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DIMENSI KOTA HIJAU

Urban Farming: Inovasi dan Keberlanjutan dalam Pengembangan Pertanian Kota



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Buku ini menggali potensi inovatif di tengah-tengah hiruk-pikuk kota melalui pendekatan urban farming. Penulis membahas secara mendalam pemanfaatan ruang yang sempit untuk praktik bercocok tanam di lingkungan perkotaan. Konsep budidaya tanpa tanah menjadi sorotan utama, dijelaskan dengan rinci ragam media tanam dan pemilihan yang tepat. Dalam bab-bab selanjutnya, buku ini membahas kebutuhan nutrisi tanaman, mengulas secara komprehensif manajemen penyakit tanaman dalam konteks urban farming. Pembaca diajak untuk memahami bagaimana teknologi dan pendekatan inovatif dapat diterapkan untuk meningkatkan hasil pertanian di kota. Sektor terakhir buku menyentuh dimensi keberlanjutan dalam konteks ekologi perkotaan. Sustainable Eco-City menjadi fokus utama, dijelaskan melalui dimensi keberlanjutan, peluang, dan tantangan yang muncul. Dengan menggunakan bahasa akademik yang menarik, penulis memberikan wawasan mendalam mengenai bagaimana urban farming dapat menjadi solusi untuk mewujudkan kota hijau yang berkelanjutan. Buku ini bukan hanya merupakan panduan praktis untuk praktisi urban farming, tetapi juga merupakan kontribusi signifikan dalam memahami potensi dan dampaknya terhadap ekosistem perkotaan secara keseluruhan.



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KATA PENGANTAR

Keinginan untuk menjadi seorang petani, meraih penghidupan dengan tangan di dalam tanah, dan menyediakan makanan berkualitas tinggi untuk dikonsumsi adalah cita-cita yang mulia. Namun, dalam perjalanannya, kita tidak dapat mengabaikan pertanyaan kunci: Bagaimana kita akan mencari nafkah dari pertanian? Kekhawatiran akan keberlanjutan dan profitabilitas pertanian adalah hal yang nyata, dan isu mengenai pertanian yang tidak menghasilkan profit bukanlah sekadar pernyataan berlebihan.

Sementara itu, ketahanan pangan menjadi isu yang semakin mendesak di berbagai negara, terutama di negara-negara dengan populasi yang terus tumbuh. Indonesia, sebagai salah satu negara dengan populasi yang tinggi, menghadapi tantangan besar dalam menjaga ketahanan pangan bagi penduduknya yang semakin bertambah. Pertumbuhan penduduk yang cepat, urbanisasi, dan perubahan iklim merupakan faktor-faktor yang memperumit situasi ini. Kita perlu mencari solusi yang inovatif dan berkelanjutan untuk mengatasi persoalan ini.

Urban farming, atau pertanian perkotaan, muncul sebagai salah satu solusi yang menjanjikan. Dengan memanfaatkan lahan terbatas di kota-kota besar, *urban farming* memungkinkan produksi makanan secara lokal dan menghasilkan makanan berkualitas tinggi. Dalam konteks Indonesia, *urban farming* dapat menjadi salah satu alat yang efektif dalam menjawab tantangan ketahanan pangan.

Menariknya, *urban farming* telah menjadi aktivitas yang banyak digemari oleh ibu-ibu rumah tangga dan pensiunan pegawai di beberapa kota besar di Indonesia. Ini tidak hanya menjadi tren, tetapi juga telah menjadi bagian dari perayaan kemerdekaan pada tanggal 17 Agustus, di mana berbagai kompetisi *urban farming* digelar untuk memperingati hari kemerdekaan. *Urban farming* telah mengubah pola pikir masyarakat mengenai bagaimana kita dapat berpartisipasi dalam memproduksi makanan kita sendiri, bahkan di tengah-tengah kota yang padat.

Mengenai hal ini, pakar ahli ekologi dan *urban farming* telah memberikan pandangan yang berharga. Seperti yang dikatakan oleh Michael Pollan, "Pertanian adalah salah satu kegiatan manusia paling esensial. Ini adalah cara kita memasukkan diri kita ke dalam ekosistem alami." Geoff Lawton menambahkan, "*Urban farming* memberikan peluang untuk mengubah kota menjadi tempat yang lebih berkelanjutan dan seimbang dengan alam."

Buku ini akan membahas secara mendalam mengenai urban farming sebagai salah satu solusi dalam mengatasi tantangan ketahanan pangan, dengan menguraikan konsep, praktik, sistem bisnis dan contoh sukses yang dapat diambil sebagai inspirasi. Kami berharap buku ini dapat menjadi panduan yang berguna bagi mereka yang ingin menggeluti *urban farming* sebagai langkah konkret dalam menjawab tantangan ketahanan pangan yang semakin mendesak.

Surabaya, Januari 2024

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BAB

1

MENGENAL URBAN FARMING, POTENSI INOVATIF DI JANTUNG KOTA

Pertumbuhan perkotaan di seluruh dunia telah menjadi fenomena yang tak terhindarkan dalam era modern ini. Perkembangan pembangunan dan infrastruktur di perkotaan telah menjadi ciri khas zaman ini, dengan gedung-gedung pencakar langit yang menjulang tinggi dan jaringan jalan yang padat sebagai pemandangan sehari-hari. Pertumbuhan ini erat kaitannya dengan peningkatan konsumsi dan kebutuhan akan sumber daya, termasuk makanan. Namun, sumber daya lahan yang tersedia di perkotaan sering kali terbatas dan berkualitas rendah. Lahan pertanian yang semakin sempit dan polusi udara yang meningkat menjadi tantangan serius bagi kualitas makanan yang dikonsumsi oleh penduduk perkotaan. Kesadaran akan pentingnya makanan sehat pun semakin meningkat, dan itulah di mana *urban farming* atau pertanian perkotaan muncul sebagai jawaban inovatif terhadap permasalahan lingkungan yang muncul di perkotaan.

Penting untuk mencermati perkembangan pembangunan dan infrastruktur di perkotaan. Kebutuhan akan hunian, perkantoran, dan fasilitas umum telah mengakibatkan hilangnya lahan pertanian yang subur di perkotaan. Perkotaan adalah pusat pertumbuhan ekonomi dan perkembangan teknologi. Gedung-gedung tinggi dan fasilitas perkotaan semakin mendominasi lanskap kota-kota besar. Seiring dengan lonjakan pembangunan dan urbanisasi, lahan perkotaan semakin terbatas dan terfragmentasi. Lahan hijau produktif untuk pertanian semakin terkikis.



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BAB

2

PEMANFAATAN RUANG SEMPIT UNTUK BERTANI DI KOTA

Pertanian memiliki keterkaitan yang erat dengan ruang dan waktu, dimana tanaman membutuhkan tempat dan waktu tertentu untuk tumbuh. Keharusan untuk menemukan ruang di kota dan daerah perkotaan menjadi langkah awal yang krusial untuk mengembangkan pertanian di lingkungan urban. Beberapa tempat yang telah dikenal seperti lahan pertanian konvensional, taman tanaman, atau kebun keluarga merupakan contoh tempat yang umum digunakan. Namun, terdapat juga tempat lain yang memiliki potensi untuk dijadikan area pertanian di kota, baik secara permanen maupun sementara. Bertanam di dalam kota kini semakin populer dengan berbagai jenis kegiatan tradisional seperti kebun pangan keluarga, kebun sekolah, dan petak-petak kebun yang tersebar di berbagai ruas kota. Namun, dalam beberapa tahun terakhir, telah muncul sebuah momentum baru di dunia pertanian perkotaan di mana fokusnya tidak lagi terbatas pada lahan terbuka atau petak-petak kebun, melainkan juga melibatkan bangunan-bangunan kota itu sendiri.

Inisiatif-inisiatif baru dan produsen pangan perkotaan kini lebih berorientasi pada kegiatan pertanian yang terintegrasi dengan lingkungan binaan kota. Muncul pula istilah "Pertanian Tanpa Lahan" (*Zero-acreage Farming*) yang menggambarkan segala bentuk pertanian perkotaan yang tidak menggunakan lahan pertanian atau ruang terbuka. *Zero-acreage Farming* atau dikenal juga dengan istilah *ZFarming* melibatkan berbagai konsep, termasuk kebun atap (*rooftop gardens*), rumah kaca atap atau *rooftop greenhouses* (RTG),

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BAB 3

BERTANI TANPA TANAH

A. Konsep Budidaya Tanpa Tanah

Budidaya tanpa tanah (*soilless culture*) dapat didefinisikan sebagai "metode menumbuhkan tanaman tanpa menggunakan tanah sebagai media perakaran, di mana unsur hara anorganik yang diserap oleh akar disediakan melalui air irigasi". Pupuk yang mengandung unsur hara yang akan disuplai ke tanaman dilarutkan dalam konsentrasi yang sesuai dalam air irigasi, dan larutan yang dihasilkan disebut "larutan nutrisi."



Hidroponik

Hidroponik adalah metode menanam tanaman di dalam larutan berbasis air yang kaya nutrisi. Hidroponik tidak menggunakan tanah, melainkan sistem perakaran yang didukung menggunakan media inert seperti sabut kelapa, serbuk gergaji, gambut, vermikulit, tanah liat, batu apung, dll.



Akuaponik

Akuaponik yaitu menggabungkan akuakultur (memelihara hewan air seperti siput, ikan, caryfish atau udang) dengan hidroponik secara bersamaan. dapat diartikan dengan budidaya ikan dan tanaman berada di satu instalasi yang sama.



Aeroponik

Aeroponik adalah proses menumbuhkan tanaman di udara atau kabut tanpa menggunakan tanah atau media agregat. Tidak seperti hidroponik atau akuaponik; aeroponik dilakukan tanpa media tanam.



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BAB 4

RAGAM DAN PEMILIHAN MEDIA TANAM

Tanah secara umum menjadi substrat pertumbuhan alami bagi tanaman, namun di perkotaan, seringkali kualitas tanah terdegradasi dan tidak mendukung pertumbuhan tanaman yang sehat. Oleh karena itu, menggantikan tanah dengan substrat lain di lingkungan perkotaan dapat berkontribusi terhadap hasil pertanian yang lebih baik. Berdasarkan sifat kimianya, media tanam dapat dibagi menjadi dua jenis, yaitu organik dan anorganik. Namun, sifat fisik dan hidraulik, terutama ukuran partikel, menjadi penting karena memengaruhi karakteristik fisik seperti porositas, kapasitas menahan air, dan ruang udara.

Meski prinsip dasar nutrisi mineral tetap sama, dinamika distribusi air, udara, dan nutrisi serta pertumbuhan akar berbeda antara sistem budidaya tanpa tanah yang terbatas ruang dan tanah lapang yang tidak terbatas. Manajemen yang lebih intensif diperlukan dalam sistem tanpa tanah untuk menciptakan lingkungan rizosfer tanaman yang optimal. Faktor volume yang terbatas menyebabkan perluasan kompetisi antar akar tanaman, sehingga manajemen pemupukan harus mempertimbangkan kapasitas buffer dan pasokan nutrisi yang terbatas. Substrat dalam hortikultura dipilih berdasarkan karakteristik fisik dan kimianya, terutama kemampuannya menyediakan oksigen dan air untuk akar tanaman. Substrat harus porous dan dapat menahan air, serta memiliki densitas massa yang rendah untuk memfasilitasi aerasi dan penanganan. Beberapa substrat tanpa tanah, seperti rockwool dan perlite, memiliki keunggulan dalam pengendalian penyakit

tersebut antara lain pelepasan antibiotik dan metabolit sekunder, produksi biosurfaktan, atau siderofor, persaingan nutrisi, dan antagonis yang diinduksi oleh mikroba pada tanaman. Meskipun demikian, pengaruh penekanan penyakit tersebut tidak selalu ditemukan dan tidak selalu dapat mencegah kerusakan serius pada tanaman. Sehingga, perlu dipertimbangkan introduksi agens hayati dan/atau manajemen habitat mikroba antagonis untuk mendukung mikrobiota sekitar yang mampu mengendalikan patogen pada perakaran tanaman. Pendekatan ini merupakan upaya dalam memanfaatkan mikroorganisme hidup, seperti bakteri atau jamur yang bersifat menguntungkan, untuk melawan patogen tanaman. Penggunaan agens hayati dapat membantu meningkatkan efek penekanan penyakit dalam sistem budidaya tanaman tanpa tanah, sehingga dapat menciptakan lingkungan yang lebih kondusif bagi pertumbuhan tanaman tanpa mengandalkan bahan kimia sintesis.

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BAB

5

KEBUTUHAN NUTRISI TANAMAN

Faktor utama yang membedakan manajemen pemberian nutrisi tanaman yang tumbuh di tanah dan tanaman yang tumbuh tanpa tanah (*soiless culture*) adalah volume substrat yang terbatas. Artinya, kapasitas penyangga untuk komposisi larutan dan pasokan nutrisi pada pertanian tanpa tanah memiliki batasan yang lebih tinggi dibanding pertanian dengan tanah (faktor kapasitas). Namun demikian, metode budidaya tanpa tanah menawarkan beberapa keunggulan unik, seperti kemampuan untuk mengontrol ketersediaan air, pH, dan konsentrasi nutrisi di zona akar tanaman. Di sisi lain, terdapat risiko yang lebih tinggi karena sistem akar yang lebih kecil dan kapasitas penyangga air dan nutrisi yang rendah, serta karena peningkatan risiko paparan suhu lingkungan yang ekstrem.

Dalam metode pertanian tanpa tanah, tanaman tidak tumbuh langsung di tanah, melainkan menggunakan media tumbuh seperti serat kelapa, batu apung, atau campuran substrat lainnya. Keunggulan utamanya terletak pada kemampuan untuk mengontrol berbagai faktor lingkungan tanah, yang tidak dapat dilakukan dengan mudah pada pertanian konvensional. Penting untuk memahami bahwa metode pertanian tanpa tanah dapat memberikan hasil yang baik, terutama jika manajemen nutrisi dan lingkungan diatur dengan cermat. Meskipun demikian, pemilihan media tumbuh dan pengelolaan nutrisi harus disesuaikan dengan karakteristik spesifik tanaman dan kondisi pertumbuhan.

mengembangkan praktik pertanian yang berkelanjutan dan efisien.

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BAB

6

MANAJEMEN PENYAKIT TANAMAN

Dari perspektif perlindungan tanaman, keunggulan utama budidaya tanaman tanpa tanah adalah menghindari penggunaan tanah sebagai sumber infeksi yang permanen. Namun, seperti yang diuraikan pada Bab Pemilihan Media Tanam, patogen tanaman dapat diintroduksi dan tersebar melalui kurangnya kebersihan selama produksi atau pengolahan media tanam, benih dan bahan tanaman yang terinfeksi, serta sanitasi yang kurang memadai dalam sistem budidaya tanpa tanah. Sistem budidaya tanaman tanpa tanah seringkali melibatkan penggunaan kembali air irigasi atau larutan nutrisi, baik secara penuh maupun sebagian. Meskipun sistem tertutup atau semi-tertutup seperti ini dapat meningkatkan efisiensi penggunaan sumber daya, namun juga membawa risiko penyebaran patogen yang menginfeksi akar tanaman melalui penggunaan kembali air irigasi atau larutan nutrisi.

Semua jenis patogen yang cenderung menginfeksi akar, terutama oomycetes seperti *Pythium* spp. dan *Phytophthora* spp., relatif dapat dengan mudah tersebar melalui seluruh sistem irigasi. Untuk mengatasi risiko penyakit dalam sistem budidaya tanpa tanah, langkah utama adalah mencegah penyebaran patogen. Meskipun demikian, upaya untuk memastikan lingkungan akar yang sehat, penggunaan varietas tanaman yang tahan penyakit, agen pengendalian biologi atau pestisida, dan penerapan praktik sanitasi yang baik juga dapat memberikan kontribusi positif terhadap kesehatan tanaman. Oleh karena itu, deteksi dan identifikasi patogen tanaman yang relevan menjadi kunci dalam

pendekatan proaktif dalam menjaga keberlanjutan ekosistem pertanian. Oleh karena itu, implementasi BCA bersama dengan langkah-langkah lainnya dapat menjadi bagian integral dari upaya pencegahan dan pengendalian penyakit tanaman secara holistik dalam pertanian.

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BAB

7

SUSTAINABLE ECO-CITY : DIMENSI KEBERLANJUTAN, PELUANG DAN TANTANGAN

A. Peran *Urban Farming* dalam Kota Berkelanjutan (*Sustainable Cities*)

Konsep kota berkelanjutan muncul dari pandangan Komisi Dunia PBB untuk Lingkungan dan Pembangunan (UNWCED atau *United Nations World Commission on Environment and Development*), yang mengartikan pembangunan berkelanjutan sebagai upaya untuk memenuhi kebutuhan generasi saat ini tanpa mengorbankan kemampuan generasi mendatang memenuhi kebutuhan mereka sendiri. Ide ini telah menjadi landasan dalam berbagai aspek kehidupan manusia, menjadi suatu norma yang mengatur perilaku manusia terhadap alam dan tanggung jawab antargenerasi. Keberlanjutan kota dapat dilihat melalui pengembangan dimensi tripartit, yaitu lingkungan, ekonomi, dan sosial. Namun demikian, keberlanjutan kota tidak terbatas dari dimensi tripartit saja, yang artinya tidak hanya berkelanjutan dari segi ekonomi, sosial, dan lingkungan, tetapi juga mencerminkan harmoni antara manusia dan alam serta tanggung jawab terhadap masa depan generasi yang akan datang.

Konsep kota berkelanjutan menjadi perhatian dunia. Hal ini terlihat jelas dalam Tujuan Pembangunan Berkelanjutan (*Sustainable Development Goal* atau *SDG's*) 11, yaitu "menjadikan kota dan pemukiman manusia inklusif, aman, tangguh, dan berkelanjutan" (*to make cities and human settlements inclusive, safe, resilient and sustainable*). Konsep ini menjadi perhatian dunia

Dimensi Pertanian Perkotaan	Manfaat Potensial	Tantangan	Isu-isu utama dalam penerapan Pertanian Perkotaan
		<p>persaingan untuk penggunaan lain (misalnya, energi surya); Teknologi terkait terlalu mahal; Praktisi sering kali bukan petani yang ahli; dapat menciptakan persaingan bagi petani pedesaan.</p>	
Politik dan Hukum	<p>Bersinergi dengan strategi politik di tingkat kota; Pertanian Perkotaan menjadi tren gaya hidup masyarakat umum dan perkotaan.</p>	<p>Kurangnya perspektif jangka panjang dan dukungan politik untuk proyek skala industri; Kerangka hukum yang belum konkrit (mis. pengaturan limbah).</p>	<p>Integrasi urban farming ke dalam strategi politik dan pembuatan kebijakan; Klarifikasi aspek hukum, khususnya hukum perencanaan pengelolaan.</p>

C. Referensi

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TENTANG PENULIS

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adalah seorang Dosen Program Studi Agroteknologi Fakultas Pertanian, Universitas Pembangunan Nasional "Veteran" Jawa Timur. Meraih gelar Sarjana Pertanian (S1) dari Universitas Brawijaya pada tahun 2015 dan menyelesaikan pendidikan Magister dan Master (*Double Degree - S2*) dari Universitas Brawijaya & NPUST, Taiwan, pada tahun 2018. Selama masa pendidikan S1, aktif mengikuti kegiatan internasional yaitu pertukaran pelajar di Rajamangala University of Technology Lanna, Nan Thailand dan *Internship program* di Charoen Phokpand Seeds Co., Ltd. Kamphaeng Phet, Thailand. Sejak awal karier telah menunjukkan dedikasi terhadap riset dan pengembangan pertanian sebagai Staf Peneliti benih (*Seed Researcher*) di perusahaan multinasional pada tahun 2019 hingga saat ini aktif sebagai pendidik pada rumpun ilmu Manajemen Hama dan Penyakit Tanaman. Pengalaman manajerial secara struktural dengan penugasan sebagai Kepala Laboratorium Kesehatan Tanaman Program Studi Agroteknologi FP UPNVJT pada periode (2023-2026). Menjadi Ketua dalam kegiatan Seminar Nasional Program Magister Fakultas Pertanian UPNVJT pada tahun 2022 dan Ketua dalam kegiatan Seminar Internasional Fakultas Pertanian UPNVJT pada tahun 2023. Dalam menunjang kepakaran, yang bersangkutan memiliki sertifikasi kompetensi BNSP bidang **Pertanian** dengan kualifikasi **Asisten Pengendali Organisme Pengganggu Tumbuhan** dan aktif dalam organisasi profesi PAGI (Perhimpunan Agroekoteknologi/agroteknologi Indonesia). Karya sebagai seorang peneliti telah terpublikasikan pada beberapa Jurnal ilmiah nasional maupun internasional bereputasi. Menjalani kerjasama pada bidang pendidikan maupun penelitian dengan Fakultas Pertanian Universitas Putra Malaysia dan NPUST, Taiwan.

Publikasi artikel-artikel ilmiah mencerminkan kontribusi nyata terhadap perkembangan ilmu pertanian, dan buku yang diterbitkan diharapkan menjadi sumber inspirasi bagi mereka yang tertarik pada bidang pertanian, khususnya dengan pertanian perkotaan yang inovatif dan berkelanjutan.

Dr. Yudi Nur Supriyadi, Sos.I., M.M



adalah Dosen yang memiliki kepakaran dibidang e-Human Resource Management (e-HRM). Yang bersangkutan telah berpengalaman sebagai dosen selama 10 tahun menjadi Dosen sekarang mengabdikan di Fakultas Ekonomi dan Bisnis Universitas Pembangunan Nasional Veteran Jakarta mendalami bidang pada Rumpun Ilmu Manajemen, Ia memilih menghabiskan waktu untuk menulis buku. Karya-karya yang sudah dimuat di surat kabar, dan website. Karya yang berbentuk buku seperti buku-buku manajemen dll, Publikasi pada jurnal ilmiah nasional bereputasi dan jurnal internasional terindex scopus Scopus Q1, Q2, Q3, Q4. beberapa karyanya pernah dipublikasikan pada Jurnal SINTA 2, 3, 4, dan 5 sesuai kepakaran aktif pada **Forum Akuntansi Dan Manajemen Dan Ekonomi, perkumpulan Dosen Perguruan Tinggi Nusantara, Perkumpulan Ahli dan Dosen Republik Indonesia, Asosiasi Ilmu Administrasi Bisnis Indonesia (AIABI), Asosiasi Program Magister Manajemen Indonesia.** Pengalaman manajerial secara struktural dengan penugasan sebagai Ka Prodi Magsiter Manajemen, Ketua Jurusan Manajemen FEB UPNVJ untuk periode (2021-sekarang); sebagai ketua Pelaksana pembukaan Prodi Doktor Manajemen S3, Wakil Ketua Zona Integritas. Dalam menunjang kepakaran, yang bersangkutan memiliki sertifikasi bidang **Certified Risk Associate (CRA), Certified Risk Professional (CRP), Certified Basic of Neo Neuro Linguistic Programming (C.NNLP), Certified Master of Neo Neuro Linguistic Programming (CM.NNLP), Certified Marketing Associate (CMA), Certified Metode Pembelajaran di Perguruan Tinggi. Certified International Quantitative**

Researcher (CIQnR). Prestasi yang diraih tingkat nasional sebagai juara pertama sarjana berprestasi tingkat nasional, saat ini juga aktif melaksanakan kegiatan pengabdian kepada masyarakat. Lolos sebagai ketua tim penelitian dana hibah Eskternal DRPM kemendikbud pada tahun 2022 dan tahun 2023. Saat ini dipercaya sebagai Praktisi dengan jabatan Direktur Utama PT. Garuda Prestasi Nusantara.

SURAT PENCATATAN CIPTAAN

Dalam rangka perlindungan ciptaan di bidang ilmu pengetahuan, seni dan sastra berdasarkan Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, dengan ini menerangkan:

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