Toshiba All-In-One POS Excels

Comparing Toshiba all-in-one POS platform against its competitors

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Executive Summary

Edison Group conducted a series of tests comparing Point-of-Sale (POS) all-in-one platforms, namely Toshiba TCx™ 800, NCR XR7, HP Engage One (formerly ElitePOS), and HP RP9, focusing on usability, serviceability, flexibility and architecture as they are the main considerations when purchasing a POS all-in-one platform for retail.

Retail environments are harsh. POS platforms must contend with several environmental factors including heat, liquids, cleaning chemical, dust/lint, vibration and electrostatic shocks. POS platforms must maximize cashier viewing regardless of stature and provide customer viewing options as well.

> *Test results clearly indicate that Toshiba has the premium integrated POS platform, earning high ratings in almost every evaluation criterion. Starting with several retail hardening features, Toshiba's POS all-in-one platform includes advanced air cooling, flexible screen tilting, formalized cable management, ease of service and future-proof architecture.*

POS platforms need to support commonly-used add-ons like biometric readers, printers, etc. now and in the future by providing a variety of connection options.

Flexibility is also reflected in screen sizes, mounting options, viewability and OS options that are the foundation of workloads and applications.

To maximize service effort and time, preserve and extend the life of the platform POS components, including cables, platform components must be easy to access without the need for special tools.

POS platform architecture reflects the commitment, understanding and thought put into the POS platform by the manufacturer. Eco-friendly materials, appropriately sized CPUs and power are indicators that the manufacturer has a holistic view of the retail market.

While all the platforms have a similar footprint, and can support most retail functions and features, there is significant variation in where the platforms can be used, under what conditions, mean-time-to-repair and operational performance.

Test results clearly indicate that Toshiba has the premium integrated POS platform, earning high ratings in almost every evaluation criterion. Starting with several retail hardening features, Toshiba's all-in-one POS platform includes advanced air cooling, flexible screen tilting, formalized cable management, ease of service and future-proof architecture.

What is Important When Considering a Purchase

Usability, Flexibility, Serviceability, and Architecture are the main considerations when considering a POS platform purchase and are used to form the following evaluation matrix:

Usability	Flexibility
Architecture	Serviceability

Usability

This category focuses on the ability to consistently use the POS platform over extended periods of time regardless of who is using it and where the POS platform is installed.

Heat Management

Maintain reliable, highly available POS operation through extended use of the POS platform. Low temperatures extend the life of a POS platform.

Spill Resistance

Spills occur as a natural part of food service and other retail uses. The ability of the POS platform to withstand liquids without any significant impact is important.

Dust/Lint

Retail environments, particularly clothing establishments, are subject to excessive and damaging dust and lint. It is important that the design of air ducts, heat fins and fan placement not only cool sufficiently, but do not allow excessive dust/lint buildup that leads to overheating.

Display Tilt

Display tilt can be an enabling or limiting factor. Ability to significantly adjust display angle provides a platform that can be used on counters of various dimensions, enables optimum use regardless of employee stature, allows the cashier to reduce/eliminate glare and enhances customer viewing.

Vibration

POS platforms are subject to constant vibration, e.g. on trains. POS platforms that can withstand high levels of vibration over long periods of time are more versatile.

Touch Screen

All POS platforms rely on touch screens to interface with POS applications. It is a critical component and the inability to translate a touch to the correct input can significantly affect retailer ROI.

Flexibility

This category focuses on choices. The choice of connection options, add-ons, display, mounting options and operating system.

Connectivity

Inclusion of various connectivity options enables a POS platform to support required I/O, now and in the future; attach devices you need, when and where you need them. Choose an interface now, with the ability to upgrade later as technology changes.

Screen Sizes

Screen size is an important characteristic as it affects where the POS can be placed, the ease to interface with the application and what applications can run effectively on the platform. For example, not having a standard size choice is a limitation - not everyone wants a wide screen. In some use cases, small screens make it difficult to port existing applications.

Add-Ons

Manufacturers' ability to extend functions/features through addition of available I/O options offered by them or other third parties is important. This allows the addition of retail specific needs like 2x20 customer display, 2nd display, MSR, biometric, iButton, printer, etc. consistent with the aesthetic of the system.

Mounting Flexibility

Mounting flexibility affects where and how a POS platform can be used - POS, Kiosk, or in unique areas of your store. VESA, a standards-based mounting configuration, enables the POS platform to be used more flexibly.

OS Support

Operating Systems (OS) form the foundation for the POS application stack. Windows is a standard POS choice. Linux offers a smaller footprint and secure environment. There are other versions of existing OS that are specifically designed to support retail. New OS choices focus on industry-specific, retail, requirements.

Serviceability

Frequently overlooked, but a critical category is serviceability. The easier it is to maintain or fix a system the more time the POS platform will be available for use. Special tool requirements and hard to get to access points, limit a retailer's ability to self-diagnose and fix as well as increasing the mean-time-to-repair.

General Serviceability

Fast, easy service options, i.e., no need for special tools improve self-help and reduce downtime. Some POS platforms offer access without tools, i.e., thumb screws. Other systems require the removal of numerous screws which increase the mean-time-to-repair.

Cable Management

Formalized cable management is directly responsible for extending POS platform life. Cable strain and breakage can be eliminated by neatly and reliably routing cables out of the way. Avoiding service to replace damaged cables/devices will ease installation and improve uptime. Cable management also contributes to neatness or overall look of the POS system in the store.

Architecture

The materials, design and construction of the POS platform directly affects all the other categories, usability, flexibility and serviceability. There are other considerations like impact on environment at end-of-life, and cost.

Basic Construction

A review of POS platform basic construction provides insights into the architectural design and construction. For example, over-use of non-recyclable materials suggests that the intent was not to deliver an eco-friendly platform. Improper placement of certain types of materials and

components (like double-sided tape and spray paint[1]) suggest last minute workarounds that were not considered during initial design and construction.

Technology Components

It is expected that appropriate technology components (i.e., CPUs, DIMMs, Storage, RAM, etc.) are used in the construction of the system. For example, an overpowered CPU adds heat and requires more power and supplemental ventilation.

Power

The amount of electricity required is reflective of technology architecture and component choices. It also has a significant impact on operating cost.

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[1] Mobile phone manufacturing techniques - used in devices designed for two-year usable life

Retail Hardened POS Costs Less

POS platforms designed with enhanced retail-hardening features are more reliable and have extended lifespans. However, retail-hardened systems may also command a higher initial purchase price.

> *Investments in retail-hardened POS platforms have a greater ROI over-time than commodity POS platforms.*

The 16 to 24-hour workdays of most retail establishments, along with harsh environments that may include dust, lint, poor ventilation, jostling and spills can shorten the life of a budget, less rugged POS system. POS that is designed specifically for retail including rigorous retail-hardening testing, ventilation designed to manage heat more effectively, cable management that increases cable life, and a design to withstand moisture, all provide added protection to the POS system.

The total cost of acquisition (TCA) for retail-hardened POS is a better investment than a Budget POS.

To get a better perspective of the TCA, consider an example of 5,000 hardened POS platforms versus 5,000 budget POS platforms. In this example, even at a price premium, a hardened POS fleet will cost less in the long run assuming an 8-year life span versus a 6-year life span, over a period of 8 years, due to the need to replace the budget POS platforms that are not as reliable and have a shorter lifespan:

Longer Life POS Savings Illustration	Hardened POS	Budget POS
Number of POS Platform	5,000	5,000
Initial Purchase Price per POS	$1,600	$1,400
Time-Period (Years)	8	8
POS Lifespan (Years)	8	6
Total POS Cost	$8,000,000	$9,333,333[2]
Savings from Hardened POS	**$1,333,333**	

Table 1 – Savings from Hardened POS

Investments in retail-hardened POS platforms have a greater ROI over-time than commodity POS platforms.

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[2] Total POS Cost is based on realized purchased cost over the life of the platform. The annual cost of Budget POS is $1,400/6 = $233.33/year * 8 years = $1,866.64. For 5,000 platforms it comes to $9,333,333 over an 8-year period.

POS Platforms to be Reviewed

The selection of POS platforms was based on several criteria including, but not limited to:

- Market Share – the company and/or system was considered a leader in the retail marketplace;

- Functions/Features – each system supported the functions required in the retail environment;

- Footprint – each system had similar physical footprints.

Following are the specifications of the tested systems:

Company	Toshiba	NCR	HP	HP
Model	TCx™ 800	XR7	Engage One	RP9
CPU	Intel Celeron 3965U (15W)	Intel Celeron G1820TE (35W)	Intel Celeron 3965U (15W)	Intel i5-6500 (65W)
RAM	8GB	4GB	8GB	8GB
Screen Size Display Ratio Comments	15.6 16:9 10-point touch	15.0 4:3 10-point touch	14.0 16:9 10-point touch	15.6 16:9 10-point touch
Tech Components	CPU - 7th Gen U class (mobile); Memory - Two memory cards; Storage - Two SSDs	CPU - 4th Gen Desktop S Class; Memory - Two memory slots; Storage - 500GB HDD 2.5" or 80 or 120GB SSD only one spot for either.	CPU - 7th Gen U class (mobile) Intel® Core™ Celeron® 3965U (2.2GHz, 2M Cache, 2 Cores); Memory - Two memory slots; Storage - One SSD.	CPU - 6th Gen Celeron (Desktop CPU) Intel S class; Memory - Two memory slots; Storage - 2 SSD; optional 2.5" hard drive - consumer grade;
Snapshots				

Table 2 – POS platform Configurations

Comparison Methodology

For a comparison of the selected POS platforms to be valid, these test elements need to be validated:

- Comparable Test Systems – the POS platforms selected need to provide the functionality needed to support retail

- Comparison Criterion – relevant and meaningful to retail.

- Test Lab – the test lab conditions should allow a complete and consistent test environment.

- Qualified Technicians – the lab technicians need to be highly qualified to perform the tests and to understand the business impact of their findings.

- Repeatable Test Procedures/Results – the tests and/or breakdown need to be repeatable and produce consistent results.

Detailed POS Platform Review

The following is an exception-based review of the criterion chosen to evaluate the four POS platforms. Tests and/or information provided by independent 3rd parties and the manufacturer were used to evaluate each of the criterion listed below (on a scale of 1 to 10, with 10 being best). In addition, each criterion is weighted based on their relative importance (1 – 5 where 5 is most important and 1 is least important).

Usability

Spill Resistance

Toshiba TCx™ 800 and NCR XR7 scored high while the HP systems did not because of airflow design which negatively affects spill resistance.
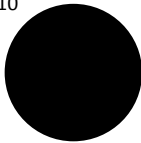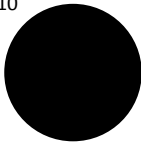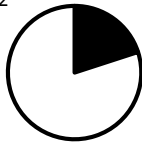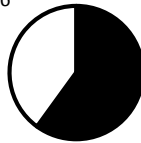
Weight / Evaluation Criteria	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 5 Fully Resistant = 10; Somewhat Resistant = 1 – 9; Not Resistant = 0;	10	10	2	6
	Platform was subjected to soda spills and simulated rain.	Per Retail Control systems passed the water spray test where water was sprayed from all sides of a functioning unit to no effect[3].	There are openings on both sides of screen to enable airflow for cooling; Liquid travels from top to the sides, "rain-gutter" effect, liquid is pulled into the system as air is forced into system to cool it.	Moderately spill resistant; As per HP documentation, "The RP9 is resistant from sprays of water at angles up to 60 degrees."[4]

Table 3 – Spill Results

Figure 1 - HP Engage One
Note, Air Vents on Sides of Screen

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3 Retail Control System, Test of NCR XR7, https://www.retailcontrolsystems.com/ncr-xr7-water-test/

4 HP Retail Hardened Whitepaper, "What makes RP9 Rugged for Retail?", https://copago.de/wp-content/uploads/2017/02/HP-RP9-G1Retail-System-is-Designed-for-retail.pdf

Dust/Lint Resistance

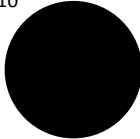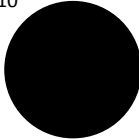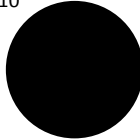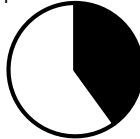HP RP9 earned a poor rating due to air flow and cooling design.

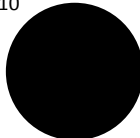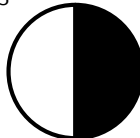| Weight / Evaluation Criteria	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 5 Superior = 10; Above minimum = 2 – 9; Consumer grade = 1;	10 Design redirects airflow and larger space between fins minimizes dust/lint impact;	10 Passed the lint/dust testing. The system did not go over temp when all air vents were closed;	10 Passed the lint/dust testing. The system did not go over temp when all air vents were closed;	4 System air inlet and CPU heat sink clog with lint quickly causing system overheating

Table 4 – Dust/Lint Resistance Results
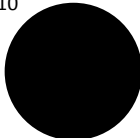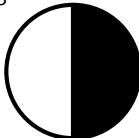
Heat Management

Temperature range tests were conducted using acceptable POS operating ranges (0 – 40C) on all the POS platforms, measuring internal temperatures using an internal heat diode sensor.

Toshiba TCx™ 800 and HP Engage One CPUs ran well within their component max temperature specifications of 100C.

While the NCR XR7 ran at an average of 48C in a normal environment, it ran at 65C when the outside temperature was 45C. The CPU is spec'd to handle temperatures up to 59C. Overheating is caused by an inadequate cooling solution.

HP RP9 failed as it ran past its max spec'd temperature of 71C in 25C ambient conditions. There are several contributing factors to the poor test results. The system uses a high wattage (65W) desktop processor. The CPU fan does not speed up until 10C over temp.

Weight / Evaluation Criteria	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 5 Under Max Spec Temp @ 25C = +5 Under Max Spec Temp @ 45C = +5	10 CPU: At ambient (25C) = 49C; Max Spec 100C; 49% of max.	5 CPU: At ambient (25C) = 48C; Max Spec 59C; 81% of max.	10 CPU: At ambient (25C) = 47C; Max Spec 100C; 47% of max.	5 CPU: At Ambient (25c) = 71c: Max Spec 71C; 100% of max.

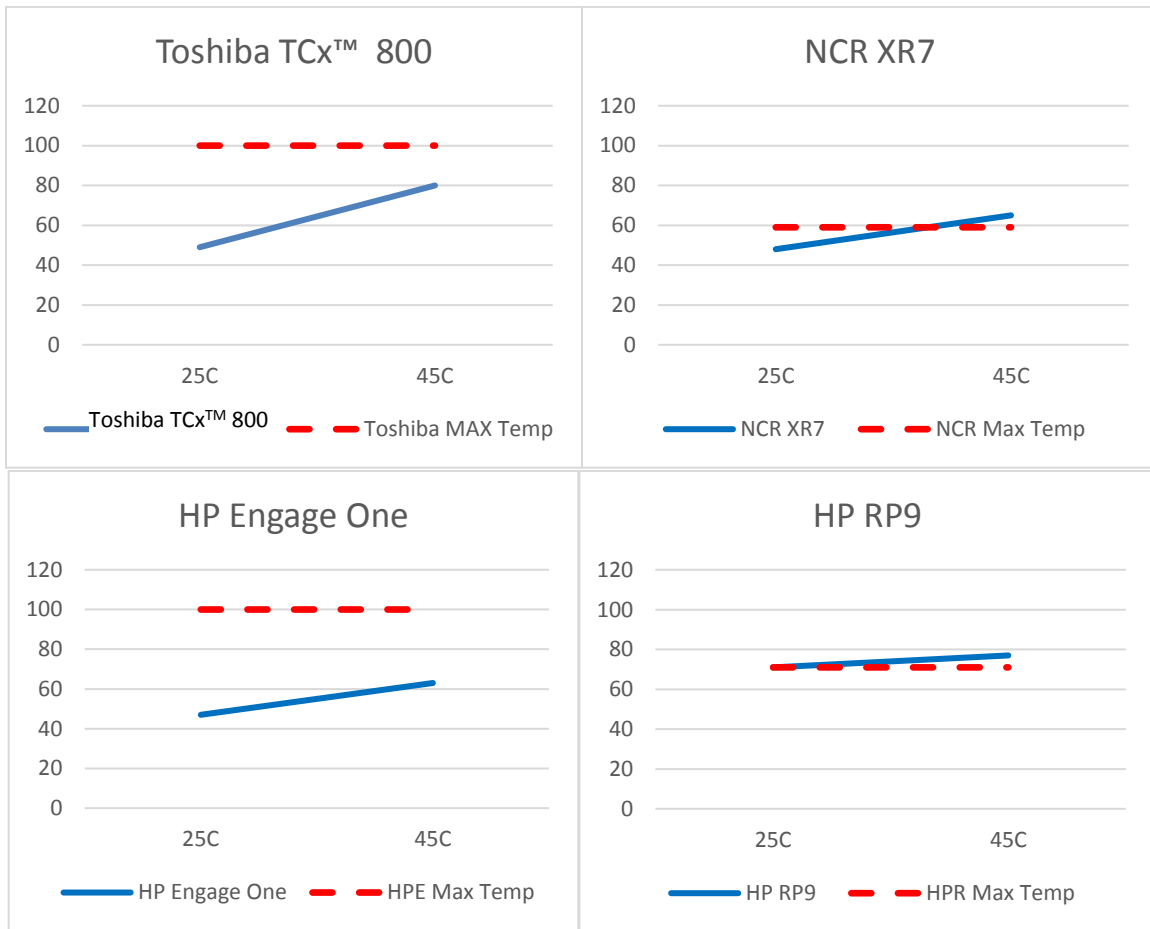| Weight / Evaluation Criteria	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
	At 45C = 80C; 80% of max.	At 45C = 65C; 110% of max.	At 45C = 63C; 63% of max.	At 45C = 77C; 108% of max. Fan does not speed up until temperature is 10C over max spec;

Table 5 – Heat Management

Chart Group 1 – Heat Management
Note: NCR XR7 Max Temp Spec crossover and HP RP9 Max Temp Spec exceed

Display Tilt

Displays are frequently adjusted to compensate for employee heights, customer viewing and glare. The more restrictive the tilt, the more restrictive the use. Display tilt was evaluated based on both cashier and customer viewing capabilities.
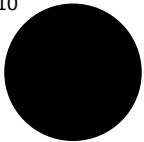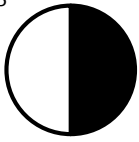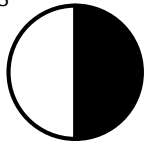
Each of the four POS platforms were placed in the same position and then the screen was tilted to account for several common use scenarios. The important characteristics are the degree of tilt, swivel, vertical positioning and whether the display adjusts when tilted towards customer.

Toshiba TCx™ 800 has the greatest range of tilt. While it does not swivel, it was designed to flip over towards the customer and the display automatically adjusts for customer viewing due to the inclusion of an accelerometer.

While the NCR XR7 has a 0-110 degree tilt range, the customer cannot see the display as it does not swivel nor can it be vertically positioned. Additional customer viewing options or a second customer display would have to be added to provide some customer viewing capability.

HP Engage One platform has limited tilt 45/55 degrees, which makes it difficult to adjust for glare and cashier/counter height. It does provide customer viewing capability as it can swivel.

HP RP9 has a full range tilt. It does not swivel and while it can be vertically repositioned, the display does not flip so customer display add-ons would have to be considered.

Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 5 See below – cashier + customer	10	5	7	5
Cashier viewing: Adjustability to manage glare; adjust for employee stature. Tilt range = +0 - 5;	Tilt - Two hinge tilt = full range.	Tilt: 0-110 degree;	Tilt: limited tilt; 45 degrees/55 degrees;	Tilt: two hinge tilt = full-range;
Customer viewing: Ability for the customer to view the screen without add-ons = +5;	Swivel - No, but ability to flip screen and flip display makes the swivel irrelevant; Vertical positioning - Yes; Can tilt towards customer;	Customer Viewing: Swivel - No; Vertical Positioning - No;	Swivel - Yes; Vertical Positioning - No;	Swivel - No; Vertical Positioning - Yes; Display does not flip when turned completely around for customer to view - no accelerometer.

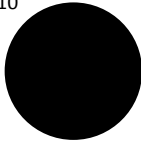| Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
	Has accelerometer – display rotates for customer to view.			

Table 6 – Display Tilt

Figures 2 – 4: Toshiba TCx™ 800
Multiple Tilt Positions

Figures 5 – 7: NCR XR7
Multiple Tilt Positions

| 45° | 55° | Swivel |

Figures 8 – 10: HP Engage One
Multiple Tilt Positions
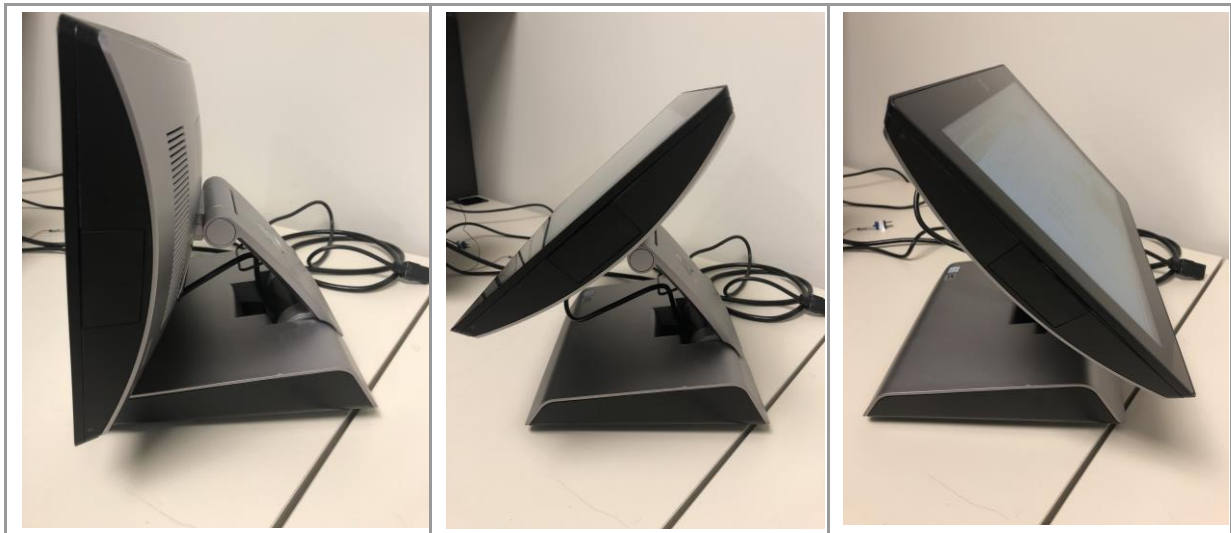
Figures 11 – 13: HP RP9
Multiple Tilt Positions
While it does tilt over, the image does not flip over.

Vibration

All POS platforms passed the vibration tests. They were subjected to constant varying levels of vibration over extended periods of time.
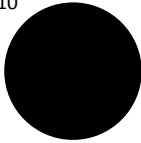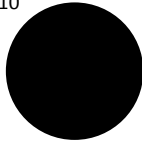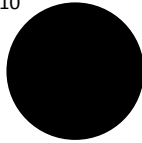
Weight / Evaluation Criteria	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 5 Passed = 10; Passed low levels of testing = 0 – 9; Failed high levels of testing = 0;	10 Passed;	10 Passed;	10 Passed;	10 Passed;

Table 7 – Vibration Test Results

Touch Screen

All POS platforms passed the touch-screen tests. They were subjected to varied point pressure on all parts of the screens, and swipe motion across different parts of the screen.
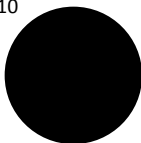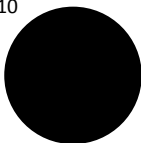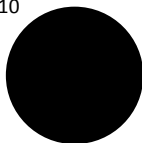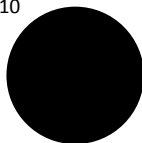
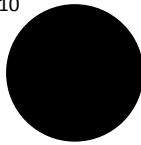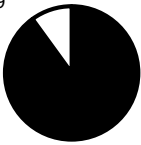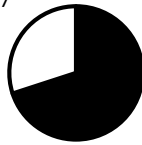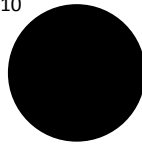| Weight / Evaluation Criteria	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 5 Passed pressure point testing = +5; Passed swipe testing = +5;	10 Passed;	10 Passed;	10 Passed;	10 Passed;

Table 8 – Touch Screen Test Results

Flexibility

Connectivity

The ability to add functions and features is limited to what types of I/O connectors are available. Standard I/O consists of powered/unpowered USB, USB 2.0, USB 3.0, USB C, VGA, RJ12, RS232, headphones, and Micro SD.

While all POS platforms have similar I/O options, there are some notable differences.

For example, NCR XR7 wireless is inserted into the system board. Wireless protocols change every 6 – 18 months. If new protocols are needed, the wireless "chip" would have to be replaced – if it was an add on, it would be much easier to service.

Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 3 Extend through USB-left or right, tilt on 2nd display = 10; Right mount options = 6; Limited I/O - no tilt/location options = 2; Base Only = -1;	10	9	7	10
	Exchangeable port cards provide numerous options; Two choices for head and two choices for base; Can use both base and head at the same time; Offers a USB mix or a RS232 mix for both head and display; USB - USB 2.0; Powered (12V) USB; 24V power In; Powered USB (24V); Cash drawer; RS232 - Powered RS 232 (12V or 5V); USB 2.0; Powered (12V) USB; 24V power; Powered USB (24V); Cash drawer; Base for either adds a USBC instead of cash drawer;	3x 12V powered USB; 1 24V powered USB; 2 USB3 PC ports; 1 serial port (RJ45 – powered (5V,12V); Cash drawer (supports 2 12V or 24V drawers; Ethernet, audio, HDMI, and Display port for 2nd video display; Optional 6 port RJ12 serial expansion; Power switch is buried back here too	Connection via Base only! Base Ports Supported: RJ12 Cash Drawer; 19V Power Brick; USB 3.1 (or Thunderbolt); RS232 (3) 0V/5V/12V Power (must be manually set on motherboard); USB 2.0 (2); USB 3.1; USBC; RJ45; Micro SD; Headphone; Yes, but have to connect to base. USB. 12V or 24V, requires a base, which means that any option will have to provide its own power,	Display head bottom - Powered 12V USB (3); Powered 24V USB (1); USB 2.0 (2); USB 3.0 (2); RS-232 (2); DisplayPort 1.2; Cash drawer; RJ-45; Audio line-in; Audio line-out; Display head top - USB (3) for peripheral devices

Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
			and brick. There is RS232, but not powered USB.	

Table 9 – Connectivity

Figure x – Toshiba TCX™ 800

NCR XR7 Ports
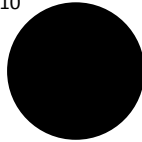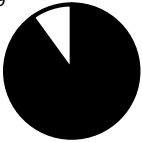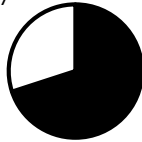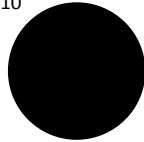

HP Engage One Base

HP RP9 Tailgate
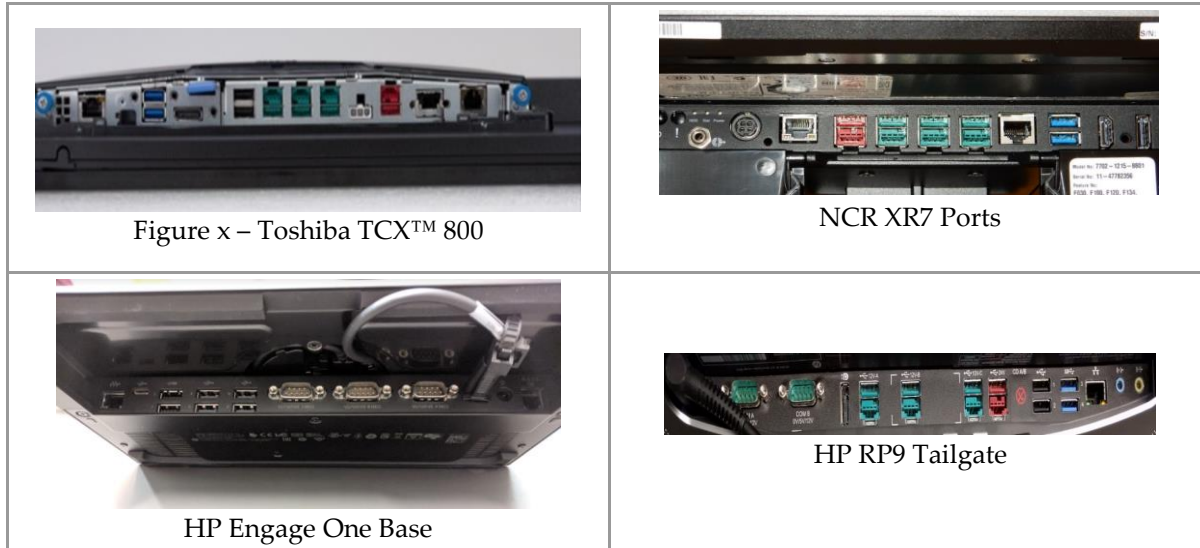
Figures 14 - 17: Connectivity

Add-Ons

Evaluation of add-ons is based on the type of I/O options available, the available manufacturer add-ons and compatibility with 3rd party add-ons.

The following table lists some representative add-ons.

While many of the POS platforms can accommodate required add-ons, there are limitations, such as only having connectivity in the base and not the head (HP Engage One).

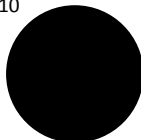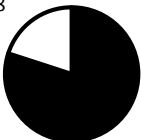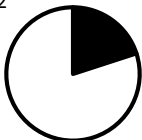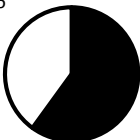| Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 3 Number and type of available add-ons = 0 – 10; Non-standard connections = -1;	10 Standard USB on both sides for installation of options;	9 USB but not standard connections;	7 Only custom integrated I/O options	10 HP RP9 Integrated Webcam; HP RP9 LCD Top Mount without Arm; HP RP9 Integrated 7in NT CFD Top w/Arm;

Customer Display	Top of display utilizes 2x20; 8" & 10" second displays;	2 x 20;	2 x 20; 10.1in Touch Display; 10.1in Non-Touch Display;	2 x 20;
MSR	Left or Right;	3-track encrypted MSR; Dual head JIS MSR;	Integrated MSR;	Single-Head MSR; Dual-Head MSR;
Barcode Scanner	Barcode Scanner;	Barcode Scanner;	2D Barcode Scanner;	Barcode Scanner;
Finger Print Reader	Biometric fingerprint reader;	Biometric fingerprint reader;	Fingerprint Reader;	Finger Print Reader;
Printer	Serial/USB Thermal Printer;	Serial/USB Thermal Printer;	Serial/USB Thermal Printer;	Serial/USB Thermal Printer;
WiFi	External;	Wireless module built into motherboard	Wireless LAN w/Bluetooth;	Wireless AMT Technology;
Of Note	i-button programmable management key for tiered access;			

Table 10 – Add-Ons

Screen Sizes

HP Engage One failed this criterion since it only offers a 14-inch 16:9 screen. This limits its use to applications that do not require a wide screen. It also has a consumer grade panel, where the other three have industrial grade panels.

Toshiba TCx™ 800 has a unique ridge on that runs along the front top of the screen so it is less subject to scratching if the system is being serviced and is placed screen down; none of the other POS platforms had anything that protects the screen.

Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 4 Each screen size choice (Max 3) = +2 for each; Raised edge = +2; Industrial grade = +2;	10 Industrial Screen Panel Screen sizes: 15/4:3; 15.6/16:9; 18.5/16:9; Raised edge on top so screen is never totally flat on surface. Independent screen display. Displays projected capacitive (10-point multi-touch).	8 Industrial Screen Panel Screen sizes: 15.0/4:3; 18.5/16:9; 21.5/16:9 Displays projected capacitive (10-point multi-touch) or resistive single touch touchscreen. No external video connector to support second display Flat screen can scratch if placed face down	2 Consumer Grade Screen Panel Screen size: 14.0/16:9; Non-standard POS screen size; Totally flat screen - cannot put face down on counter to maintain…may scratch. FHD (1920x1080) resolution on a small screen.	6 Industrial Screen Panel Screen Sizes: 15.6/16:9; 18.5/16:9 No ridge…flat on table. Glass can be scratched. Screen size options… Displays projected capacitive (10-point multi-touch).

			Displays projected capacitive (10-point multi-touch); Application on screen buttons will be too small to use in most POS applications.	

<div align="center">Table 11 – Screen Sizes</div>

Mounting Flexibility

All the POS platforms offer expected mounting options. HP Engage One does not have ports in the head so the stand is required when using as a POS.
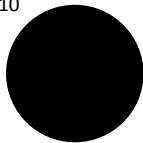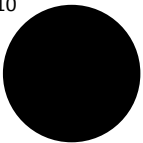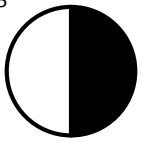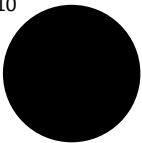
Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 3 VESA, and multiple options = 10; Stand only = 5;	10 Walls, ceiling, table top, kiosk, pedestal, pole; VESA 100mm; Head can be detached for versatile mounting. Power can be connected to base or head. Everything is in the head. Stand is optional. Mounted on custom stand or hub.	10 Walls, table top stand, kiosk pedestal, pole; VESA;	5 Fixed Position Stand, Rotate/Tilt Stand that allows for 10° angle adjustability & 180-degree rotation left or right, or no stand (display – head unit only) which includes 100mm VESA Mounting Bracket; Base required for any POS solution use as there are no ports on the head.	10 Walls, table top, kiosk, pole; VESA 100mm.

<div align="center">Table 12 – Mounting Options</div>

OS Support

All of the platforms run Windows 10 and some form of LINUX. However, one major difference is that Toshiba has rolled out TCx™ Sky, a commercial grade LINUX OS, specifically created to be used to support Retail and POS. This will be a complete solution offering with application and middleware components available for the grocery and high-volume segments.
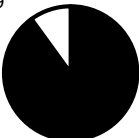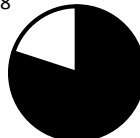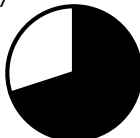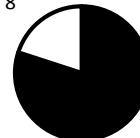
Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 1 Windows 10 = +5; Windows 7 = +1; Linux = +2; POS Specific = +2	9	8	7	8
Windows 10	Yes	Yes	Yes	Yes
Windows 7	N/A	Yes	N/A	Yes
LINUX	Yes	Yes	Yes	Yes
FreeDOS	N/A	N/A	Yes[5]	Yes
POS Specific	Yes	N/A	N/A	N/A

Table 13 – OS Support

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[5] HP claims this OS is supported, Intel does not support this OS on their CPUs.

Serviceability

With the help of an experienced technician each system was disassembled for a first-hand experience on what is required to service each unit. A summary of results is presented in the tables below.

General Serviceability

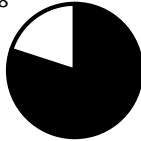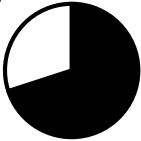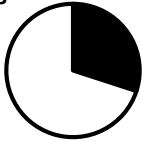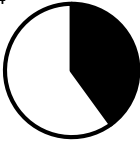The ability to quickly and easily dissemble POS platforms to service parts is important.

Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 3 Minimal screws and/or connectors removed before having access = + 0 – 5; Ease of access = +0 – 5; Special tools needed = -2; Tape used for construction= -3	8 Two thumb screws.	7 Two screws to take off cover; Nine screws to get the main bezel off to add accessories.	**3** Hole under screen that allows you to disconnect head from base; Three screws (small in bottom ridge) - slip lock; Painted inside of plastic case with copper paint to shield electrostatic discharge - pass EMI - Not environmentally friendly; Adhesive EMI gasketing (reliability concern) for grounding; Faraday cage over memory to keep signal noise out/in.	4 Relatively easy to take apart the main case; Plastic latches flimsy, likely to break during repeated disassembly; However, there are 15 screws that have to be removed to get at motherboard, and special tools required to remove plastic without damage when servicing touch screen;

Table 14 – General Serviceability

Cable Management

The access of I/O ports and preservation of cables is a critical part of the selection process. It was interesting to note that the treatment of cable routing differed significantly between the various platforms.

Toshiba's was the only system that provided formalized cable management extending the life of the platform by preventing cable wear and breakage, presents a clean, neat appearance, and provides ease of service.
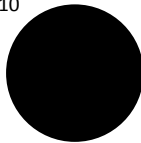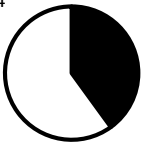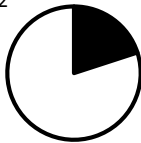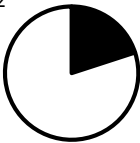
Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 3 Presence of cable bars, channels, cable routing = 10; Limited cable routing = 0 – 9;	10 Cable routing in head, arm and base; Designed to support 12 cables; Channels in base to keep cables separated; Two sets of ports, one in head and one in base; Run down or straight out from base; Three metal tie downs to hold down cables.	4 Cable cover and channel through base; Must maneuver cables to get cover to close; Must remove 1 screw to get to cable conduit on hinge; Excessive strain on cables at top when cover is closed - constant changes in tilt can cause issues; 7cm clearance from port, other POS platforms had more clearance; Not possible to route all cables of a fully cabled system through the stand; No provisions to retain non-latching cables – cables can be easily pulled out of connector.	2 No cable management, no cable covers; Only one cable is tie wrapped; Need tight turning radius to accommodate short base accommodation for cables; May need to build custom counter to hide cables; 6cm clearance from port; Thick cables may prevent the POS unit from sitting flat against the counter; Swivel action damaged cable insulation (worn through to copper); No provisions to retain non-latching cables – cables can be easily pulled out of connector.	2 No cable management; Cable cover hides cables, makes cable installation more difficult; Putting in 7 cables - will see cables and potentially limit motion of screen; Cable cover thin/flimsy plastic, will not stay on if any pressure is exerted from cables. Cables can be problematic since if they are not placed properly, they will raise the base; Fatter cables must be inserted first to make room in cable trough for other cables. No provisions to retain non-latching cables – cables can be easily pulled out of connector.

Table 15 – Cable Management

Toshiba TCx™ 800
Formal cable
management system

NCR XR7
Cable strain due to
tight turns and cover

HP Engage One
Pinched cable wear
from base to head –
caused by frequent
screen tilt.

HP RP9
Cables limit range of
motion.

Figures 18 - 21: Cable Management

Architecture

Basic Construction

Considerations are design, access and eco-friendly. Note, the use of two-sided tape is a mobile device construction methodology.
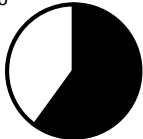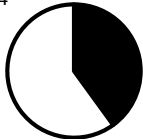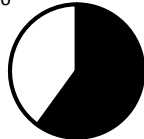
Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 3 Eco friendly & no work arounds = 6; Eco friendly, but work arounds = 3; No work arounds, but not eco-friendly = 3; Not eco-friendly and work arounds = 0; Easy to access = 0 – 4;	8 Plastic cover; metal frame.	6 Cast aluminum base. Two-sided tape used in construction.	4 Use of non-standard connector between base and display limits use of display; Use of what looks like copper spray paint on chassis to combat electrostatic charge? Due to poor design, excessive swiveling may damage cables; Fan included in base. A lot of two-sided tape used in construction (negatively impacts system reliability/longevity); IT ECO declaration US ENERGY STAR EPEAT Gold (registration varies by country/region) Low Halogen	6 Power brick is inserted in base - thinner design of brick made just for HP. Provides additional weight for base. Hides brick. Two-sided tape used in some areas.

Table 16 – Basic Construction

| Toshiba TCx™ 800 Snapshot | NCR XR7 Two-sided tape used to secure Touch Controller Logic to back of LCD panel. | HP Engage One Conductive Paint on Chassis | HP RP9 Two-sided tape secures controller card to back of LCD |
| | | HP Engage One Two-sided tape used throughout | |
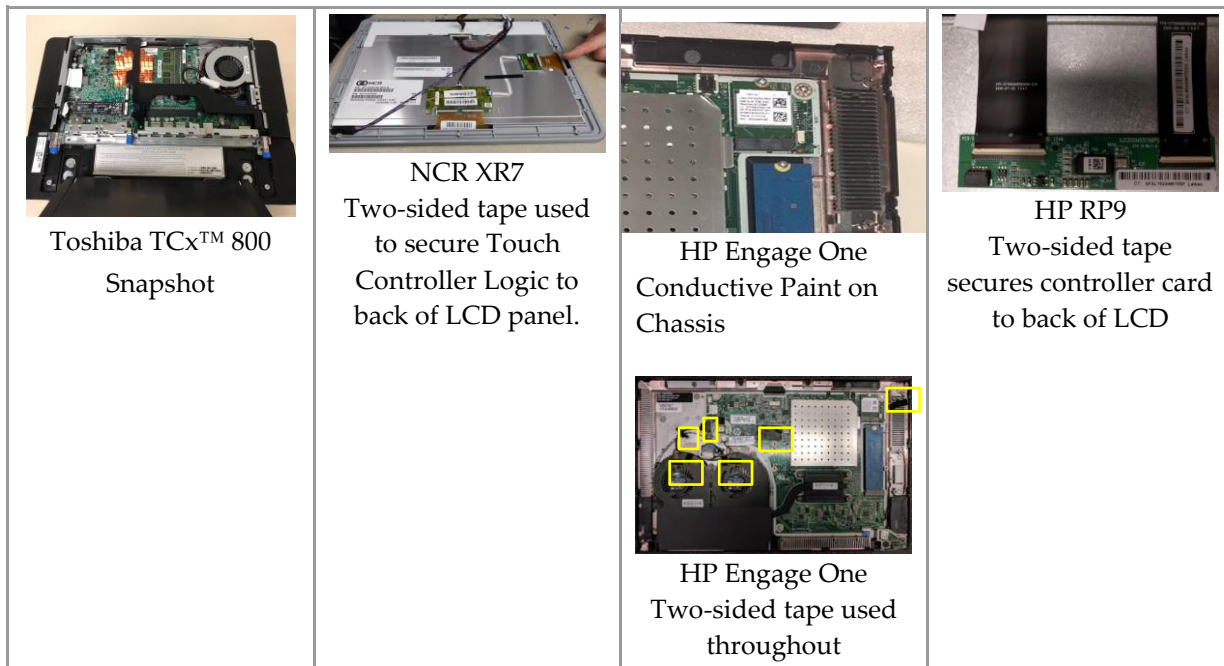
Figures 22 - 26: Basic Construction

Technology Components

Evaluated based on CPU, Storage and Memory.
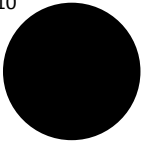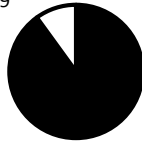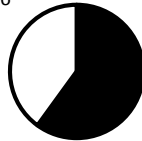
Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 3 Appropriate level of resources = 10; Under/over powered (CPU) = 0 – 8;	10 CPU - 7th Gen U class (mobile); Memory - Two memory cards; Storage - Two SSDs	10 CPU - 4th Gen Desktop S Class; Memory - Two memory slots; Storage - 500GB HDD 2.5" or 80 or 120GB SSD only one spot for either. Socketed Bios chips - typically used for development and not production. Should be soldered.	9 CPU - 7th Gen U class (mobile) Intel® Core™ Celeron® 3965U (2.2GHz, 2M Cache, 2 Cores); Memory - Two memory slots; Storage - One SSD.	6 CPU - 6th Gen Celeron (Desktop CPU) Intel S class; Memory - Two memory slots; Storage - 2 SSD; optional 2.5" hard drive - consumer grade;

Table 17 – Technology Components

Power

HP RP9 is powered by a desktop CPU and therefore requires a significantly larger power source (65W vs 15W).
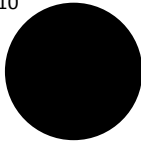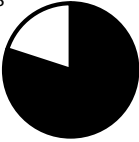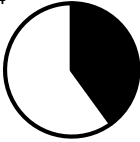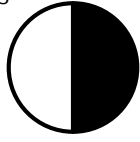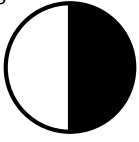
Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Weight: 3	8 Power Supply: 150W	4 Power Supply: 150W	5 Power Supply: 120W	5 Power Supply: 230W
Power consumption: less the better = +0 - 5;	CPU Power: 15W System: 15W Total: 30W	CPU Power: 35W System: 20W Total: 55W	CPU Power: 15W System: 15W Total: 30W	CPU Power: 65W System: 25W Total: 90W
Available IO power = +0 - 5;	Available Power: 120W	Available Power: 95W	Available Power: 90W	Available Power 140W
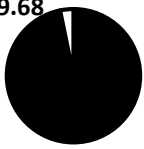
Table 18 – Power
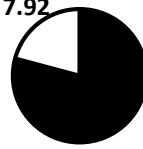
Figure 27 – HP RP9 Base
Note, Large Power Brick in Base
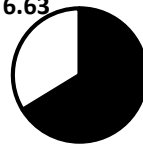
Final Weightings, Rankings

The evaluation matrixes below summarize the ratings for each of the four POS platforms broken down into the four considerations. The number in the middle of each matrix is the accumulated weighted average rating overall.

Toshiba TCx™ 800		
Usability 10.00		Flexibility 9.93
	9.68	
Architecture 8.67		Serviceability 9.00

NCR XR7		
Usability 8.33		Flexibility 8.86
	7.92	
Architecture 6.67		Serviceability 5.50

HP Engage One		
Usability 8.17		Flexibility 5.14
	6.54	
Architecture 6.00		Serviceability 2.50

HP RP9		
Usability 6.67		Flexibility 8.71
	6.63	
Architecture 5.67		Serviceability 3.00

Usability - The Toshiba TCx™ 800 is the most likely platform to stand up to the harsh retail conditions. NCR XR7 and HP Engage One are tied for second place with HP RP9 in last place.

Flexibility – Again, the Toshiba entry ranked highest. NCR ranked a close second with HP RP9 coming in third and HP Engage One ranking last.

Serviceability – Toshiba ranked highest with the other three a distant second (NCR), third (HP RP9) and fourth (HP Engage One).

Architecture – Toshiba also ranked first, NCR XR7 second, HP Engage One third and HP RP9 fourth.

The range of final weighted average ratings is 6.54 – 9.68.

Summary

When choosing a POS platform for retail, usability, flexibility, serviceability and architecture are important considerations. Edison evaluated four POS platforms, namely Toshiba TCX™ 800, NCR XR7, HP Engage One and HP RP9 using 16 weighted criteria.

Each of the criterion were evaluated (1 – 10, where 10 was the best) using quantitative measures and then weighted (1 – 5, where 5 was most important) based on experience and customer feedback.

Toshiba TCx™ 800 had the highest average weighted rating for each of the four considerations.

After detailed evaluation of all four POS platforms, it is evident that the reason Toshiba TCx™ 800 is the best choice has everything to do with Toshiba's clear understanding of the retail space and how that understanding translates into design and implementation decisions that make this platform significantly "hardened" to withstand the harsh retail environment.

NCR XR7 came in second place, HP Engage One in third and HP RP9 in last.

Out of the four considerations, usability, serviceability and architecture had the most impact on negative evaluations.

Usability limitations based on inadequate heat management, excessive build-up of dust/lint, and inability to withstand moisture affected the evaluation. Limited screen positioning makes it difficult for the sales associate and customer alike.

Serviceability factors like inadequate accommodation for cables, inaccessible components, excessive screws and fasteners, and the need for special tools make it difficult and time consuming to repair/service the platform and therefore affect the rating.

Architectural design and implementation affect platform life, use and serviceability. Design workarounds like two-sided tape and spray-painted interiors (eco-unfriendly) to minimize electrostatic impact lowered ratings.

After detailed evaluation of all four POS platforms, it is evident that the reason Toshiba TCx™ 800 is the best choice has everything to do with Toshiba's clear understanding of the retail space and how that understanding translates into design and implementation decisions that make this platform significantly "hardened" to withstand the harsh retail environment.

Appendix

Final Weighted Ratings Detail

Note that the final weighted average ratings and priority order are as follows:

1. Toshiba TCx™ 800   9.68
2. NCR XR7   7.92
3. HP Engage One   6.54
4. HP RP9   6.63

Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9	Weighting
Usability					
Spill Resistance	10	10	2	6	5
Dust/Lint	10	10	10	4	5
Heat Management	10	5	10	5	5
Display Tilt	10	5	7	5	5
Vibration	10	10	10	10	5
Touch Screen	10	10	10	10	5
Usability Weighted Average	**10.00**	**8.33**	**8.17**	**6.67**	**30**
Flexibility					
Connectivity	10	9	7	10	3
Add-Ons	10	9	7	10	3
Screen Sizes	10	8	2	6	4
Mounting Flexibility	10	10	5	10	3
OS Support	9	8	7	8	1
Flexibility Weighted Avg	**9.93**	**8.86**	**5.14**	**8.71**	**14**
Serviceability					
General Serviceability	8	7	3	4	3
Cable Management	10	4	2	2	3
Serviceability Weighted Avg	**9.00**	**5.50**	**2.50**	**3.00**	**6**
Architecture					
Basic Construction	8	6	4	6	3
Technology Components	10	10	9	6	3
Power Requirements	8	4	5	5	3
Architecture Weighted Avg	**8.67**	**6.67**	**6.00**	**5.67**	**9**
Weighted Average Rating	**9.68**	**7.92**	**6.54**	**6.63**	**59**

Table 19 – Final Weighted Average Ratings

OS Support

Specific details as to what OS is being offered by each POS

Evaluation Criterion	Toshiba TCx™ 800	NCR XR7	HP Engage One	HP RP9
Windows 10	Microsoft Windows 10 IoT Enterprise CBB;	Windows 10 IoT Enterprise 2016 LTSB Value;	Windows 10 Pro 64-bit 1; Windows 10 IoT Enterprise 2016 LTSB 64-bit 1; FreeDOS;	Windows 10;
Windows 7/8	N/A* MS/Intel only support WIN10 on Gen 7 and forward	Windows® 7 Professional (32-bit or 64-bit); Windows Embedded 8.1 Industry Pro (64-bit);	N/A* MS/Intel only support WIN10 on Gen 7 and forward	Windows 7;
LINUX	Microsoft Windows 10 IoT Enterprise LTSB 2016; Enabled for Linux Kernel 4.4; Windows 10 IoT CBB, and Windows 10 IoT Enterprise 2016 LTSB 64 bit, and is enabled for Linux	SUSE® Linux® Enterprise (SLES 12 SP2 64- bit OS);	SUSE Linux; Enterprise Desktop 12 (certification only) +;	SUSE Linux Enterprise Desktop YES Certified
FreeDOS	N/A	N/A	FreeDOS[6]	FreeDOS 2.0;
POS Specific	TCx™ Sky V1.1.01,			

Table 20 – POS OS Choice Details

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[6] HP claims this OS is supported, Intel does not support this OS on their CPUs.