is very, very unique to our advertisers. And it's unique because we are the only place where we can combine insight from – in terms of what our customers' preferences are and customer behavior is, not just online, but also offline inside of our stores. Nobody else can do that, right? And what this allows us to be able to do is to be able to allow our advertisers and our suppliers to be able to connect with our customers and to be able to draw insights in terms of their shopping behavior, what products work, what products won't work, in ways that nobody else can do.

And so that's the reason why advertising becomes a very important part of how we allow our advertisers to be able to connect to our customers. And you talked a little bit about DSP and about Trade Desk. Trade Desk is where we are launching our demand-side platform, our DSP with Trade Desk. And this basically allows advertisers to be able to reach customers on properties outside of Walmart.com as well.

And so think of it – let's say that you are Pampers and you want to be able to reach your customers. Your typical customer is a young mom with a small child. She might be going to some other location like carry mommy (sic) [Carry Me Mommy] (00:25:14). And so you want to be able to reach out to your customers through that, and so we enable that through things like the Trade Desk partnership.

Data obviously – I keep talking about it, it becomes a very, very key part of being able to do all of this. And our data insights are very key for our advertiser and our partners, our suppliers to be able to figure out the shopping with the needs of our customers and to be able to then also figure out how to better track their products to be able to best serve them. And so that's how it's all coming together and it's really this part of the omni flywheel, if you will.

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**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

How hard is it to attract top technology talent to Walmart? And how do you become kind of high in the stack of employers choice?

**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

We are already very high in being a top talent attractor. We are able to attract really great talent from pretty much all parts of the industries, different locations. And I think the main reason why we have been very, very successful at being able to attract really great tech talent is that people get excited about the commitment of – to the purpose of save money and live better, but it's also about the skill. Being a technologist at Walmart means that you get to work on problems that are very hard, that are – I keep talking about data, ML, all of these things, these are not just hard problems, but they are problems where working on those can have huge impact and you can have huge impact at scale. And you combine that with purpose, which is really about save money, live better. That combination is magic and I was attracted to it. That's the reason why I came.

And that story is very, very compelling. We can attract and we continue to attract talent from all different parts, whether they're data scientist, whether they're full stack developers, whether they're front-end developer, you name it. Walmart is a fantastic place to come and work and we are seeing that all the time.

**Edward Yruma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

In one of your comments, you mentioned Walmart Pay; I use it. You guys were kind of early in implementing digital wallet in-store. I guess just assessing it though, kind of what's worked and what hasn't? How can you increase usage? How does a firm fit in and would you ever use Apple Pay?

**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

So look, I think when it comes to whether it is financial instruments, whether it is payment instrument, the primary thing that we focus on is what do the customers want? And one thing is very clear. Our customers want a lot of choice, right? And what some of them want to be able to pay immediately. Some of them want to be able to pay in installments, some of them want to make use of a different payment instrument. So that is the reason why we offered Walmart Pay, we offer a firm. All of these things are ways in which we serve our customer in terms of what they want. So overall, we continue to keep looking at opportunities based upon what our customers want but it also needs to make sense in terms of the overall ecosystem that we are trying to build; and largely it is a business strategy that we continue to follow which is really starting with the customer focus on the customer and make sure that it also works in terms of the largest strategy. So you will hear us, as we continue to evolve, we'll continue to make the changes to it and as we make changes you will hear about it.

**Edward Yruma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

You also touched a little bit about in-store checkout technology. I know you guys were also early in using mobile checkout. I remember doing this at the Sam's prototype a number of years ago. I know in some instances if a superstore as Walmart Plus you have mobile checkout; I guess what prevents you from using it more broadly? And then I guess do you think that cashierless stores are the future?

**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

So again, I think the main thing is really about listening to our customers and reducing friction. And as far as check out is concerned, we are trying to make checkout as easy as possible where the customers want it. So taking customer-first lens in technology whether it is in Sam's or in Walmart, one thing became very, very clear customers don't like to stand in long lines, right. That's that – at the checkout line. So that's the reason why we

built and deployed Scan & Go. And it solves a very, very big customer pain point which are available in Sam's Club and is also now available for Walmart Plus customers. And you can use this to checkout as you're shopping. And then when you come to the checkout line, you don't have to stand in these long lines. It's a great benefit to our customers. They love it. Not everybody wants to always use all of the different technologies. And so when you think about cashierless stores versus hiring cashiers, different customers end up having different preferences. So to the extent that mobile options, checkout options resonate, those things we are making it available. There are other options that still involve cashiers and we are trying – we will have that. We are making our associates more effective so that they can spend more time helping out our customers. We will continue to have all of these people.

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**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

Can you talk a little bit about blockchain? I think you guys even touched on that at a shareholders meeting over the Analyst Day, but how has the use of blockchain helped to supply chain? And then where else in the enterprise can you apply blockchain technology?

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**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

So blockchain is another technology that I'm very, very excited about. We use it primarily in terms of food transparency. It's actually for leafy greens during the production phase. And basically what it allows us to do is to be able to transparently track the entire – from production onwards. And so if there are industry recalls, you can very, very quickly identify if Walmart received products from the impacted stores. And so during out-back investigations we call, we can narrow the scale, we can narrow the scope on both customer and we can really quickly take action. So, that's a very common area and we'll continue to double down on that, but we are also starting to look at blockchain in multiple different areas as well; anywhere where we can look at blockchain as a mechanism to be able to automate the transactions between supplier; carrier, logistics; those are all areas that we'll continue to use blockchain [indiscernible] (00:33:54) another one, right, so that we can calculate the carbon footprint. Sustainability is a big thing. Factory audits; sourcing – around ethical sourcing, circular supply chain; lots and lots of different areas where traceability, transparency and ability for us to be able to chain together multiple different events around a particular product or a particular item becomes very, very important. Blockchain is going to continue to evolve over there.

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**Edward Yuma**

*Analyst, KeyBanc Capital Markets, Inc.*

Q

Another question we got from the audience is about how has digital transformation changed your technology choices in data and analytics? Are more of your databases and analytics moving to the cloud or shifting to newer types of data architectures?

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**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

A

Absolutely. I told you, right? Data is one of the key things that we are actively moving to the cloud. We've all already moved around 150 petabytes of data. We want to make use of the capabilities that cloud allows us to be able to leverage. So, in particular by moving data to the cloud, we can run our normal analytics a whole lot faster; 23% faster and gives a better experience as well because it's scalable, it's elastic, it costs less because we don't need to have these massive data footprints and we don't need it, but the most important thing in my mind is really the fact that we can run advanced analytics and we can run ML workloads on it a whole lot better than we can do

it on a monolithic on-prem database also. So that's why we are kind of all in, in the sense that all the things where we need to run advanced analytics and ML workloads, we are moving all of that to the cloud.

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**Edward Yruma**

*Analyst, KeyBanc Capital Markets, Inc.*



I know this is kind of a critical time in your business heading into holiday and the retail analyst community were all focused on markdowns and near-term conditions, but I guess just I'd love to get your longer term position. Putting on your technologist hat, when you think about what will be the most disruptive technology over the next 5 or 10 years, what do you think it'll be? Will it be voice? Is it AR? And then probably just as a final question for me; how do you help ensure that Walmart can have the foundational work done so that you're ready to meet some of these new challenges?

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**Suresh Kumar**

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*



Yeah. So I definitely think that any technology that ultimately reduces friction for our customers, makes it more convenient for them, engenders more trust, makes it safer, these are the technologies that are going to continue to have an outsized impact as far as retail is concerned. That's on the customer experience side. And any technology that helps us be more efficient, be more nimble will allow us to generate insights faster and to be able to act on them. Those are the technologies that are going to continue to have a big impact when it comes to how we run our business. So if you think about it in these two axes, on the first one – in fact, on both of these, I think ability to handle large amounts of data and to be able to reason over that data and that's where ML and AI comes in, I think that is going to continue to happen, right. So there is no dearth of the kinds of use cases that we can have with advanced ML and AI models.

When it comes to reducing customer friction making shopping easier, better, even more enjoyable, certainly voice is very natural extension, right? So we started off with desktop and now we have got really, really powerful phones, but even that, I think over a period of time, the most natural way in which you are going to interact with the system that's out there including for shopping is going to be through voice and voice is going to continue to become a very important part of it. We are already seeing that with our Sam's. We rolled that out for our associates and our associates just love that feature where they can – whatever information they want, they can just ask. So they don't need to go to the back room and type something and try to find an answer for it.

On the shop floor, they say hey, how many items are there in the back room? And it'll just tell you, and you know what to do about it. So anything that reduces friction is good. And while it reduces friction therefore, I think that's going to continue to have a big impact. AR/VR is very interesting. I think AR, we are already starting to see the impact of with our associates. We deployed something where it helps our associates, it guides our associates in terms of how to restock items on the shelf, and it guides you to which shelf and which location in the shelf. So it's again about reducing friction and creating efficiency. With our customer, I think the example that I gave you in terms of what you're building, that's another example where you don't have to actually go buy an item before you figure out how exactly it's going to work. Think about AR for furniture, right? So you can take the furniture and you can place it in your living room. Let's say you are trying to buy your tent for your next vacation. You want to see how good it is. You don't want to actually buy it and try to set it up and then find out that it's not working for you. AR/VR becomes very important for that. So I think these types of technologies are going to continue to evolve. But I look at it primarily from is it reducing customer friction, is it making it easier for them to shop, and on the backend is it allowing us to drive insights better and faster and be able to reason over data more effectively.

## Edward Yuma

*Analyst, KeyBanc Capital Markets, Inc.*

Well, with that we and others, I'm sure, on the call hope that your app and your analytics capabilities and all these great things you're doing in technology stack allow us to get all the toys on our kids Christmas list this Christmas without hassle, without friction as you guys always do. So Suresh, thank you very much for it and thank you for the questions. If we didn't answer your question, please feel free to email the Walmart IR team and thank you very much for your time this afternoon.

## Suresh Kumar

*Executive Vice President, Global Chief Technology Officer & Chief Development Officer, Walmart, Inc.*

Yes. Thank you so much for having me. It's great talking to you and to be on the call with you. Thank you.

## Edward Yuma

*Analyst, KeyBanc Capital Markets, Inc.*

Thank you.

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